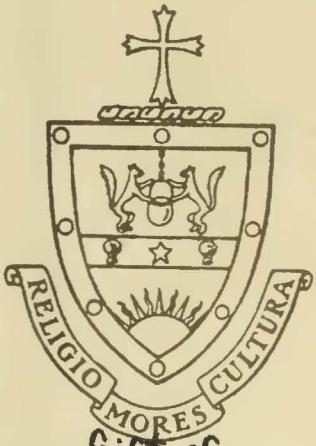
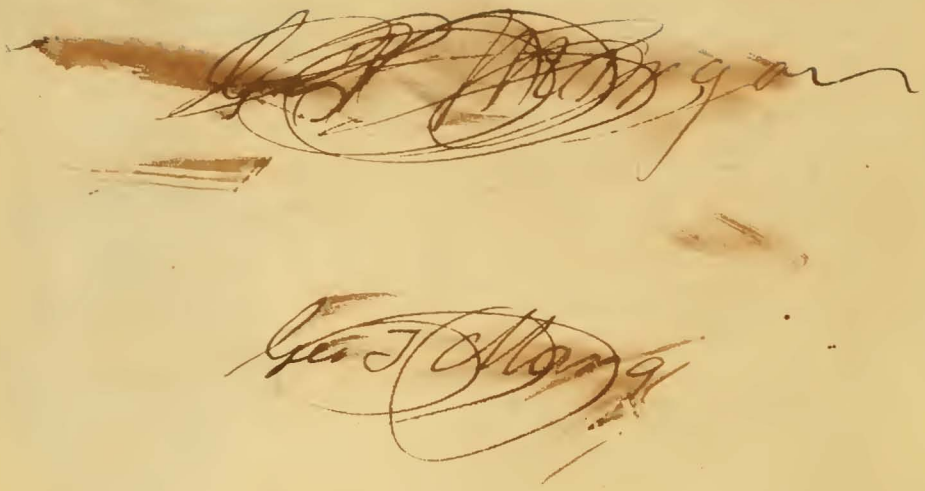




REPORTS

OF THE

INSPECTORS OF MINES

OF THE

ANTHRACITE COAL REGIONS

OF

PENNSYLVANIA,

FOR THE

YEAR 1876.

HARRISBURG:
B. F. MEYERS, STATE PRINTER
1877.

CONTENTS.

REPORTS.

REPORT

OF THE INSPECTOR OF MINES FOR THE THIRD OR SHAMOKIN DISTRICT, FOR THE YEAR 1876.

To His Excellency, JOHN F. HARTRANFT,
Governor of the Commonwealth of Pennsylvania:

SIR:—I herewith submit my Fourth Annual Report as Inspector of Coal Mines for the Third or Shamokin district, for the year ending December 31, 1876, as required by act of Assembly of 1870, giving my report on the general condition of collieries in this district; also the number of fatal and non-fatal accidents during the year, given in tabular form, with remarks on the character of the same.

I also report the number of steam engines, boilers, steam and pole pumps, fans, &c., and number of men employed, with number of tons of coal mined and sent to market, and estimated amount of coal consumed at collieries and by employees.

It has been customary to report each colliery in detail in former years. This custom has been dispensed with this year as being monotonous and not imparting any new information *other* than that given in tabular forms, except such collieries where improvements have been made during the year or new ones opened.

A list of collieries worked out and abandoned will be noticed briefly. There is a marked improvement in the manner of working the different collieries, and especially in the modes or systems of ventilation as compared with former years. Inside foremen have become interested as to the best methods of insuring good ventilation in their respective collieries, while on the other hand a small minority are satisfied to plod in the same circumscribed tracks of their predecessors. Happily the numbers are small.

The number of fatal accidents this year are 37 and same as last year, while the non-fatal accidents are 61 and 45 less than in 1875.

These casualties are in a great measure due to negligence and a lack of practical knowledge of mining, as during the past few years we find the farmer and cobbler, and those not of the best kind, working as laborers in the mines for a short time when he will provide himself with a few tools and can then be found assuming the responsibilities of a miner in a breast or gangway. This class of so-called miners are generally the first victims of their own inexperience; and if this evil ended here we should not be compelled to chronicle so many accidents from fire-damp explosions in our collieries which generate carbureted hydrogen gas so largely. It is no wonder why so many accidents occur while such a state of things exist.

Much has been said and written comparing the casualties in the anthracite coal fields with those of Great Britain, and which is manifestly unjust to us. While we are compelled, by force of circumstances over which we have no control, to leave at least twenty-five per cent. of our production on the dirt bank they, on the other hand, can utilize every ton of coal brought to the surface and be credited as their gross production.

I take the liberty of acknowledging my thanks to all with whom I have had official business during the year.

Very respectfully submitted,

WM. HEMINGRAY.

LIST OF ACCIDENTS and loss of life therefrom in the Third or Shamokin district, Northumberland county, for the year ending December, 1876.

DATE.	No. of acc't.	Name of Colliery.	Location.	Name of Owner or Agent.	Persons killed.
Feb. 26	1	Brookside	Tower City	P. and R. Coal and Iron Company	Robert Evans.
Mar. 1	2	North Side	Lykens Valley	Edward Miller	Jacob Rikert.
11	3	Cameron	Shamokin	Mineral Railroad and Mining Co	Samuel Wenkel.
24	4	Continental	Centralia	Gorrell & Co	Mike Monahen.
April 3	5	Monitor	Locust Summit	G. W. Johns & Bro	Pat. Dougherty.
11	6	....do	....do	....do....do	James Wood.
12	7	Luke Fidler	Shamokin	Mineral Railroad and Mining Co	Samuel Jones.
20	8	Tunnel colliery	Ashland	P. and R. Coal and Iron Company	John Clark.
27	9	....do	....do	....do....do....do	Pat. Galespie.
27	10	Burnside	Burnside	May, Morgan & Co	Andrew Yokoski.
May 6	11	East colliery	Big Mine Run	Jeremiah Taylor & Co	Earnest Let.
12	12	Bear Valley shaft	Bear Valley	Heim & Goodwell	James Brooks.
16	13	Enterprise	Excelsior	Thomas Baumgardner	Mike Hennefy.
16	14	Hickory Ridge	Hickory Ridge	Mineral Railroad and Mining Co	William Taylor.
24	15	Stewartville	Mt. Carmel	Wm. Montelius	Martin Manning.
June 1	16	Williamstown	Williamstown	Summit Branch Railroad	John Clouser.
8	17	Short Mountain	Wiconisco	....do....do	Samuel Plean.
23	18	Morton	Mt. Carmel	Thomas Morton	John Blane.
July 6	19	Cameron	Shamokin	Mineral Railroad and Mining Co	Daniel Carroll.
17	20	....do	....do	....do....do....do	Edward Walters.
Aug. 16	21	Miriam	Locust Summit	P. and R. Coal and Iron Company	John Straub.
31	22	Monitor	....do	G. W. John	Constantine Mishler.
Sept. 11	23	Brookside	Tower City	P. and R. Coal and Iron Company	William Cheese.
26	24	Big Mine Run	Big Mine Run	Taylor & Co	Charles M'Gillan.
Oct. 7	25	Luke Fidler	Shamokin	Mineral Railroad and Mining Co	Peter Bobber.
7	26	Lykens Valley	Wiconisco	Summit Branch Railroad	Pat. Mulvaney.
17	27	Burnside	Burnside	May, Morgan & Co	Vincent Adgaski.
27	28	Cameron	Shamokin	Mineral Railroad and Mining Co	John Boyle.
Nov. 4	29	Continental	Centralia	Gorrell & Co	John Garrety.
6	30	Henry Clay shaft, No. 1	Shamokin	Langdon & Co	Michael Farrell.
11	31	Tunnel	Ashland	P. and R. Coal and Iron Company	James Stephenson.
15	32	Mt. Carmel shaft	Alaski	....do....do....do	Benjamin Rowe.
29	33	....do	....do	....do....do....do	George Turner.
Dec. 21	34	Continental	Centralia	Gorrell & Co	Daniel Malloy.
21	35	....do	....do	....do	Thomas Daly.
21	36	....do	....do	....do	Thomas Monahen.
21	37	....do	....do	....do	John Vernon.

TABLE of Fatal Accidents in Shamokin District, for the year ending December 31, 1876.

ACCIDENTS.	Explosions of carbureted hydrogen gas	Falls of roof	Falls of coal	Explosions of blasting powder	Miscellaneous—Under ground	Above ground	Crushed by mine cars	Totals
Fatal	1	3	12	12	5	1	3	37
Non-fatal	13	6	15	6	4	6	11	61

LIST OF NON-FATAL ACCIDENTS in the Third or Shamokin district, for the year ending December 31, 1876.

DATE.	No.	Name of Colliery.	Name of Operator.	Name of Land-owner.	Name of Person Injured.
Jan. 17	1	Franklin	Lovett, Booth & Co	P. and R. Coal and Iron Company	Cornelius Otto.
Feb. 1	2	Big Mountain	Llewellyn, Patterson & Co.,	do do	Thos. Speer.
8	3	Black Diamond	Swank & Co	Henry Saylor	Dommick Oats.
Mar. 15	4	Stewartville	Wm. Montelius	Locust Mountain Coal and Iron Co	John Britt.
April 15	5	Trevorton	P. and R. Coal and Iron Co.	P. and R. Coal and Iron Company	Nelson Morgan.
16	6	do	do do	do do do	John Backworth.
16	7	Locust Run	do do	do do do	Jno. James.
18	8	Preston, No. 2	do do	do do do	Mich'l Grady.
18	9	Northumberland Coal Co	Treger & Co	Unknown	Hanns Bolick.
19	10	Summit Branch	Summit Branch R. R. Co	Summit Branch Railroad	James Warlow.
27	11	Tunnel Colliery	P. and R. Coal and Iron Co.	P. and R. Coal and Iron Company	Thos. Williams.
27	12	do	do do	do do do	Jno. M'Donald.
May 1	13	Preston, No. 2	do do	do do do	Edward Dooley.
2	14	Potts Colliery	do do	do do do	Thos. R. Davis.
4	15	Bear Valley	Heim & Goodwell	do do do	Wm Wynn.
8	16	Buck Ridge	I. May & Co	Renshaw & Johnson	Jno. Snyder.
9	17	Henry Clay	J. Langdon & Co.	P. and R. Coal and Iron Company	John Curry.
12	18	Buck Ridge	I. May & Co	Renshaw & Johnson	David Brown.
July 11	19	Monitor	G. W. Johns & Bro	P. and R. Coal and Iron Company	Christ'n Snudon.
12	20	Short Mountain	Summit Branch R. R. Co	Summit Branch Railroad	Wm. Thomas.
19	21	Henry Clay	J. Langdon & Co	P. and R. Coal and Iron Company	Israel Krosaski.
19	22	Short Mountain	Summit Branch R. R. Co	Summit Branch Railroad	H. B. Matter.
28	23	Summit Branch Railroad	do do	do do	Dan'l Phillips.
29	24	do do	do do	do do	Wm. Schlimm.
Aug. 2	25	Geo. Fales	Heim & Goodwell	P. and R. Coal and Iron Company	John Dombriski.
2	26	Locust Gap	Graber & Co	do do	Wm. M'Cafferty.
3	27	Stewartville	Wm. Montelius	Locust Mountain Coal and Iron Co	Edwin Hall.
11	28	Big Mountain	Patterson, Llewellyn & Co.,	P. and R. Coal and Iron Company	Jacob Hill.
15	29	Marriam	P. and R. Coal and Iron Co.	do do do	Henry Knock.
20	30	Summit Branch Railroad	Summit Branch R. R. Co	Summit Branch Railroad	John Kent.
23	31	Henry Clay	Langdon & Co	P. and R. Coal and Iron Company	Jos. Cobbell.
Sept. 8	32	Tunnel Colliery	P. and R. Coal and Iron Co.	do do do	Jno. J. Jones.
12	33	Luke Fidler	Mineral R. R. and M. Co	Mineral Railroad and Mining Co	Frank Kanaski.
13	34	Monitor	G. W. Johns & Bro	P. and R. Coal and Iron Company	John Schraeder.
21	35	Keystone	P. and R. Coal and Iron Co.	do do do	Wm. Parry.
Oct. 3	36	Summit Branch Railroad	Summit Branch Railroad	Summit Branch Railroad	John Curtney.
3	37	do do	do do	do do	George Kesler.

LIST OF NON-FATAL ACCIDENTS—Continued.

Date.	No.	Name of Colliery.	Name of Operator.	Name of Land-owner.	Name of Person Injured.
Oct. 3	38	Sterling	Fulton & Co	P. and R. Coal and Iron Company	Wm. Blouser.
9	39	Locust Run	P. and R. Coal and Iron Co.	do do do	Wm. Brennan.
9	40	Lykens Valley	Summit Branch Railroad	Summit Branch Railroad	Chas. Hoover.
9	41	do	do do	do do	Wm. Price.
9	42	do	do do	do do	Mike Hoffman.
9	43	do	do do	do do	Lewis Hoffman.
9	44	do	do do	do do	Anthony Blotzer.
9	45	do	do do	do do	John Hawley.
10	46	Centralia	Dr. Prevost	Locust Mountain Coal and Iron Co	Pat Joyce.
14	47	Locust Run	P. and R. Coal and Iron Co.	do do do	Chas. Brady.
19	48	Trevorton	do do	P. and R. Coal and Iron Company	Otto Lamb.
23	49	Locust Run	do do	Locust Mountain Coal and Iron Co	Thos. Grimes.
23	50	Big Mountain	Patterson, Llewellyn & Co.	P. and R. Coal and Iron Company	Eli Haas.
27	51	Buck Ridge	I. May & Co	do do do	Geo. Snyder.
28	52	Luke Fidler	Mineral R. R. and M. Co	Mineral Railroad and Mining Co	Mike Lucas.
28	53	Continental	Robert Gorrell	Girard Lands	Henry Dalton.
30	54	Mt. Carmel Shaft	P. and R. Coal and Iron Co.	P. and R. Coal and Iron Company	Mike Delaney.
Nov. 7	55	Locust Spring	do do	do do do	Jno. Chellow.
7	56	do	do do	do do do	Pat Churchill.
7	57	do	do do	do do do	B——, boy.
7	58	Luke Fidler	Mineral R. R. and M. Co	Mineral Railroad and Mining Co	Wm. Kohl.
7	59	do	do do	do do do	Henry Dresher.
14	60	do	do do	do do do	Mich'l Mushell.
14	61	Locust Gap	Graber & Co	P. and R. Coal and Iron Company	James Car.

IMPROVEMENTS MADE DURING THE YEAR 1876.

Monitor Colliery.

Situated at Locust Summit, in Northumberland county, and operated by G. W. Johns & Bros.

An addition has been made to the breaker, increasing its preparing capacity to 600 tons per day. New smith and carpenter shops have also been built during the year. New gangways and breasts have been opened, sufficent to meet any demand that may be made. The interior of the mine is in excellent condition as regards quantity, quality and management.

Bast Colliery.

Big Mine Run. Owned and operated by P. &. R. C. & I. Co.

The improvements now making at this colliery consists of a tunnel driving southward, and is already driven 75 yards, and intended to cut the South dip in the Ashland basin.

Two air compressors, of 40-horse power each, are erected at the surface, furnishing power to operate five boring machines, now in use, for driving the tunnel, and at the time of my visit, December 15, these boring machines were in operation—only at night. The work being done by day by hammers and jumpers, owing to a scarcity of boilers to furnish steam to supply the air compressors.

Centralia Colliery.

Situated at Centralia and operated by Dr. Provost.

Extensive repairs have been made inside on the Mammoth vein. A new dry slope, on the Skidmore vein, has been put in working condition during this year. The coal from Mammoth and Skidmore veins being prepared at the new breaker recently built. This breaker has a preparing capacity of 1,000 tons per day. The coal is hoisted from both slopes in large cars, permanently attached to ropes, usually designated "gun boats or monitors."

The improvements made at this colliery are of a durable character, and capable of producing and preparing a large quantity of coal.

Union Colliery.

Situated at Dark Corner, one mile east of Centralia. Operated by Anderson & Ryon.

A new slope has been sunk on the Mammoth vein, at the eastern end of the old water level workings. The necessary machinery for hoisting, pumping and ventilating has been erected, while the gangways, breasts and airways have been opened and are ready for future operations.

Cameron Colliery.

Owned and operated by Mineral Railroad and Mining Company.

A new slope has been sunk on the Lykens Valley vein and gangways, driven east and west, 225 and 250 yards.

On the east side the vein is in a rock fault, while on the west the coal is very good. The slope is sunk down 125 yards on south dip, angle of 40°.

Collieries Suspended and Abandoned.

Enterprise Colliery, at Little Mine Run, formerly operated by J. R. Cleaver, and on lands of Philadelphia and Reading Coal and Iron Company. The coal mined out and colliery abandoned.

Shamokin Colliery, in West Shamokin, on lands of Keller, Kelso & Co., formerly operated by Aucker, Bower & Co. The breaker burned in the spring of 1876 and suspended since that time.

Marshall Colliery, in Shamokin borough, on lands of William H. Marshall, and operated by Reese & Bros., has been worked out and abandoned.

SUSPENDED.

Morton Colliery, near Mt. Carmel, on lands of Northern Central Railroad, and formerly operated by Morton & Bros.

Red Ash Colliery.—Situated in Helfenstein. Owned and operated by Achmuty & Bickel.

NEW COLLIERIES.

East Shamokin Colliery.—Situated on southern edge of Shamokin borough, on lands of Philadelphia and Reading Coal and Iron Company, and operated by John Cruikshank, and consists of one water level drift, opening No. 13 vein, Pink Ash, five and a-half feet thick, on a north dip of 45°. Also another, Red Ash, vein of six feet thick. A tunnel is now driving southward to open the No. 10 vein, which is expected to be reached shortly. A breaker of a capacity of 400 tons per day is in course of erection. This colliery is expected to be ready to ship coal in the spring of 1877.

Marshall Colliery.—Operators: Messrs. Roup & Shields.

This colliery consists of a water level drift on one of the upper Red Ash veins. The coal will be prepared at the old Marshall breaker.

NEW COLLIERIES OPENED.

Sterling Colliery.—Located at Burnside, consists of a double track slope sunk down through the western workings of Henry Clay, and continued 120 yards below the gangway level of Henry Clay. Working gangways are driving east and west in the lower level, and the west gangway of Henry Clay workings is still continued westward and operated by this colliery. Steam machinery of 170-house power with six boilers and one steam pump, used for drainage, are in operation on the Twin veins. The coal is of fine quality, and promises to be one of our first class collieries. Messrs. Fulton & Kendrick are the operators.

Henry Clay No. 1 Shaft.—Is located outside of the borough of Shamokin, southward. This shaft is now in progress of sinking, being already down 60 yards. Estimated distance to reach the Twin veins is 40 yards more. This shaft is intended to work on the third lift, under the present Henry Clay slope workings. Messrs. Langdon & Fulton operators.

A more extended notice of this colliery may be given in reports for 1877.

NUMBER AND GENERAL DESCRIPTION OF COLLIERIES IN SHAMOKIN DISTRICT IN 1876.

Number	Name of Colliery.	Name of Operator.	Land-owner.	Location.	Name of Veins.	Horse power.	Pumps	Fans	Boilers	Employed inside	Employed outside.	Tonnage.
1.	Brookside	P. & R. C. & I. Co	P. & R. C. & I. Co	Tower City	Lykens Valley	205	3	3	22	Employed inside, 2,000 men, 845 boys.	....	172,651.15
2.	Mt. Carmel shaft	....do....do	....do....do	Alaska	E or Mammoth	385	1	1	16		....	71,384.07
3.	Trevorton	....do....do	....do....do	Trevorton	Twins and L. Valley	365	1	2	19		....	39,349.06
4.	Bast Colliery	....do....do	....do....do	Big Mine Run	E or Mammoth	1,280	3	1	26		....	82,611.14
5.	Locust Spring	....do....do	....do....do	Locust Gap	E	165	1	1	11		....	22,699.11
6.	Wadley slope	....do....do	....do....do	Ashland	E	65	2	2	4		....	
7.	Locust Run	....do....do	....do....do	....do	E and Skidmore	220	2	1	21		....	52,953.03
8.	Tunnel	....do....do	....do....do	....do	E and Primrose	1,470	3	3	36		....	76,439.19
9.	Keystone	....do....do	....do....do	Locust Dale	E	1,010	2	1	19		....	32,001.06
10.	Potts	....do....do	....do....do	....do	E	850	4	1	28		....	39,067.05
11.	Merriam	....do....do	....do....do	Locust Summit	E	375	4	1	20		....	115,326.11
12.	Helfenstein	....do....do	....do....do	Helfenstein	Lykens Valley	165	1	1	5		....	16,308.07
13.	Preston, No. 1	....do....do	....do....do	Girardville	Skidmore	105	2	1	7		....	17,525.09
14.	Preston, No. 2	....do....do	....do....do	....do	E and B. M	175	2	2	13		....	32,179.02
15.	Preston, No. 3	....do....do	....do....do	....do	E	815	1	1	17		....	
16.	Preston, No. 4	....do....do	....do....do	....do	E	30	....	....	3		....	38.00
17.	Burnside	May, Morgan & Co	....do....do	Burnside	Twins	240	1	2	11	132	99	60,500.00
18.	Bear Valley	Heim & Goodwill	....do....do	Carbon Run	....do	55	....	....	3	175	50	55,007.06
19.	Bear shaft	....do....do	....do....do	....do	....do	385	1	1	10	50	....	
20.	George Fales	....do....do	....do....do	....do	Primrose and Red Ash	90	1	....	6	50	45	15,189.15
21.	Big Mountain	Patterson, Llewellyn & Co	....do....do	Big Mountain	Twins	80	....	1	5	390	128	105,530.00
22.	Diamond	A. Bancroft	....do....do	Little Mine Run	R. A	5	....	....	1	5	....	987.16
23.	Vaughan	Vaughan & Co	....do....do	Ashland	E	....	....	....	....	6	4	1,482.00
24.	Excelsior	C. W. Kingsley	....do....do	Excelsior	Twins	65	....	....	6	119	99	37,933.01
25.	Enterprise	Thomas Baumgardner	....do....do	....do	....do	240	1	1	13	128	82	72,550.17
26.	Brady	Thomas Gorman	P. & R. and L. Valley	Greenback	Twins and B. M	70	....	....	5	87	68	23,917.04
27.	Franklin	Lovell & Booth	P. & R. C. & I. Co	Shamokin	Red Ash	8	....	....	1	15	14	4,252.07
28.	Henry Clay	J. Langdon & Co	....do....do	....do	Twins	100	1	1	7	125	72	83,374.14
29.	Locust Gap	Graber & Co	....do....do	Locust Gap	Mammoth	265	1	1	12	126	113	52,371.16
30.	Monitor	G. W. John & Bro	....do....do	....do	....do	325	2	1	18	190	75	81,620.00
31.	Reliance	Baumgardner & Co	....do....do	Mt. Carmel	Twins	305	1	1	11	97	98	32,708.14
32.	Henry Clay, No. 1	Langdon & Co	....do....do	Shamokin	Shaft Sinking	40	....	....	2	50	....	
33.	Sterling	Kendrick & Fulton	....do....do	Burnside	Twins	205	1	1	6	93	46	20,394.12
34.	Royal Oak	Tillet & Co	....do....do	Shamokin	Red Ash	....	....	....	....	5	....	700.00
35.	Ben. Franklin	Douty & Baumgardner	....do....do	Doutyville	Lykens Valley	35	1	1	6	92	63	31,145.01
36.	Short Mountain	S. B. R. R	L. Valley Coal Co	Wiconisco	....do	1,711	6	2	56	450	182	149,611.03
37.	Lykens Valley	....do	....do....do	....do	....do							
38.	Big Lick	....do	....do....do	Dayton	....do	482	1	1	24	33	43	1,482.05
39.	Williamst'n or S. B. R. R.	....do	S. B. R. R.	Williamstown	....do	728	7	2	31	620	170	239,768.04
40.	Big Run Gap	....do	L. Valley Coal Co	Big Run Gap	....do	....	....	....	....	20	....	3,000.00
41.	North Side	....do	....do....do	Lykens Valley	....do	10	....	....	1	12	....	2,677.00
42.	Centralia	Dr. Provost	Loc. M. C. & I. Co	Centralia	B. M. and Mammoth	590	4	1	26	152	168	88,207.19
43.	Hazel Dell	Gorrell & Co	....do....do	....do	....do....do	155	....	....	12	128	90	29,384.00
44.	Lilly Colliery	George Troutman	....do....do	....do	....do....do	....	....	....	....	14	....	
45.	Stewartville	William Montelius	....do....do	Mt. Carmel	Skidmore & Mammoth	65	1	....	6	111	87	60,042.12
46.	Lake Fidler	M. R. R. & M. Co	M. R. R. & M. Co	Shamokin	Twins	225	1	1	8	226	108	100,551.11

Number and General Description of Collieries in Shamokin District in 1876—*Continued.*

Number.	Name of Colliery.	Name of Operator.	Land-owner.	Location.	Name of Veins.	Horse power.	Pumps.	Fans.	Boilers.	Employed inside.	Employed outside.	Tonnage.
47.	Cameron	M. R. R. & M. Co.	M. R. R. & M. Co.	Shamokin	7, 8, 9 & 10 and L. Valley.	545	5	2	21	403	181	178,662.16
48.	Hickory Swamp	do do	do do	Shamokin, east 1 mile	Twins	105	..	1	..	128	108	30,872.04
49.	Hickory Ridge	do do	do do	Hickory Ridge	Twins and Skidmore	195	1	1	9	94	51	9,622.17
50.	Lancaster	do do	do do	1 mile east Shamokin	8 and 9 or Twins	15	..	..	1	46	20	16,146.00
51.	Buck Ridge	I. May & Co	Renshaw & Johnson	Shamokin	Twins	195	1	1	14	100	60	55,182.00
52.	Red Ash (suspended)	Achnuty & Bickel	Achnuty & Bickel	Helfenstein	Lykens Valley							
53.	Black Diamond	Swank & Co.	Henry Saylor	Green Ridge	Twins	185	1	1	6	57	39	35,267.02
54.	Northumberland Coal Co.	Watkins & Co.	Unknown	3 m. north Mt. Carmel	Lykens Valley	15	..	..	2	20	.....	1,000.00
55.	West Lehigh	F. L. Shuman	Long, Lee & Hunter	Glen City	Buck Mountain	85	1	..	3	30	20	18,000.00
56.	Glen City Colliery	J. H. Losee	Lougenberger & Kase	do	do	90	..	..	5	56	36	17,454.06
57.	East Shamokin	John Cruikshank	P. & R. C. & I. Co.	Shamokin	Pink Ash, Red Ash, Primrose	35	..	..	2	30	....	Non-shipments.
58.	Morton	Morton & Bros.	N. C. R. R.	Mt. Carmel	Mammoth	12	..	..	1	28	15	8,899.10
59.	Continental	R. Gorrell	City trusts	Dark Corner	do	270	2	1	17	149	123	59,613.00
60.	Union	Anderson & Ryan	do	do	Skidmore & Mammoth	195	..	1	7	159	.....	35,975.10
61.	Shamokin	Aucker & Bower	Keller & Co	West Shamokin	Red Ash	25	..	..	2	20	15	1,288.00
62.	Marshall	Reese & Bros.	William H. Marshall	Shamokin	do	8	1	..	2	10	8	68.00
63.	Big Mine Run	J. Taylor & Co.	Locust M. C. & I. Co	Big Mine Run	Skidmore	105	..	1	11	146	99	43,575.00
64.	Enterprise	J. R. Cleaver	P. & R. C. & I. Co.	Little Mine Run	Holmes	45	1	1	4	54	.....	.....
	Total					16,354	78	47	669	5,118	5,534	2,588,005.17
	Local consumption					.....	..	..	....	.....	.....	151,971.04
	Gross total in 1876					....	..	..	....	.....	.....	2,739,977.01

FATAL ACCIDENTS.

Explosions of Blasting Powder.

No. 1. Robert Evans, killed at Brookside Colliery, February 26, 1876, by a premature discharge of a blast. He had prepared a shot, and had lit the fuse, retreating to a place of safety. Having waited nearly half an hour, and the shot not having exploded, the deceased went back, and was in the act of boring out the tamping when the shot exploded, striking him violently and injuring him fatally that he died in fifteen minutes after.

No. 2. Jacob Rikert, killed at North Side Colliery. The deceased was working in a breast with the inside foreman, *Jacob Shire*. They had prepared a hole ready for firing, the foreman told the deceased to go down to the second heading or cross-cut for safety, while he (the foreman) would fire the shot and go down to the upper cross-cut; when the deceased got down to the place assigned him he called out *all right*. The foreman applied the match and went down to the upper cross-cut. When the blast exploded the foreman on looking down the chute saw the deceased man's lamp flicker and then go out. He then called to the deceased, but got no answer, when he immediately went down the chute and found the deceased laying dead, having been struck by a piece of coal flying from the blast. My opinion is that the deceased was partly out of the cross-cut watching the explosion when it took place, and was struck by the coal, causing his death.

No. 3. Samuel Wenkle, killed at Cameron Colliery, March 11, 1876. He was working breast No. 27, and had driven a cross-cut over to No. 28, which was worked nearly up to that point. On the morning of the accident the men working in 28 told the deceased that when they were ready to fire a blast they would rap on the pillar and he (the deceased) should answer by rapping back. With this understanding the parties in No. 28 had prepared a blast ready for firing, and gave the signal as agreed on, but got no answer, although they could hear the deceased on the outside of his breast and some distance above them. The parties in No. 28 considered him at a safe distance, and fired the blast, which cut through into the cross-cut, igniting some powder belonging to the deceased, creating a large body of powder smoke. It is supposed the deceased was suffocated by this smoke while trying to escape, as his body was found in the chute of breast 26. He was dead when found.

No. 4. Michael Minehan, killed at Continental Colliery, March 21, 1876. The deceased went to work at night, taking a young boy along for company, intending to drive a cross-cut or *heading* out of manway into a breast. And from the evidence given by the boy Riley, it appears the deceased had bored and loaded two holes ready for firing, the deceased sent the boy down to a place of safety, when he fired the first blast and immediately went back to fire the second, which also exploded, putting out the light of the boy Riley, and who, being in darkness, called to the deceased but got no answer, when Riley went up the manway in the dark until he reached the body of Minehan, who he thinks was dead at that time. He, Riley, turned him over and fell himself, (thinks he fainted,) but finally recovered sufficiently to get out and give an alarm. The colliery was not shipping coal at this time, and the deceased had asked the inside foreman for some cars to load his coal into, but was told that the cars were all full. The manway and cross-cut or heading below were nearly all closed with coal at time of accident, and impeding the current of air that usually passed in the lower heading. I visited the place the following day and found the manway and

lower heading nearly closed up, and that the accident was caused by the deceased returning back too soon after firing the first shot. The manway being probably full of smoke, he may have applied his light to the squib and causing the shot to explode before he could get out of danger. This is another instance of a laxity of discipline in allowing men to work in the mines when not regularly at work, allowing them to block up air-courses, leaving doors open, sometimes reversing the currents of air entirely; and unless the officers in charge of the mine are on the alert daily and enforce discipline such accidents must be the inevitable result.

No. 5. Ernest Lex, killed at Bast Colliery by a premature explosion of a blast, while working in return airway. This accident occurred on the 6th of May, and he died on the 9th inst.

No. 6. Mike Hennefy, killed at Enterprise Colliery, May 16, 1876, while making a cartridge, a spark from his lamp or pipe falling among the powder, causing the explosion which resulted in his death on the 26th inst; another result of carelessness.

No. 7. Wm. Taylor, fatally injured at Hickory Swamp, on 16th of May, while making cartridge, and died on the 1st of June, 1876.

No. 8. Edward Walters, killed at Cameron Colliery, on the 16th of July, by premature discharge of a blast while tamping a hole.

Nos. 9, 10, 11 and 12. Dan'l Malloy, Thos. Daley, Thomas Monahen and John Vernon, killed at Continental Colliery, December 21, 1876, by an explosion of four kegs of powder. From the evidence elicited at the coroner's inquest it appears that two of the unfortunate men, Monahen and Vernon, on the morning of the accident, 21st inst., took in to their work two kegs of powder each, and remarked to the inside foreman, Mr. Brakerty, that they were going to square up their breasts preparatory to being measured up on the following day. They had also told their wives the same thing, consequently no alarm was felt at their absence until the following morning, when a wife of one of the deceased men became alarmed at their absence and search was immediately made, which resulted in finding the four unfortunate men in the manway *dead*, and presenting a shocking sight; they were mangled almost beyond recognition.

The remnants of the powder kegs and oil cans were found torn and twisted into all conceivable shapes, while the strata was undisturbed, and presented no evidence of such a terrible catastrophe as had recently taken place.

Parties who were working adjacent on either side of them in breasts, until four o'clock in the afternoon and from six until eleven o'clock at night, testified that they neither saw nor heard anything unusual during that time; and the exact time when the explosion actually took place will probably never be known, as no evidence could be produced to satisfy the jury on that point.

I made a personal examination of the place on the following day, but found no marks of violence in the manway to indicate the exact place where the explosion occurred.

The jury, after hearing all the evidence bearing on the subject, rendered a verdict that Thomas Daley, Daniel Malloy, Thomas Monahen and John Vernon came to their deaths by an explosion of powder, but the cause and time of the explosion was unknown to the jury.

Explosions of Carbureted Hydrogen Gas.

No. 1. Pat Muldowney, fatally injured at Lykens Valley Slope, October 7, 1876, and died on 14th inst. From all the information which could be

gained it appears that the deceased and six others were trying to extinguish a fire in one of the breasts. The inside foreman, Mr. Bateman, being present giving directions. A Babcock Fire Extinguisher was being used until the charge was exhausted, when the foreman ordered them to go down to the gangway and re-charge it, but in the hurry and confusion that prevailed at the time some of them neglected to obey the order given, when the flames of the fire communicating with a small body of carbureted hydrogen at face of breast an explosion took place, burning several men, and the deceased among the number, who died in seven days after. This was another case of neglect in not obeying the orders given, as the foreman and a majority of the men engaged at the time went down to the gangway and escaped any injury whatever.

FALLS OF COAL.

No. 1. Pat Dougherty, killed at Monitor Colliery, April 3, 1876. The deceased was opening a new breast, and was trying to bar or pry down a piece of top coal when it fell on him, killing him instantly.

No. 2. Andrew Yokoski, killed at Burnside Colliery, April 26, 1876, while trying to get down some top coal.

No. 3. Martin Manning, killed at Stewartville Colliery, May 24, 1876, by a fall of coal while skipping a pillar.

No. 4. John Blair, killed at Morton Colliery, June 23, 1876, by a fall of coal. He was running two loaded cars down a plane gangway when the cars got off the track, knocking out two pairs of timber, the coal falling on him, killing him instantly.

No. 5. Daniel Carroll, killed at Cameron Colliery, July 6, 1876, by a fall of coal while working in a breast.

No. 6. John Straub, killed at Merriam Colliery, August 11, 1876, while working in a breast.

No. 7. Wm. Cheese, killed at Brookside Colliery, September 11, 1876, by a fall of coal while working in a breast.

No. 8. Chas. M'Gillan, killed at Big Mine Run by a fall of coal while working in a breast.

No 9. Peter Bobber, killed at Luke Fidler Colliery, October 7, 1876, by a piece of coal falling on him while working in a breast.

No. 10. George Turner, killed at Mt. Carmel Shaft, November 29, 1876, by a piece of top coal. He had fired a blast in one of the lower benches, and on returning sounded the top coal with a drill, and remarked to his partner that it sounded hollow or loose, yet in view of this fact he commenced to work again under this overhanging coal when it fell on him, killing him. The deceased was an engineer by profession, and was about to leave his work as a miner and resume his duties as an engineer on the following day.

No. 11. Vincent Adgaski, killed at Burnside Colliery, October 17, 1876. He was working in a breast, and his partner was engaged in trying to pry down some top coal. The deceased told his partner to be careful, and while standing watching his partner the top coal fell, striking a prop and knocking the prop against the deceased, killing him on the spot.

FALLS OF ROOF.

No. 1. Samuel Jones, killed at Luke Fidler Colliery, April 12, 1876, by a piece of slate or roof while working in a breast.

No. 2. John Clouser, killed at Williamstown Colliery, June 1, 1876, by a fall of roof while working in breast.

No. 3. Ben Row, killed at Mt. Carmel Shaft, November 15, 1876, by a piece of slate falling on him while lifting a car on the track in a breast.

Crushed by Mine Cars.

No. 1. Constantine Mishler, killed at Monitor Colliery, July 31, 1876. The deceased was engaged in putting a slope car on the track, and having done so, sent his partner down to the bottom of the slope to put on another car while he (the deceased) staid in the slope to watch the car coming up past the place where the former car had got off the track. The engineer testified, at the inquest, that on hoisting the next car he felt an unusual resistance on the engine, and stopped and reported that something was wrong in the slope, and on search being made the deceased was found laying between the rails, the car having passed over him. No positive account as to how the accident occurred could be ascertained, as the deceased was dead when found.

No. 2. James Wood, killed at Monitor Colliery, April 11, 1876. The deceased was a driver in the first lift, and was found dead under the train of cars, they having passed over him.

Miscellaneous Under Ground.

No. 1. James Brooks, found dead in a chute, at Bear Valley Colliery, May 12, 1876. He was employed as a laborer by Thomas Robinson, miner, and had been sent up a manway to rap on the pillar, as Robinson was driving a cross-cut over to the manway. The deceased went away for the purpose of rapping on the pillar, but Robinson, after waiting for some time and not hearing any signal, went up the manway himself and found the deceased about six yards above the gangway, but *dead*. He was sitting upright in the manway when found.

No. 2. John Clark, killed at Tunnel Colliery, April 20, 1876. The deceased was working with his partner, James Melarkey, on the inside chute, when the coal started to run out from face of breast, Melarkey ran across the breast and got down the outside chute in safety. The deceased attempted to get down the inside chute, and succeeded in getting down to the battery, where the coal followed so close on him as to partly bury him. An alarm was immediately given, and parties went to his assistance at once, but owing to a large body of carbureted hydrogen gas being liberated from the strata by the rush of coal they could not get to him for some time. Every effort was made to get him out in the darkness, as no safety-lamp could be carried to the place, and while attempting to do so another heavy rush of coal came down, driving the rescuing party away to save their own lives, and covering the unfortunate man up. When another attempt was made to get him out they succeeded, but he was dead when found.

No. 3. John Garrety, killed at Continental Colliery, November 4, 1876. The deceased was working in a breast, and had made up a cartridge in the cross-cut, while coming across the face of his breast with the cartridge in his hand some top coal fell on the loose coal in the breast, causing it to rush down on the bottom slate, and carrying the deceased down in the moving mass of loose coal, and killing him.

No. 4. Mike Farrell, fatally injured at Henry Clay Shaft, No. 1, November 6, 1876, by being struck by the hoisting bucket. He died next day.

No. 5. James Stephenson, killed at Tunnel Colliery, November 11, 1876.

The deceased was sitting in a cross-cut or heading watching his employer, John Dougherty, who was driving another cross-cut a short distance inside, when a fall of coal took place in one of the breasts, bringing down a large body of carbureted hydrogen gas, extinguishing the lights in both the safety-lamps, when Dougherty told the deceased to get down the manway quick; Dougherty succeded in doing so, but the deceased did not get down. When search was made immediately after he was found part way up the manway, but life was extinct, being smothered by the rush of carbureted hydrogen gas.

No. 6. Pat Galespie, killed at Tunnel Colliery, April 27, 1876, from the results of an explosion of carbureted hydrogen gas.

The deceased was working in a manway between 49th and 50th breasts, when an explosion took place in the return airway, supposed to be about No. 25 breast outside, as two men, Thomas Williams and James M'Donald, were repairing the return airway at or about that point, and who also reported the explosion as having taken place, from their safety lamps; also they being the only two men burned by the explosion. The only theory given as to the actual cause of Galespie's death was, that immediately after the explosion Galespie retreated outwards through the monkey, or outward air course, from 49 to 37, where his body was found and supposed to be killed by *after-damp* or *carbonic oxyde*, as no marks of violence were to be found on him when discovered. I made a careful examination of the scene of disaster and came to the following conclusion, viz: That at the time of the accident fully 40,000 feet of air was traversing the gangway inwardly, and making allowances for leakage, the velocity of even half that amount, returning outwards through the return airway, whose area was much less than the gangway inlet, would be considerably increased, so much, in fact, that the safety lamp afforded no protection to the men employed when the returning air was mixed with carbureted hydrogen gas in such quantity as to render it explosive. Also, that owing to the liberation of an unusual quantity of carbureted hydrogen gas, by falls of coal, &c., in its returning outwards, and mixed with the return air, it formed an explosive compound, and traveling at a high velocity, when it reached the two men employed in the return airways it blew the flame directly through the gauze of the safety lamp, hence the explosion, which knocked down a few doors and brattices, and reversed the current of air temporarily, and the deceased in trying to escape outwardly, rushed direct to meet the after-damp, which no doubt was the cause of his death. Also, if he had retreated down into the gangway his life would undoubtedly have been spared, had he been thoroughly conversant with the most practical mode of retreat in such cases.

Miscellaneous Above Ground.

No. 1. John Boyle, killed at Cameron colliery, October 27, 1876. The deceased was picking slate off the cars outside the main railroad track after being loaded at the breaker. It is supposed that the train of cars got a sudden jar, throwing the deceased between them, crushing the deceased that he died on the place.

No. 2. Samuel Plearn, killed at Short Mountain colliery, June 8, 1876, by being run over by cars on the dirt bank.

Ventilation.

This very important subject of ventilation is becoming a matter of considerable importance by all persons of intelligence employed in mining anthracite coal, and especially by inside foremen in charge of collieries.

The old and unreliable system of ventilation by atmospheric action and furnaces are gradually giving place to more improved systems by mechanical means, viz: the steam exhausting fan now in general use in Europe and America.

Much has been said and written on the merits of the different fans now in use, each having its advocates in its favor as to the effectiveness or power to produce the greatest amount of air at the least cost. While there is no question as to the superiority of some over others we do not attach so much importance on the superiority of one fan over another to produce effective ventilation as we do to larger openings for the free passage of air in the mines. In order to illustrate this fact take two fans of equal dimensions revolving at the same speed, everything else being equal except the areas of air passages in the mines; on applying the water gauge it is not unusual to find the drag or friction in the mine where the air course areas are large—not more than three-tenths of an inch—while in the case where the air courses are small the drag or friction will be one and a-half inches. While the fan operating from large air courses will show a displacement of 40,000 cubic feet per minute the one operating on the small air course will show a displacement only of 25,000 cubic feet per minute. Another serious drawback to the free passage of air circulating through mines is owing to sharp curves and angles in the inlet and outlet air passages, creating friction on the air in its return to the fan.

This question is not as thoroughly understood by our inside foremen as could be desired, often being passed by as of no importance; nevertheless this subject is receiving more attention at the hands of all interested in mine ventilation, and ere long we hope to see every mine ventilated that the miner can pursue his dangerous avocation in safety as far as ventilation is concerned.

Dangers of Mining Anthracite Coal, as Compared Against Bituminous.

Reference or comparison has often been made on this subject, and the question is often asked, why so many accidents occur in the anthracite coal mines as compared with mining coal in the bituminous coal fields of the world? Any one acquainted with the methods of mining in the different coal fields may see at once the extra risk and danger in the anthracite coal seams over those of bituminous. While the miner in the small bituminous vein is compelled to curve, or undermine with the pick for every ton of coal he produces, and is constantly at the face of his work, he is enabled to see the appearance of danger far more readily than the miner in the large anthracite veins, lying at sharp angles, and who frequently cannot approach or even see the condition of the roof of the vein. Another source of danger, often fatal to the anthracite miner in large veins on sharp angles, is in *miner's parlance* from slips or fractures of the strata falling out from face the breasts, while he is at work, it being a moral impossibility for the miner to get up to examine this source of danger, which is a constant menace to his life and limb.

While the miner in the bituminous coal seam can undermine in the small vein with the pick, and then require but a small quantity of powder to throw down his coal, the miner in anthracite is compelled to use powder altogether to blast out all the coal he can produce, thereby increasing the risk and danger very materially. The quantity of powder used in one of our large veins, as shown by the returns for the current year from one of our large collieries—the Monitor, in Northumberland county—the quantity of coal produced was 81,620 tons. The quantity of powder consumed was 1,850 kegs, of 25 pounds each, making 46,250 pounds used in the produc-

tion of 81,620 tons of coal, being an average of a little over one-half pound of powder for each ton of coal mined. This vein is 22 feet thick. At the Black Diamond colliery, where the vein is 8 feet thick, 35,207 tons of coal were produced in 1876, and 29,825 pounds of powder used in its production, being a little over $\frac{3}{4}$ of a pound of powder for each ton of coal mined, and which may be used as the average in this district; and which may also partly account for some of the fatal and non-fatal accidents in the anthracite coal mines.

Another source of danger exists in mining anthracite coal, and which might, with ordinary care and prudence on the part of the miner, be avoided, viz: Making up cartridges in small cross-cuts or headings with his lamp on his head, and not unfrequently a tobacco pipe in his mouth, with a strong current of air passing at the same time; when a spark of fire from either lamp or pipe falls among the loose powder in the keg or cartridge an explosion takes place, and sometimes none are left to tell the tale. One-third of all the accidents in this district in 1876 were of this character.

It is an unpleasant duty to be compelled to record the recklessness with which the miner handles powder; and in the absence of legislative enactments the question arises: What can be done?

Another source of danger, of a more dangerous character than the above, exists in our mines which yield carbureted hydrogen gases in large quantities, by the employment of men of no experience with fire-damp; and while a colliery may be operated with comparative safety by miners of experience in gases. But in course of time a few inexperienced men get employment, and one mistake on their part involves too often the lives of all the rest in the mine at the same time. *A case in point while writing:* A miner on going in to work was met by the fire boss and told that a small quantity of gas was in his breast that morning, and to be careful and see that it was brushed out before commencing work. When the miner went up in the breast, which was driven up only seven yards, and brushed out the gas while in the darkness, until he *thought* it must be cleaned out, when *lo*, instead of trying it with his safety-lamp, he struck a match to light his miners' lamp, when an explosion took place, but fortunately not very heavy and burning no one but himself, however not seriously. Had carbureted hydrogen gas existed in large quantities in that immediate vicinity the consequences might have been terrible, and could only be attributable to ignorance and recklessness. As a general rule, while we are yet in comparative infancy in this country in coal mining, we are fortunate in not having to record so many *wholesale* accidents by explosions of fire-damp. But until our miners exercise more care in the prosecution of their dangerous avocation, and legislative enactments are more specific in their character accidents will still continue to happen.

CHARACTERISTICS OF COLLIERIES.

NAMES OF COLLIERIES.	NAMES OF OPERATORS.	NAMES OF LANDOWNERS.	Number of drifts	Number of tunnels	Number of inside slopes	Number of slopes	Number of shafts	Number of breakers	Number of steam boilers
Brookside	P. and R. Coal and Iron Company.	P. and R. Coal and Iron Company.		1	1	1		2	2
Mt. Carmel shaft	do	do					2	1	
Trevorton	do	do	2	1		1		2	25
Bast slopes	do	do	1			2		1	26
Locust Spring	do	do				1		1	11
Wadley slope	do	do				1			4
Locust Run	do	Locust Mountain Coal and Iron Co.		1		1		1	24
Tunnel slopes	do	P. and R. Coal and Iron Company.		1		2		1	36
Keystone	do	do				2		1	36
Locustdale	do	do				2		1	25
Mariam	do	do				2		1	20
Helfenstine	do	do		1	1			1	5
Preston, No. 1	do	do	1			1		1	7
Preston, No. 2	do	do		2		1		1	13
Preston, No. 3	do	do		1		1			
Preston, No. 4	do	do		1				1	17
Burnside	May, Morgan & Co	do	1			3		1	11
Bear Valley slope	Hime & Goodwell	do							
Bear Valley shaft	do	do					1		
George Fales'	do	do							
Big Mountain	Patterson Llewellyn	do	6					1	5
Diamond	Af. Bancroft	do	1					1	1
Vaughan	D. Vaughan & Co	do	1					1	1
Excelsior	C. W. Kingsley & Co	do	4					1	6
Enterprise	Thos. Baumgardner	do				1		1	13
Brady	Thos. Gorman	P. & R. C. & I. Co. and L. V. R. R. Co.	3					1	5
Franklin	Lovell & Booth	P. and R. Coal and Iron Company.	1					1	1
Henry Clay	J. Langden	do	1			1		1	7
Locust Gap	C. Graber & Co	do		1		2		1	12
Monitor	G. W. Johns & Bro	do			1	1		1	14

Reliance	Thos. Baumgardner & Co	P. and R. Coal and Iron Company.				1		1	11
Henry Clay shaft	Langdon & Co	do do do					†1		
Sterling	Kindrick & Fulton	do do do				1		1	6
Royal Oak	Tillet & Co	do do do	1						
Ben Franklin	Douty & Baumgardner	do do do	2	1	1			1	6
Short Mountain	Lykens Valley Coal Company	Summit Branch Railroad Comp'y.				1		1	56
Lykens Valley	do do	do do do							
Big Lick	do do	do do do			1	1		1	24
Williamstown	Summit Branch Railroad Comp'y.	do do do		1	3			1	31
Big Run			2						
North Side			1					1	1
Centralia				1		2		1	26
Hazledell				1		1		2	12
Lilly									
Stewartsville						1		1	6
Luke Fidler				1			1	1	8
Cameron			3			3		1	21
Hickory Swamp				1		1		1	7
Hickory Ridge				1		1		1	9
Lancaster			4					1	1
Buck Ridge			2			2		1	14
Red Ash				1				1	2
Black Diamond						1		1	6
Northumberl'd Coal Co.			1					1	1
West Lehigh						1		1	3
Glenn City				1		1		1	5
East Shamokin			2	1				1	2
Morton			2					1	1
Continental						2		1	17
Union			1			1		1	9
Shamokin*									
Marshall			1					1	2
Big Mine Run			2						
Enterprise						1		1	13

*Burned down. †Sinking.

RECAPITULATION.

Number of drifts	46
Number of tunnels	20
Number of inside slopes	8
Number of outside slopes	48
Number of shafts	5
Number of breakers	55
Number of boilers	647

COAL produced in tons per year, and number of persons employed in 1876.

REMARKS.	In 1876.	In 1875.
Coal produced in tons per year	3,208,306	3,348,726
Number of persons employed	10,652	9,585
Ratio of coal produced per person employed	.282	.348
Number of lives lost per year	37	38
Ratio of coal produced per life lost	86,711	81,282
Ratio of persons employed per life lost	.288	.349

LIST OF FATAL ACCIDENTS.

No. of accident ...	Occupation.	Age	Widow	No. of children ...	Cause of Injury.	Fire-damp explosions	Falls of roof.....	Falls of coal.....	Falling into shafts or slopes	By explosions of blasting powder.	Miscellaneous, under ground	Above ground	Falling under and crushed by cars.	Total accidents...
1..	Miner	47	....	5	Explosion of a blast while boring out tamping	.....	.....	.....	.....	1	.....	.....	.....	.....
2..	Laborer	19	Sin		Struck by a piece of coal from a blast.....	.....	.....	.....	.....	1	.....	.....	.....	.....
3..	Miner	26	1	2	Suffocated by powder smoke.....	.....	.....	.....	.....	1	.....	.....	.....	.....
4..	...do	29	1	2	Struck by coal from a blast.....	.....	.....	.....	.....	1	.....	.....	.....	.....
5..	...do	35	1	3	Killed by fall of coal in breast.....	.....	.....	1	.....	.....	.....	.....	.....	.....
6..	Driver.....	18	Sin		Killed by being run over by trip of cars	.....	.....	.....	.....	.....	.....	.....	.....	.....
7..	Miner	65	Sin		Killed by fall of roof.....	.....	1	.....	.....	.....	.....	.....	.....	.....
8..	...do	32	1	3	Killed; smothered in chute with fine coal and dirt.	.....	.....	.....	.....	.....	1	.....	.....	.....
9..	...do	35	1	3	Killed; suffocated by carbonic oxide, (after damp.)	.....	.....	.....	.....	.....	1	.....	.....	.....
10..	...do	35	1	1	Killed by fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	.....
11..	...do	....	.....	....	Premature explosion of a blast.....	.....	.....	.....	.....	1	.. ...	.....	.....	.....
12..	Laborer	18	Sin		Found dead in chute.....	.....	.....	.....	.....	.....	1	.....	.....	.....
13..	Miner	44	1	5	Fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	.....
14..	...do	23	.....	....	Explosion of powder while making cartridge.....	.....	.....	.....	.....	1	.....	.....	.....	.....
15..	...do	60	Sin		Explosion of powder while making cartridge.....	.....	.....	.....	.....	1	.....	.....	.....	.....
16..	...do	....	.....	....	By fall of roof.....	.....	1	.....	.....	.....	.....	.....	.....	.....
17..	Driver.....	17	Sin		Run over by car on dirt bank	.....	.....	.....	.....	.....	.....	.....	1	.....
18..	...do	20	Sin		Fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	.....
19..	Miner	25	1	1	Fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	.....
20..	...do	25	Sin		Explosion of a blast while tamping.....	.....	.....	.....	.....	1	.....	.....	.....	.....
21..	...do	54	.....	....	Fall of coal...	.....	.....	1	.....	.....	.....	.....	.....	.....
22..	Laborer	40	1	2	Run over by mine car in slope.....	.....	.....	.....	.....	.....	.....	1	1	.....
23..	Miner	26	Sin		Fall of coal in breast.....	.....	.....	1	.....	.....	.....	.....	.....	.....
24..	...do	35	1	2	Fall of coal in breast.....	.....	.....	1	.....	.....	.....	.....	.....	.....
25..	...do	48	1	4	Killed by fall of coal in breast	.....	.....	1	.....	.....	.....	.....	.....	.....
26..	...do	25	1	....	Killed by fall of coal in breast & struck by falling prop	.....	.....	1	.....	.....	.....	.....	.....	.....
27..	...do	44	1	7	Killed by explosion of carbureted hydrogen gas...	1	.....	.....	.....	.....	.....	.....	.....	.....
28..	Laborer (boy)	17	....	....	Crushed by cars outside.....	.....	.....	.....	.....	.....	.....	1	.....	.....
29..	Miner	37	1	3	Killed by being drawn down breast by rush of coal.	.....	.....	.....	.....	.....	1	.....	.....	.....
30..	...do	28	Sin		Killed by being struck by hoisting bucket in shaft.	.....	.....	.....	.....	.....	1	.....	.....	.....

LIST OF FATAL ACCIDENTS—*Continued.*

No. of accident	Occupation.	Age	Widow	No. of children	Cause of Injury.	Fire-damp explosions	Falls of roof	Falls of coal	Falling into shafts or slopes	By explosions of blasting powder.	Miscellaneous, under ground	Above ground	Falling under and crushed by cars.	Total accidents
31..	Laborer	31	1	....	Killed by being suffocated by C. H2 in manway	.....	.....	.....	.....	.....	1	.....	.....	.....
32..	Miner	40	1	5	Killed by fall of roof	.....	1	.....	.....	.....	.....	.....	.....	.....
33..	...do	44	1	3	Killed by fall of coal	.....	.....	1	.....	.....	.....	.....	.....	.....
34..	...do	40	1	6	Killed by explosion of powder	.....	.....	.....	.....	1	.....	.....	.....	.....
35..	...do	28	1	2	Killed by explosion of powder	.....	.....	.....	.....	1	.....	.....	.....	.....
36..	...do	43	1	3	Killed by explosion of powder	.....	.....	.....	.....	1	.....	.....	.....	.....
37..	...do	26	1	....	Killed by explosion of powder	.....	.....	.....	.....	1	.....	.....	.....	.....
						1	3	11	.....	12	6	2	2	.....

Total number of fatal casualties, 37; five of which subsequently died of injuries.

REPORT

OF THE INSPECTOR OF COAL MINES FOR THE SECOND SCHUYLKILL DISTRICT.

OFFICE OF INSPECTOR OF COAL MINES,
SHENANDOAH, PA.

To His Excellency, JOHN F. HARTRANFT,
Governor of the Commonwealth of Pennsylvania:

SIR:—I have the honor to submit herewith my annual report, as inspector of coal mines for this district, ending December, 1876.

The report contains, among others, the following items bearing on the subject of health and safety: Also some of the principal sources from which accidents occur, and the dangers attending the mining of anthracite coal in comparison with that of bituminous. Also a table showing the number of fans in use, and the amount of air discharged per minute. I have arranged accidents resulting in death and serious personal injuries in a tabulated form, also a detailed statement of the extent and cause of accident.

There has been 27 fatal, and 48 persons injured more or less. There has been an output of 2,891,117 tons, of which 2,740,117 tons was sent to market; making 107,078 tons for each life lost, 60,231 tons were produced for each serious accident which occurred, one life was lost for each 378½ persons employed in and about the mines.

I regret to have to say that the list of fatal accidents this year shows one more life lost than the report of 1875, whilst the list of non-fatal accidents shows a decrease of more than fifty per cent. less than the year 1875. There has been an increase in the output of coal in this district this year over that of 1875 of 328,772 tons, which shows an increase of 12,177 tons more produced this year than that of last for each life sacrificed.

It will be seen by the detailed statement of the cause of accidents which resulted in the loss of life that there is a fearful lack of discipline in and about the mines, which is undoubtedly owing to the want of a code of special rules for the government of the employees of each colliery. I have made careful examination of all places where those accidents occurred, and do not hesitate to say that a large percentage of those accidents might have been prevented under rigid mine discipline.

I have the honor to be
Your Excellency's obedient servant,
SAMUEL GAY, *Inspector of Mines.*

LIST OF ACCIDENTS, and loss of life therefrom, in the Shenandoah district, Schuylkill county, for the year ending December, 1876.

DATE.	No. of acc't.	Name of Colliery.	Location.	Name of Owner or Agent.	Persons killed.
Jan. 8.....	1...	No. 2 slope	Lost Creek	Philadelphia Coal Company	John Wilkes.
Feb. 4.....	2...	Stanton	Gilberton.....	Miller, Hoch & Co.....	Abraham Haines.
April 21.....	3...	Ellen Gowen	Near Shenandoah.....	P. and R. Coal and Iron Company ...	Edward Broughall.
May 1....	4...	Mahanoy City	Mahanoy	....do.....do.....do	John Sthall.
2.....	5...	Indian Ridge.....	Shenandoah.....	....do.....do.....do	John M'Lendy.
8.....	6...	....do	....do	....do.....do.....do	James M'Loughlin.
26.....	7...	Bear Ridge, No. 1	Mahanoy Plane	Bear Ridge Coal Company	James Holvey.
26.....	8...	....do	....do	....do.....do	Jeremiah Mahony.
June 2.....	9...	Knickerbocker	Yatesville.....	P. and R. Coal and Iron Company ...	Patrick M'Grady.
19.....	10...	Furnace	Gilberton.....	Atkins & Bros.....	Michael Russell.
30.....	11...	Indian Ridge.....	Shenandoah.....	P. and R. Coal and Iron Company ...	John Walsh.
July 26.....	12...	Cuyler	Raven Run.....	Heaton & Bros	Edward Bearman.
24.....	13...	No. 2 slope	Lost Creek	Philadelphia Coal Company	William Thomas.
Aug. 18.....	14...	Girard.....	Girardsville	Beatty & Garretson.....	Henry Jones.
Sept. 11.....	15...	Bear Ridge, No. 2	Mahanoy Plane	Bear Ridge Coal Company	Patrick Gallagher.
18.....	16...	Indian Ridge.....	Shenandoah.....	P. and R. Coal and Iron Company ...	Thomas Cassidy.
28.....	17...	Lawrence	Mahanoy Plane	Lawrence, Merkle & Co	Henry Folk.
Oct. 6.....	18...	Honey Brook, No. 1.....	Audenried	Lehigh and Wilkesbarre Coal Co	Michael Hennessey.
20.....	19...	....do.....No. 4.....	....do	...do.....do.....do	James O'Donnell.
21.....	20...	Stanton.....	Gilberton.....	Miller, Hoch & Co.....	James Carrabine.
Nov. 13.....	21...	....do	....do	....do.....do	William Jackson.
23.....	22...	No. 2 slope	Lost Creek	Philadelphia Coal Company	John Cafferty.
Dec. 5.....	23...	Colorado, No. 1.....	Colorado	....do.....do	William Richards.
6.....	24...	Koh-i-noor	Shenandoah	Richard Heckscher	Frederick Guest.

LIST OF NON-FATAL ACCIDENTS in the Shenandoah district, Schuylkill county, for the year ending December, 1876.

DATE.	No. of acc't.	Name of Colliery.	Location.	Name of Owner or Agent.	Persons Injured.
Jan. 31.....	25...	Cuyler	Raven Run.....	Heaton & Bros.....	John Walsh.
Feb. 8.....	26...	Lehigh, No. 3	Shenandoah.....	Philadelphia Coal Company	Daniel Owens.
Jan. 4.....	27...	....do... No. 4	Audenreid	Lehigh and Wilkesbarre Coal Co	Peter Boyle.
26.....	28...	No. 4, Lost Creek	Lost Creek	Philadelphia Coal Company	John Johns.
Feb. 12.....	29...	Wm. Penn	Wm. Penn	William Penn Coal Company	Benjamin Beddall.
Mar. 11.....	30...	Mahanoy City	Mahanoy	P. and R. Coal and Iron Company ...	Daniel Westwood.
April 3.....	31...	Tunnel Ridge	....do	George W. Cole	Isaac Jones.
Mar. 30.....	32...	Knickerbocker	Yatesville.....	P. and R. Coal and Iron Company ...	Edw'd Fitzsimmons.
April 8.....	33...	Cuyler	Raven Run.....	Heaton & Bros.....	William Burns.
22.....	34...	Plank Ridge	Shenandoah.....	P. and R. Coal and Iron Company ...	James Durkin.
24.....	35...	West Shenandoah.....	....do	....do.....do.....do	Robert Siddall.
22.....	36...	Mahanoy City	Mahanoy	....do.....do.....do	John Rowley.
22.....	37...	....do	....do	....do.....do.....do	George Ellis.
24.....	38...	Knickerbocker	Yatesville.....	....do..... ...do.....do	William Gregory.
29.....	39...	Indian Ridge.....	Shenandoah.....	....do.....do.....do	Evan Richards.
May 2.....	40...	Boston Run	Boston Run	....do.....do.....do	James Mittall.
3.....	41...	Lawrence	Mahanoy Plane	Lawrence, Merkle & Co.....	John Scanlon.
4.....	42...	Turkey Run	Shenandoah.....	Haas, Brenizer & Co.....	Edward Flattery.
10.....	43...	....do	....do	....do.....do	Patrick Hughes.
June 13.....	44...	Elmwood	Mahanoy	P. and R. Coal and Iron Company ...	John Kline.
14.....	45...	Plank Ridge	Shenandoah.....	....do.....do.....do	David Fitzgerald.
22.....	46...	Stanton	Gilberton.....	Miller, Hoch & Co.....	John Eltringham.
	47...	Ellen Gowen	Near Shenandoah	P. and R. Coal and Iron Company ...	Andrew Wisker.
	48...	Thomas	Shenandoah.....	Thomas Coal Company.....	Philip Beck.
July 28.....	49...	Plank Ridge	....do	P. and R. Coal and Iron Company ...	James Tallet—*died.*
Aug. 21.....	50...	Lehigh	Mahanoy	Hazard, Fisher & Co.....	Frank Manied.
Sept. 8.....	51..	Bear Run	St. Nicholas	Wiggan & Tribbles	Joseph Richards.
14.....	52...	Plank Ridge.....	Shenandoah.....	P. and R. Coal and Iron Company ...	Bernard Smith—*died.*
18.....	53...	Mahanoy City.....	Mahanoy	....do.....do	John Schwartz.
18.....	54...	Hammond	Girardville	Gross, Moody & Co	James Butler.
9.....	55...	Vulcan	Mahanoy	Samuel I. Atkinson.....	Willie Salmon.
Oct. 12.....	56...	Indian Ridge.....	Shenandoah.....	P. and R. Coal and Iron Company ...	John Siduskie.
14.....	57...	Stanton.....	Gilberton.....	Miller, Hoch & Co.....	William Irvin.
18.....	58...	No. 2	Lost Creek	Philadelphia Coal Company	Martin Donohoe.
21.....	59...	Turkey Run.....	Shenandoah.....	Haas, Brenizer & Co.....	John Radkin.
Nov. 14.....	60...	St. Nicholas	St. Nicholas	St. Nicholas Coal Company	William Blair—*died.*
16.....	61...	Wm. Penn	Wm. Penn	William Penn Coal Company	William James.

LIST OF NON-FATAL ACCIDENTS—*Continued.*

DATE.	No. of acc't.	Name of Colliery.	Location.	Name of Owner or Agent.	Persons Injured.
Nov. 16.....	62 ..	Wm. Penn	Wm. Penn	William Penn Coal Company	Thomas Horan.
16.....	63...	Plank Ridge	Shenandoah.....	P. and R. Coal and Iron Company ...	John Stack.
18. ...	64...	Stanton	Gilberton.....	Miller, Hoch & Co.....	John Lamb.
25.....	65...	....do	....do	....do.....do.....	Dennis Mahony.
Dec. 1.....	66...	Shenandoah City.....	Shenandoah	James Neal, trustee	Joseph Boeam.
1.....	67...	....do	....do	....do.....do.....	Peter Monaghan.
6.....	68...	Stanton.....	Gilberton.....	Miller, Hoch & Co.....	Joseph Sullivan.
6.....	69...	Ellen Gowen	Near Shenandoah	P. and R. Coal and Iron Company ...	Thomas Cook.
11.....	70...	East Mahanoy.....	Mahanoy	Focht, Whittaker & Co.....	Alexander Coldy.
15.....	71...	Hammond	Girardville	P. and R. Coal and Iron Company ...	Michael Carney.
28.....	72...	Boston Run	Boston Run	....do.....do.....do.....	Peter Crone.

LIST OF ACCIDENTS.

No. of accident...	Occupation.	Age	Widow.....	No. of children...	Cause of Death.	Fire-damp explosions.....	Falls of roof.....	Falls of coal.....	Falling into shafts or slopes	By explosions of blasting powder,	Miscellaneous under ground.....	Above ground....	Falling under and crushed by cars,	Total deaths .....
1..	Laborer	22	.....	.....	Crushed between a water car and slope collar.....	.....	.....	.....	.....	.....	.....	.....	1	1
2..	Spragger	15	.....	.....	Crushed between two cars while riding on bumpers	.....	.....	.....	.....	.....	.....	.....	1	1
3..	Miner	24	.....	.....	Crushed by the cage in the shaft.....	.....	.....	.....	.....	.....	1	.....	.....	1
4..	....do	56	1	4	Fall of roof in a breast.....	.....	1	.....	.....	.....	.....	.....	.....	1
5..	....do	24	1	....	Fall of coal in a chute.....	.....	.....	1	.....	.....	.....	.....	.....	1
6..	Laborer	56	1	1	Boiler explosion.....	.....	.....	.....	.....	.....	.....	1	.....	1
7..	Miner	42	1	4	Smothered in trying to start dirt in an air hole which was blocked.....	.....	.....	.....	.....	.....	1	.....	.....	1
8..	....do	38	1	3	Same as above.....	.....	.....	.....	.....	.....	1	.....	.....	1
9..	....do	23	.....	.....	Fall of coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
10..	Laborer	24	.....	.....	Crushed by a car in slope	.....	.....	.....	.....	.....	.....	.....	1	1
11..	Door boy.....	15	.....	.....	Crushed between car and door in gangway	.....	.....	.....	.....	.....	.....	.....	1	1
12..	Laborer	18	.....	.....	Crushed by a car on the coal plane at breaker.....	.....	.....	.....	.....	.....	.....	1	.....	1
13..	Miner	48	1	4	Fall of surface in a hole which had fallen to day-light	.....	.....	.....	.....	.....	1	.....	.....	1
14..	....do	38	1	9	Fall of coal in breast	.....	.....	1	.....	.....	.....	.....	.....	1
15..	Laborer	26	.....	.....	Caught in chute while drilling a hole in a lump of coal in a battery.....	.....	.....	.....	.....	.....	1	.....	.....	1
16..	Miner	33	1	3	Fall of coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
17..	Laborer	18	.....	.....	Caught in a coal chute.....	.....	.....	.....	.....	.....	1	.....	.....	1
18..	Miner	47	1	6	Fall of coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
19..	....do	48	1	5	Fall of top coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
20..	Driver.....	17	.....	.....	Fell under a car on the breaker trestling.....	.....	.....	.....	.....	.....	.....	1	.....	1
21..	Miner	46	1	9	Fall of coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
22..	....do	30	1	3	Lump of loose coal rolling down from pile in breast	.....	.....	.....	.....	.....	1	.....	.....	1
23..	....do	21	.....	.....	Fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	1
24..	Laborer	24	.....	.....	Crushed by the cage in bottom of shaft	.....	.....	.....	.....	.....	1	.....	.....	1
						.....	1	8	....	.....	8	3	4	24

LIST OF ACCIDENTS—*Continued.*

No. of accident...	Occupation.	Age.....	Widow.....	No. of children...	Cause of Injury.	Fire-damp explosions.....	Falls of roof.....	Falls of coal.....	Falling into shafts or slopes.....	By explosions of blasting powder,	Miscellaneous under ground.....	Above ground....	Falling under and crushed by cars,	Total accidents...
25..	Driver.....	....	.....	...	Fell under a mine locomotive, the wheel passing over his hand which had to be amputated	.....	.....	.....	.....	.....	.....	1	.....	1
26..	Miner	....	.....	....	Leg broken by a fall of coal.....	.....	.....	1	.....	.....	.....	.....	.....	1
27..	....do	...	.....	....	Collar bone broken.....	.....	.....	1	.....	.....	.....	.....	.....	1
28..	....do	....	.....	....	Severely bruised on the head by a piece of timber falling down an air shaft.....	.....	.....	.....	.....	.....	1	.....	.....	1
29..	Out. foreman.	....	.....	....	Hip dislocated by being struck with a mine car ...	.....	.....	.....	.....	.....	.....	.....	1	1
30..	Miner	....	.....	....	Slightly injured by a fall of coal, sinking slope....	.....	.....	1	.....	.....	.....	.....	.....	1
31..	....do	....	.....	....	Leg broken while in the act of stepping down out of an under-ground engine room	.....	.....	.....	.....	.....	1	.....	.....	1
32..	....do	....	.....	....	Burned by an explosion of gas.....	1	.....	.....	.....	.....	.....	.....	.....	1
33..	....do	....	.....	....	Leg broken by a fall of coal in a breast	.....	.....	1	.....	.....	.....	.....	.....	1
34..	....do	....	.....	....	Severely injured by a fall of coal in a breast.....	.....	.....	1	.....	.....	.....	.....	.....	1
35..	....do	....	.....	....	Hip dislocated by being struck with a mine car ...	.....	.....	.....	.....	.....	.....	.....	1	1
36..	....do	....	.....	....	Burned by igniting a keg of blasting powder.....	.....	.....	.....	.....	1	.....	.....	.....	1
37..	....do	....	.....	....	Slightly burned by explosion of gas.	1	.....	.....	.....	.....	.....	.....	.....	1
38..	Driver.....	....	.....	....	Collar bone broken; jammed by his mule.....	.....	.....	.....	.....	.....	1	.....	.....	1
39..	....do	....	.....	....	Thigh broken by a dirt car striking him.....	.....	.....	.....	.....	.....	.....	1	.....	1
40..	Miner	....	.....	....	Injured severely by premature explosion of a shot,	.....	.....	.....	.....	1	.....	.....	.....	1
41..	....do	....	.....	....	Burned by an explosion of gas.....	1	.....	.....	.....	.....	.....	.....	.....	1
42..	....do	....	.....	....	Severely burned by igniting a keg of powder.....	.....	.....	.....	.....	1	.....	.....	.....	1
43..	....do	....	.....	....	Severely burned by igniting a keg of powder.....	.....	.....	.....	.....	1	.....	.....	.....	1
44..	....do	....	.....	....	Slightly injured by a fall of roof in breast.....	.....	1	.....	.....	.....	.....	.....	.....	1
45..	....do	....	.....	....	Slightly injured by piece of coal flying from a shot,	.....	.....	.....	.....	.....	1	.....	.....	1
46..	Breaker boy..	....	.....	....	Leg broken by being caught in a belt pulley	.....	.....	.....	.....	.....	.....	1	.....	1
47..	Laborer	....	.....	....	Injured by a fall of coal in a breast.....	.....	.....	1	.....	.....	.....	.....	.....	1
48..	....do	....	.....	....	Leg broken by slipping off a step at boiler house ..	.....	.....	.....	.....	.....	.....	1	.....	1
49..	Miner	....	.....	....	By a fall of coal in breast; died six weeks after....	.....	.....	1	.....	.....	.....	.....	.....	1
						3	1	7	.....	4	4	4	2	25

List of Accidents—*Continued.*

No. of accident.	Occupation.	Age	Widow	No. of children	Cause of Accident.	Fire-damp explosions	Falls of roof	Falls of coal	Falling into shafts or slopes	By explosions of blasting powder,	Miscellaneous underground	Above ground	Falling under and crushed by cars,	Total accidents
50	Miner				Burned severely by igniting a keg of powder					1				1
51	Driver				Skull fractured by a kick from a mule							1		1
52	Miner		1	1	Thigh broken and injured int. by fall of coal; died			1						1
53	....do				Burned by gas; caused by entering his breast at night with naked lamp	1								1
54	....do				Leg broken near ankle, struck with a piece of coal,						1			1
55	State picker				Injured by attempting to get on connecting rod of breaker engine							1		1
56	Laborer				Hand badly mutilated by being run over by a car,							1		1
57	Miner				Slightly burned by gas	1								1
58	Laborer		1		Skull fractured between 2 cars, died 6 weeks after,								1	1
59	Miner				Slightly injured, gangway collar rolled against him						1			1
60	....do				Burned by explosion of gas, caused by entering his breast before it was examined	1								1
61	....do				Severely injured by a fall of coal			1						1
62	....do				Severely injured by a fall of coal			1						1
63	Driver				Slightly injured by being struck by a car								1	1
64	Miner				A severe cut on the hand by a piece of coal			1						1
65	....do				Slightly burned by gas	1								1
66	....do				Slightly burned by gas	1								1
67	....do				Slightly burned by gas	1								1
68	....do				Slightly injured by a fall of coal			1						1
69	Driver				Severely injured, having both legs broken and hand cut by falling under a car							1		1
70	Laborer				Foot injured by being crushed under a car wheel						1			1
71	....do				Leg broken by being caught in a chute by coal starting from battery						1			1
72	Miner				Collar bone broken by a fall of coal			1						1
						6		6		1	4	4	2	23

IMPROVEMENTS.

There have been but very few new openings under way this year to be compared with years previous to this, which is owing to the depression in the coal trade. Nevertheless in the face of these dull times there has been some extensive improvements made during the year, with an expectation of a good demand for coal in the future.

New Openings Completed During 1876.

Miller, Hoch & Co.'s new slope, commenced and completed this year, sunk to the depth of 720 feet, on an average angle of 60°; vertical depth, 623 feet. The opening is on Mammoth vein, which is 35 feet thick at this place, and in splendid condition. As a rule the coal in this basin is purer than any other coal basin north of the Broad Mountain, for generally the coal is a bright and glossy fracture through the whole of the benches, with but a small percentage of impurities running through the different beds or benches to be compared with the Shenandoah basin. A tunnel is about to be driven north from the Mammoth, which will cut the Seven-foot, Skidmore and Buck Mountain veins, which, when completed, will make this one of the largest producing collieries in the Mahanoy Valley.

At the Furnace colliery of Atkins Bros. a new slope has been sunk to the depth of 420 feet on an average angle of 40°, south dip. The opening is on the Buck Mountain vein, which at this place ranges in thickness from 10 to 14 feet.

At the "Copley" colliery of Lentz & Bowman, a new shaft that was commenced in 1875 and is now completed, striking the Buck Mountain vein near the centre of the basin, 230 feet deep. The outside improvements at this colliery is very complete and built in a very substantial manner. The hoisting cages are also provided with safety appliances in accordance with the requirements of the law.

At the Mahanoy City colliery a new inside slope was commenced in 1875 and completed early in the spring of this year. This opening is on the top split of the Mammoth vein, and sunk 110 yards. The hoisting machinery consists of a pair of engines, 120-horse power. There are also two pair of air compressers, 80-horse power, built by Messrs. Allison & Bannon, which supplies the motive power. This is a great improvement on the old system of using boilers inside, and is also superior for carrying steam into the mines.

At the William Penn colliery a new inside slope has been completed this year, and sunk to a depth of 120 yards below the present shaft level, on an average angle of 45°. Steam is used as the motive power, and carried from the boilers located at the surface. One 40-horse power engine is used for hoisting purposes.

At the Cuyler colliery of Heaton & Bros. a new inside slope has also been completed this year. This opening is on the Buck Mountain vein, and sunk to the depth of 457 feet, on an average angle of 10°, north dip.

At Turkey Run colliery a new inside slope has been sunk 110 yards on an angle of 27°, north dip, and gangways opened. One 40-horse power engine is used for hoisting. The steam boilers are located outside.

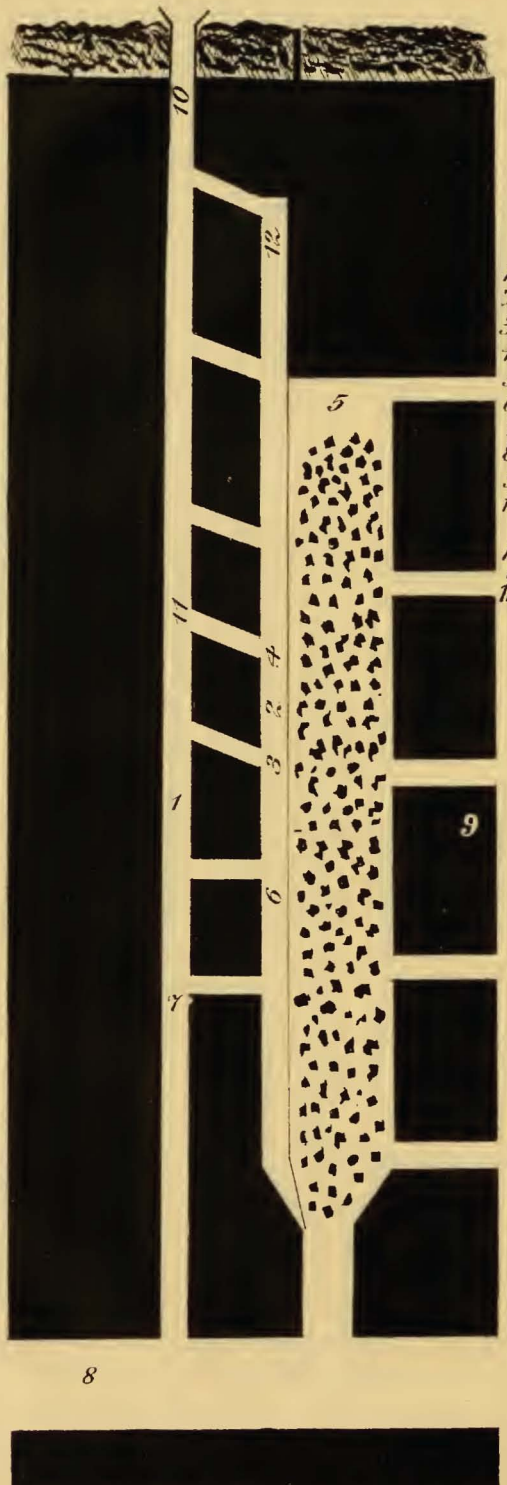
CHARACTERISTICS OF COLLIERIES.

NAME OF COLLIERY.	NAME OF OWNERS OR LESSEES.	NAME OF LANDOWNERS.	Number of drifts in operation	Number of tunnels in use	Number of inside slopes	Number of slopes	Number of shafts	Number of breakers	Number of boilers	EMPLOYEES. Inside	EMPLOYEES. Outside	Amount of coal sent to market in tons	Amount sold and consumed at the mines	Total amount produced in tons
William Penn	Wm. Penn Coal Company	Girard estate			1		1	2		250	250	118,000	6,000	124,000
Koh-i-noor	Richard Heckscher & Co	John Gilbert and others			1		1	1		167	132	85,077	5,000	90,000
Indian Ridge	P. and R. Coal and Iron Company	P. and R. Coal and Iron Company					1	1				106,213	6,000	112,213
Plank Ridge	do do do	do do do				2	1	1				99,074	4,000	103,074
West Shenandoah	do do do	John Gilbert and others				1	1	1				60,909	2,400	63,309
Knickerbocker	do do do	P. and R. Coal and Iron Company	1	1		1		1				108,985	5,000	113,985
Ellen Gowen drift	do do do	do do do	1				1	1				87,884	4,000	91,884
Ellen Gowen shaft														
Mahanoy City	do do do	do do do			1	1		1		1,530	1,138	68,362	5,000	73,362
North Mahanoy	do do do	do do do		1		1		1				50,217	3,000	53,217
Elmwood	do do do	do do do		1		1		1				38,211	3,000	41,211
Boston Run	do do do	do do do		1		1		1				50,151	3,000	53,151
Girard	do do do	Girard estate		1		2		1				46,290	5,000	51,290
Girardville	do do do	do				1		1				99,652	5,000	104,652
Hammond	do do do	do	5											
Centennial	do do do	John Gilbert and others	New											
Lehigh, No. 3	Philadelphia Coal Company	Girard estate				2		1		162	152	75,747	5,000	80,747
Lehigh, No. 4	do do	do				1		1		167	174	112,118	6,000	118,118
Lehigh, No. 2	do do	do				2		1						
Colorado, No. 1	do do	do				1		1		154	164	59,871	4,000	63,871
Honey Brook, No. 1	Lehigh and Wilkesbarre Coal Co	Lehigh and Wilkesbarre Coal Co			1	1		1		154	119	92,667	6,404	99,071
Honey Brook, No. 4	do do do	do do do			1	1		1		109	99	81,138	7,359	88,497
Honey Brook, No. 5	do do do	do do do				1		1		166	106	119,702	4,386	124,088
Honey Brook, No. 3	do do do	do do do				1								
Bear Ridge, No. 1	Bear Ridge Coal Company	Girard estate				1		1		150	250	93,774	6,226	100,000
Bear Ridge, No. 2	do do	do		1				1						
Thomas	Thomas Coal Company	do				2		1		196	211	89,368	5,494	94,862
Lawrence	Lawrence, Merkle & Co	John Gilbert and others				2		1		100	152	81,000	4,000	85,000
Stanton	Miller, Hoch & Co	do				2		1		107	144	56,000	4,000	60,000
Gilberton	Gilberton Coal Company	do do				2		1		79	139	86,000	5,691	91,691
Hickory	do do	do do				2		1		112	112	41,000	4,000	45,000
Furnace	Atkins & Bros	do do	1	1		1		1		35	25	13,796	500	14,296
Bear Run	Wiggan & Treibles	P. and R. Coal and Iron Company				1		1		80	100	57,651	4,000	61,651
St. Nicholas	St. Nicholas Coal Company	do do do				1		1		95	96	51,876	4,000	55,876
Tunnel Ridge	Geo. W. Cole	do do do		1		1		1		130	148	40,132	4,000	44,132
Glendon	Haydon & Co	Delano Land Company		1		1		1		103	85	13,060	2,000	15,060
East Mahanoy	Focht, Whittaker & Co	do					1	1		109	114	56,553	2,000	58,553
Copley	Lutz & Bowman	do do	3				1	1		102	107	46,111	2,000	48,111
West Lehigh	Fisher, Hazard & Co	do do		1		1		1		130	120	65,443	5,000	70,443
Pine Creek	Thomas, Roberts & Co	do do				1		1		25	50	3,096	500	3,596
Primrose	Primrose Coal Company	do do			1	1		1		155	59	54,350	3,000	57,350
Beaver Run	Kite & Collins	do do		1				1		20	10	1,977	23	2,000
Shenandoah City	James Neal, trustee	P. and R. Coal and Iron Company	1		1	1		2		241	83	48,999	4,000	52,999
Turkey Run	Haas, Brenizer & Co	John Gilbert and others	1	1	2			1		151	96	59,200	2,800	62,000

CHARACTERISTICS OF COLLIERIES—*Continued.*

NAME OF COLLIERY.	NAME OF OWNERS OR LESSEES.	NAME OF LANDOWNERS.	Number of drifts in operation	Number of tunnels in use	Number of inside slopes	Number of slopes	Number of shafts	Number of breakers	Number of boilers	EMPLOYEES. Inside	EMPLOYEES. Outside	Amount of coal sent to market in tons	Amount sold and consumed at the mines.	Total amount produced in tons
Suffolk	Suffolk Coal Company	P. and R. Coal and Iron Company.	1	1		1		1		123	85	44,680	2,000	46,680
Cuyler	Heaton & Co	Girard heirs	2		1			1		125	120	51,000	4,000	55,000
Girard Mammoth	Mammoth Vein Coal Company	do	1			1		1		116	113	51,000	4,000	55,000
Hartford, No. 1	Richard, Phillips & Co	P. and R. Coal and Iron Company.	1					1		40	10	8,113		8,113
Hartford	King, Tyler & Co	do do do	1					1		10	5	6,290		6,290
Staffordshire	Ward, Jones & Ollver	do do do	1	1				1		21	14	7,458		7,458
Turkey Run Primrose	Jones, Banks & Co	John Gilbert and others	1					1		10	5	5,000		5,000
Koh-i-noor Primrose	Evans & Co	do do	1					1		10	5	4,000		4,000
Vulcan	Samuel I. Atkinson	Delano Land Company	1	1		1		1		87	44	36,216	2,000	38,216
Grant	Parmlee & Russell	do do		2				1		49	38	7,507		7,507
Myersville	Idle	do do												
Silver Brook	Idle	Lehigh and Wilkesbarre Coal Co.												
Hillside	Abandoned	P. and R. Coal and Iron Company.												

Plan representing place where accident N° 7 & 8 occurred at Bear Ridge Colliery N° 1



1 Where Halvey was found.
2 Where Mahoney was smothered.
3 Cross Cut being opened.
4 Cross Cut Dirt rush out of.
5 Breast full of Loose Coal.
6 Manway in Breast.
7 Manway in Pillar.
8 Main Gangway.
9 Outside Pillar of Breast.
10 Where the Hole was being enlarged.
11 A piece of Manway driven in & the solid for the purpose of ventilating the hole driven to surface.
12

FATAL ACCIDENTS FROM FALLS OF COAL.

No. 5. John M'Lendy, a miner, was killed by a fall of coal in a chute at Indian Ridge colliery. M'Lendy had just returned into the face of the chute after firing a shot, we suppose, without ever making an examination of the nature of the coal which formed the roof. From the evidence taken at the investigation it appears that M'Lendy had a car standing partly loaded, but had not sufficient coal to finish it until the shot was fired; being in a hurry, no doubt, to finish the car he rushed back to the face without taking the necessary precaution.

No. 9. Patrick M'Grady, a miner, was killed instantly by a fall of coal at Knickerbocker colliery. The seam is about 15 feet thick; the sense of hearing is about the only safeguard under these circumstances.

No. 14. Henry Jones, a miner, was killed instantly by a piece of coal falling on him while in the act of crossing his breast.

No. 16. Thomas Cassidy, a miner, was killed instantly by a fall of coal at Indian Ridge colliery. Cassidy had just fired a shot, and undoubtedly did not allow time for the place to settle, neither had the powder smoke time to clear away.

No. 18. Michael Hennessy, a miner, was killed instantly by a fall of coal at Honey Brook colliery, No. 1. From the evidence given at the inquest it would appear that Hennessy was doubtful in regard to the safety of working under the coal which fell on him, and caused his death. A short time before the accident he called a miner, who was working the next breast outside of him, to obtain his opinion. After examining the coal they concluded that it was dangerous, and remarked one to the other that it was worth watching. In about fifteen minutes after the other miner left the place the coal fell, killing him.

No. 20. James O'Donnell, a miner, was killed by a fall of coal at Honey Brook colliery, No. 4. In this case I must say that there was a great deal of carelessness displayed. The dip in this place was about 45°, and coal very jointy, running at all angles, which makes large coal seams very dangerous even at the face. O'Donnell went down the middle of the breast a distance of 15 yards on top of the loose coal to drill a hole in the top coal of the seam. On examining the breast I found the manway in good condition, but in and down the middle of the breast there were large bodies of coal hanging ready to fall. Yet in the face of all these dangers this man ran the risk of going down the distance before mentioned, with no place whatsoever in which to escape. From the evidence given by the laborer who was working with him at the time the coal hanging over them had been working all the while they were drilling the hole which they intended to fire, and they had retreated up to the face of the breast several times expecting a fall to come. The last time they went back it was to tamp the hole, having the powder in. While in the act of tamping the mass of coal which they had the shot in fell, killing O'Donnell instantly and slightly injuring the laborer.

No. 21. William Jackson, a miner, was killed by a fall of coal in the Stanton colliery, near the Mahanoy Plane. It appears that he had just fired a shot and had returned to the face, and was in the act of dressing down the loose coal when a piece fell from the face, striking him on the forehead, cutting his head almost in two halves.

No. 23. William Richards, a miner, was killed by a fall of coal at Colorado colliery, No. 1. The angle here is from 60° to 70°, and worked by

the run. On examining the place I found the manways in good condition, much better than manways are generally kept. At the face the coal was very jointy (what miners generally term slippy) and free, which makes these places very dangerous, unless there is a great deal of care and precaution used. As far as the working of this place was concerned undoubtedly it was worked in as safe a manner as the nature of the circumstances would permit. Nevertheless we think that the deceased exposed himself to dangers, which he ought not to have, by crossing into the middle of the breast, which was extremely dangerous owing to the steep angle and the nature of the seam.

Fatal Accidents from Falls of Roof.

No. 4. John Sthall, a miner, was killed by a fall of roof in a breast in Mahanoy City colliery.

Fatal Accidents from Mine Cars.

No. 1. John Wilkes, a laborer, was instantly killed at Lost Creek colliery, No. 5. He was caught between the cover of a water car and a piece of timber. He was assisting some other men to complete the bottom of the new slope, and he had been laboring in the slope while sinking, so he must have been fully aware of the danger of attempting to ride on the top of the water car out of the sump. There was not more than three inches of space between the top of the car and the under-side of the piece of timber which formed the floor of the gangway. Below this point there was from three to four feet of room above the top of the car; also above the same point there was from six to eight feet of room above the car. All the other men working with Wilkes came up out of the sump and waited to have the car hoisted to the level of the platform, where they made it a rule to get on the car to ride up the slope. Instead of Wilkes doing as they did, he remained in the sump until the car started, and threw himself on the cover of the car and was hoisted to the point where the top of the car and the piece of timber forming the floor of gangway came nearly together, and he was crushed to death in the most fearful manner. From the information gleaned at the investigation it appears that it was only a short time before this that the same man was thrown off the spreader-chain, barely escaping being crushed.

No. 2. Abraham Hains, a boy, whose work it was to sprag the cars at the bottom of the slope at Stanton colliery, was mortally injured and died in a few hours after the accident occurred. He had left his place at the slope bottom, and was riding on the front bumper of a car, and in passing around a curve was thrown under the car, with fatal results.

No. 10. Michael Russell, a laborer, was crushed to death between a car and centre prop in the new slope at Furnace colliery, Gilberton. The deceased was attending to some blocking which was under the wheels of car that was off the track, down about twenty yards from the top of the slope. While they were in the act of trying to get it on the blocking slipped from under the wheels on the side at which Russell was standing, causing the car to lurch to that side, crushing him between the prop and car.

No. 11. John Walsh, a door-tender, was killed at Indian Ridge shaft, (owned by the Philadelphia and Reading Coal and Iron Company,) by being caught between a door and car. The supposition at the time was that the boy had fell asleep and did not awake until the car was close at hand, and in rushing to open the door was caught by the car, receiving fatal injuries, from which he died shortly after the occurrence.

No. 12. Edward Brennan, an outside laborer, was mortally injured at the Cuyler colliery by being thrown from off the front of an empty car on a coal plane. The car passed over him, crushing him internally, from the effects of which he died in a few hours after the accident.

No. 20. James Carrabine, an outside driver, was killed at the Stanton colliery. It would appear from the testimony given at the investigation that the boy had unhitched his mule from the loaded car, and was running ahead of the car; also that he was in the act of picking up a sprag from the track when he was knocked down by the car which passed over him, killing him instantly.

Miscellaneous Underground Accidents.

No. 7. James Holvey, a miner, was smothered at Bear Ridge colliery, No. 1, Mahanoy Plane. He and some others had just driven an air-hole out to the surface, and had commenced to enlarge it and also to timber it down from the top. The dip was 55°. After standing a few set of timbers the hole became blocked with dirt which they had put down. Holvey, as he could not work any longer on account of the hole being filled up, went down the slope. He saw the inside foreman on the gangway, and told him that the hole was blocked. The foreman told him to go and see where, and what the obstruction was which had blocked the dirt. It would appear that he went up about sixty yards from the gangway and there found the passage blocked. There is every reason to believe that, in the face of all the danger, he started the dirt without even trying to secure his own safety. The result was, he was caught with the rush and smothered before assistance could be rendered. We do not hesitate to say that if there had been anything like precautionary measures used in this case, by Holvey, this accident would not have occurred.

No. 8. Jeremiah Mahony, a miner, was also smothered at Bear Ridge colliery, No. 1, while helping to get Holvey out. There was a breast running parallel with the air hole, having six yards of a pillar between them, with cross-cuts cut through the pillar about every ten yards. Holvey was caught between two of these openings. The breast manway was open, and also the cross-cuts. Mahony, with two other men, passed through the last cross-cut they could get to in the air hole. It was supposed that Holvey was between the last named cross-cut and the next above, which proved to be correct, as it was there where he was found. It appeared to have been the intention of Mahony to open the cross-cut above, which was full of dirt that had run in from the air hole, and from this point to put in poles to debar the dirt above the cross-cut from running until Holvey was taken out. The manway was very small, not allowing room for the three men to work. Mahony went above the cross-cut and sat in the manway while the other two men were clearing the cross-cut, which was a very unsafe position. From the evidence taken at the inquest it appears that these two men had told Mahony several times that he was in a very unsafe place and wanted him to come down to the cross-cut, they dreading that the dirt would rush out of some of the cross-cuts and catch him. But he told them that he was safe and to go ahead with getting the dirt out of the cross-cut. As the men had anticipated so it happened. Before they had got near through with the work a rush of dirt came out of one of the cross-cuts catching Mahony and burying him alive.

No. 13. William Thomas, a miner, was killed at Lost Creek, No. 2, by a fall of surface while taking out coal from one of the old holes which had

fallen through to daylight. Thomas had the reputation of being a good miner and very industrious man, but also of being very anxious to make money, and that he often times ran risks which were unnecessary where life is at stake. From the testimony taken in this case it appears the man who was working with him had tried to induce him to leave the hole until the place would settle, as there were pieces of surface continually dropping from the sides, but remonstrances were to no purpose as he was in dread the fall would come and bury some loose coal that was laying in the hole. The result was the fall came striking Thomas and breaking his neck.

No. 22. John Cafferty, a miner, was killed at Lost Creek colliery, No. 2, by a lump of coal rolling down from the top of a pile out of which he and his laborer were loading at the time, catching him between a small car (called buggy) and the lump of coal, killing him instantly. In this case Cafferty's attention had been called to the danger by his laborer, and they had every opportunity of moving the lump and making the place safe, but failed to do so. The verdict of the coroner's jury was: that the deceased came to his death through gross carelessness.

No. 24. Frederick Guest, a laborer, was crushed by the cage, killing him instantly, at the bottom of Koh-i-noor shaft, while attempting to cross the bottom while the cage was in motion. This is against the rules of the colliery, and furthermore it is not necessary that any person should cross the shaft bottom at any time, as there is a traveling way around the bottom of the shaft from the east to the west side. It appears from the testimony taken at the coroner's investigation that he did not attempt to cross until the cage was within ten feet of the bottom. To prevent accidents of this description there might be self-acting gates used similar to those in use on the top of shafts, made to work inversely, so that the cage would press them down, and as the cage was raised they would follow it up until the opening was closed.

No. 15. Patrick Gallagher, a laborer, was killed at Bear Ridge colliery, No. 2, by being caught in a chute while in the act of drilling a hole in a piece of rock in a battery. The rock in which he was drilling gave way, catching him in the chute and crushing him to death.

No. 17. Henry Foulk, a laborer, was killed in Lawrence & Merkle's colliery, foot of Mahanoy Plane. It appears that he had drawn the chute empty owing to the battery being blocked with a large lump of coal. The man, whose work it was to attend to the starting of the battery, thought it best not to start it before they had an empty car, as the coal might have rushed on to the gangway. When the car arrived at the chute the starter commenced to free the lump. In the meantime Foulk got up into the chute and when the coal started the large lump struck a centre prop in the middle of the chute which the deceased was standing against. It appears that the sudden jar of the blow in striking the prop which he was leaning against caused a concussion of the brain, as there were no marks of violence on his person. However, he had no business in the chute while it was being started, as he had nothing to do even on the platform until the chute was full.

No. 3. Edward Broughall, a miner, was killed instantly at the Ellen Gowen colliery by being caught between the cage and the shaft timbers. This accident may be classed with several others. Provided proper care and precaution had been taken the accident would not have occurred. Broughall had just come down the shaft during the dinner hour, and on his arrival at the bottom he got off the cage. Just at this time another man arrived at the bottom of the shaft who had been kicked on the leg by

a mule. This man got on the cage to be hoisted up when Broughall also returned and got on the cage to make some inquiry regarding the extent of the other man's injuries. It appears that the deceased stayed on the cage until it started to ascend when he attempted to jump off and was caught between the cage and the shaft timbers, crushing his head in a most fearful manner.

No. 25. James Tallett, a miner, was injured at the Plank Ridge colliery by a fall of coal in his breast, and died from the effects about six weeks after the accident occurred. This man's attention had been called to the danger of working under the piece of coal which fell on him, and he was told by miners working in the next breast to him that it was not safe, but paid no attention to their warning. His neglect resulted in his being so seriously injured that he died in the time above mentioned.

No. 26. William Blair, a miner, was burned by an explosion of fire-damp (carbureted hydrogen gas) while in the act of entering his breast. Although this man did not appear to be seriously burned, and it was also the opinion of those attending him that there was no danger, nevertheless Blair died. In this case there was neglect on both sides, on the part of those in charge of the colliery and Blair himself. This was the verdict of the jury on investigating the cause of the accident. This accident occurred at the St. Nicholas colliery, Mahanoy Valley.

No. 27. Barney Smith, a miner, was seriously injured at Plank Ridge colliery, by a fall of coal fracturing his thigh, which caused his death in about two weeks after the accident.

No. 6. James M'Loughlin, an outside laborer at Indian Ridge colliery, was mortally injured, only living a few hours after the accident. This accident occurred through the bursting of a steam boiler at this colliery. M'Loughlin at the time of the accident was under the breaker, which is located from 75 to 100 yards from the boilers, and was struck on the head with a piece of brick thrown from the walls which surrounded the boilers.

This was one of those mysterious kind of accidents which generally covers up its tracks in boiler explosions, but nevertheless there are a great many theories as to the causes, which was the case with this accident. These boilers had been examined by the boiler inspector's deputy four months before the accident occurred, and the exploded one reported a second class boiler, which, according to the testimony of the inspector's deputy given at the investigation, he considered safe in carrying 75 to 80 lbs. pressure to the square inch, which was the steam pressure carried in these boilers at the time of explosion. This boiler was 34 inches in diameter and 30 feet long, and when new was made of iron five-sixteenth of an inch thick, but at the time of the accident the bottom of the boiler was only one-eighth inch, increasing in thickness up to the water line, at which point it attained nearly its original thickness. The reducing of the iron in thickness was caused by the use of water containing mineral acid, which is very destructive to boilers and iron in general around the mines.

I think the testimony taken at the inquest leaves no room for doubt as to what was the cause of the bursting of said boiler. The first witness examined was Thomas Harkins, who said: "I am fireman at the Indian Ridge colliery; a few minutes before the accident I had coaled the fires, and also tried the water in this set of boilers and found the water between the second and top gauge, and the feed pump still pumping water into this set of boilers. I did not observe any leak or anything wrong with the boiler when coaling the fire, but I had no sooner closed the fire-door and commenced

coaling the next set of fires to the boiler which bursted when I saw the fire-door fly open. I went and closed it, again it blew open, and I ran and got my shovel and tried to close it again, but did not succeed, as the flame and steam was blowing out too strong. I became alarmed and ran to the engine room to report to the engineer, just as I entered I heard the report of the boiler bursting."

The next witness, James O'Herron, said: "I am a carpenter at said colliery, and was standing in front of the shop and saw the fireman trying to close the fire-door, and also saw the flame blowing out from two to three minutes before the boiler left its place." This man's testimony was corroborated by another carpenter who saw the whole proceedings

Verdict of the Coroner's Jury.—That the deceased, James M'Loughlin, came to his death by the bursting of a steam boiler at the Indian Ridge colliery; that the cause of the bursting of said boiler was owing to its being reduced to two-fifths of its original thickness and strength on the bottom part of said boiler.

Jurors—E. A. Levering, J. F. Jacoby, Daniel Ellis, T. W. Wilson, Jos. Beacham, John A. Smith.

CHARLES DENGLER, *Dep. Coroner.*

Ventilation.

This is one of the most important subjects connected with mining. Drainage is also a matter which permits of no secondary consideration. Where these two important branches are neglected, or not thoroughly understood, no matter how valuable the seam of coal may be, it must virtually be wrought at a loss by the operator. Therefore these two branches require no argument to impress their importance on those who fully understand the true principles which must govern in the future in mining anthracite coal. The natural advantages of mining coal above water level in the anthracite coal fields are nearly exhausted, and as each year rolls by we are compelled to go deeper into the bowels of the earth, and the difficulties to be met with increase in proportion to the depth we are required to sink.

The cost of mining depends very materially on the condition of ventilation, whether it be in mines that generate explosive gas or in those that do not, but to a greater extent in anthracite than in bituminous mines. This is owing to the large amount of powder used, requiring large volumes of air to sweep and carry away the smoke which results from blasting. Ventilation is therefore a very important matter to be considered even in the most harmless anthracite mines, as the safety of the workingmen, and the amount of labor which can be performed in a given time, depend upon the length of time it takes to clear the working places of powder smoke after the firing of a shot. If the air current is slack the miner may be kept from the face of his working place a half an hour before he can return with safety, whilst with a large current of air circulating through his working place he might have returned as soon as the shot was discharged, thereby saving time. This is a matter which may be studied by many colliery owners to their advantage, and also to the benefit of the workingmen. We do not hesitate to say that in some of our mines from ten to twenty per cent of the miners' time is lost from this cause, (powder smoke.)

At this time there can be no reasonable excuse offered by those in charge of collieries for not having an adequate amount of air for all purposes passing through all working places. At present it is only a question of dollars and cents, together with a practical knowledge of the natural laws, which

govern ventilation. If these two items are supplied there is scarcely a limit to the amount of air which can be circulated through the openings of a mine with the improved ventilators of the age.

There are forty-five fans in use in this district of various dimensions, varying somewhat in their construction and nearly all on the exhaust principle. Most of the different patterns are claimed to be superior to the others, and some parties go so far even as to give the amount of air these fans will discharge per minute for each certain size fan running at a given number of revolutions.

These calculations, no doubt, are correct theoretically, but there are very few of them which give the same results in practice. We do not wish to convey the idea but that some of these ventilators are superior to others, but the ventilation of a mine depends a great deal more on the size and construction of the openings the air has to pass through than it does on the ventilating machine.

It may not be out of place here to give the results of experiments with some of these fan ventilators; in particular two, which are eighteen feet in diameter, Guibal pattern, and built by the same parties. One of these fans is in use at what is known as the Ellen Gowan shaft, and at the time of the experiment was running forty-eight revolutions per minute, and was discharging 45,300 cubic feet of air per minute; drag as per water gauge, $\frac{6}{10}$ of an inch. The Indian Ridge fan, of the same dimensions, at the time of the experiment was running ninety revolutions per minute, and was discharging but 37,750 cubic feet per minute, water gauge indicating $1\frac{6}{10}$ inches. In another case a common exhaust fan, with open periphery fifteen feet in diameter, vanes five feet square, running eighty revolutions per minute, discharged 43,000 cubic feet, drag indicating by water gauge $\frac{7}{10}$ of an inch. It will be readily seen by these results that whilst at one of these mines it only required a ventilating pressure of $3\frac{12}{100}$ pounds per square foot to pass 45,300 cubic feet of air per minute, in the other case it required a ventilating pressure of $8\frac{32}{100}$ pounds to pass 37,750 cubic feet in the same given time.

TABLE showing the number of Fans in use.

NAME OF COLLIERY.	By what means ventilation is produced.	Depth of opening in feet.	Fan diameter in feet.	Number of fan side openings.	Number of revolutions per minute.	Cubic feet of air discharged per minute.	Drag of mines in inches of water gauge.	Closed or open periphery.	Ventilating pressure per square foot.
Indian Ridge	Guibal fan		18	1	88	37,750	1 6-10	Closed	
Ellen Gowen shaft	do		18	1	48	45,300	6-10	do	
Do drift	Fan		15	2	65	36,580	5-10	Open	
Knickerbocker	do		10	2					
Do	do		15	2					
Plank Ridge									
West Shenandoah	Fan		10	1	85	25,600		Closed	
Mahanoy City	do		14	2	80	23,200	6-10	do	
Do	do		10	2	85	10,000			
North Mahanoy	Propeller		7½	1	120	10,500			
Do	do		7½	1	130	8,250			
Elmwood	Fan		12	2	40	17,000		Open	
Boston Run	do		10	2					
Do	do		7	2					
Hammond	do		14						
Girardsville drifts	do		10						
Girard	do		10						
Do	do		10	2	144	13,200	1 8-10		
Bear Ridge, No. 1	do		14		80	20,000	1	Closed	
Do No. 2	Propeller fan		12		83	15,300	2-10		
Lawrence	Fan		12		125	14,300	1 1-10		
Stanton	do		14	2	80	23,000	7½-10		

TABLE SHOWING THE NUMBER OF FANS IN USE—*Continued.*

NAME OF COLLIERY.	By what means ventilation is produced	Depth of opening in feet.	Fan diameter in feet	Number of fan side openings	Number of revolutions per minute	Cubic feet of air discharged per minute	Drag of mines in inches of water gauge	Closed or open periphery.	Ventilating pressure per square foot
Gilberton	Steam pumps					22,000			
Hickory	Fan		14						
Do	do		14			18,000			
Furnace	Furnace								
Bear Run	Fan		8	2					
Do	do		15	2		35,200			
St. Nicholas	do		14	2		14,300			
Tunnel Ridge	Fan and furnace		9	2		25,000			
Vulcan	Fan		12	2		9,000			
Primrose	do		12	2	95	16,500			
Glendon	do		12	2	80	15,000			
West Lehigh	do		15	2	75	45,045	8-10	Closed	
Suffolk	do		12	2	90	10,000			
Keely Run	do		14	2	69	29,000	2-10	Open	
Koh-i-noor	do		15	2	80	43,000	7-10		
Lehigh, No. 3	do		10	2	116	39,500	5-10	Open	
Do., No. 4	do		10	2	120	50,000	5-10	Closed	
Lost Creek, No. 2	do		12				4-10		
Colorado, No. 1	do		12	2	120	30,800	4-10		
Girard Mammoth	Fan propeller		12						
Cuyler	Fan		14			21,120		Open	
East Mahanoy	do		10					Closed	
William Penn	do		16		80	25,400		Open	
Turkey Run	do		12	2	67	21,600	5-10	Closed	
Shenandoah City	do		16						
Copley	Furnace								
Trenton	do								
Hartford	Fan		9						
King, Tyler & Co	Furnace								
Raven Run	do								
Grant	do								
Honey Brook, No. 1	do								
Do. No. 3	do								
Do. No. 4	Exhaust steam								
Do. No. 5	do								

The greater danger attending the mining of anthracite coal as compared with that of the bituminous mines of Great Britain and of this and other States.

1st. OWING TO THE GREATER THICKNESS OF THE VEINS.

It is a fact well known to practical miners and those who understand mining that the liability to accident in mining in thick coal seams is far greater than in mining seams of moderate thickness. In the first place if we take the thick coal seam of South Staffordshire and compare it with the other mining districts of the British coal fields we find the casualties, both fatal and non-fatal, far exceed in number those of any other mining district in Great Britain; and a very large majority of the accidents occur from falls of coal or roof. Suppose one-half the coal mined in Great Britain were taken from seams such as the thick coal seams above mentioned, the result would be quite different in regard to the amount or number of tons mined for each fatal accident which occurs. We think it will be within bounds to say that there is not five per cent. of the whole amount of coal produced in Great Britain mined from seams as large as that of South Staffordshire, whilst in the anthracite coal fields of Pennsylvania there is 50 per cent. of the coal mined from seams over fifteen feet thick.

We will take for instance the Mahanoy and Shenandoah district, in which there are fifty-four collieries in operation, thirty-three of these are working the Mammoth seam, ranging from twenty-five to sixty feet in thickness; fifteen are working the Buck Mountain seam, ranging from ten to twenty feet in thickness; six are working seams varying from ten to three feet in

A Cross Section of Mammoth Seam at the Staunton Colliery.
Plan representing the working a breast being worked by the run angle 60°
The Red Lines running diagonally through the different Beds or Benches
represent Slips or Planes which are one of the principal causes of acci-
dents by falls of Coal in Mammoth Seam Shenandoah District

SCALE. 10 FEET TO THE INCH

thickness. The thirty-three collieries working the Mammoth seam produce fully seventy-five per cent. of the whole amount mined in this district, therefore the large amount of coal mined from this seam is one of the principal causes of so many accidents occurring, as no ordinary timbering can be used to support the roof, nor can the eye detect in these vast openings where special danger threatens. The sense of hearing is the only safeguard the miner has, which must be very sensitive to catch any preliminary cracking of the coal or rock, which indicates the approach of a fall. Falls are also sometimes detected by small pieces dropping from the mass hanging over the workman. But often these falls occur without giving any warning, which is owing to the treacherous nature of the large seams; as the different beds are broken up by slips or plane surfaces running at all angles through the benches of coal which form the seams. Sometimes, under the most careful examination by the most practical workman, this source of danger cannot be detected, as nature has so completely fitted the blocks together that compose the beds of coal, and in such various forms, that the eye and the sense of hearing oftentimes are deceived. These blocks may appear to be solid from sounding them, whilst the next moment they may fall without any notice whatsoever. These places are only absolutely safe, therefore, when secured by timbering.

2d. Because of the Greater Quantity of Powder Used.

Another prolific source of danger in mining anthracite coal arises from the large amount of powder used for mining purposes, as nearly all of the coal has to be blasted. One keg of powder, weighing 25 pounds, is usually used for every fifty tons of coal sent to market.

The accidents which occur from the use of powder in the mines are due to various causes, and the miner is endangered in several ways, but the greatest danger arises from not using the precautions which are necessary in handling so dangerous an explosive. The mode generally in practice with the miners in making up the powder into cartridges for the purpose of blasting is extremely reckless. Generally they hold the keg containing the powder under one arm and the cartridge in the other hand, with their lamps hanging on their heads; and, besides, almost always this work is done in some small heading where there is not room enough to turn around even when on their knees.

Another source of danger arising from the use of powder is when a cartridge is being inserted into the hole which has been bored to receive it. The cartridge is pierced with what the miners call a needle, which is made of iron, varying from three to five feet in length, and about five-eighths of an inch in diameter at the large end, drawn on a regular taper to a fine point. Should this needle be driven to the back of the hole while inserting the charge or shot of powder, there is danger of striking some flinty or fiery substances which are found to a greater or less extent in all minerals, but more so in anthracite than in bituminous coal. There is also danger in the process of tamping the hole, which is also done with an iron tamping bar, unless great care is taken not to break the cartridge while inserting it.

In either of the above cases there is danger of a premature explosion of the powder in the hole, and oftentimes the most fearful accidents that can befall a human being occur from them. Sometimes the results are fatal and at other times miners are blinded or injured and maimed for life.

There is also another source of danger, and probably the greatest of all arising from the use of powder in blasting. It is from shots which fail to explode at the time generally allowed by the miner for the match to ignite

the powder in the squib, although this source of danger may have been somewhat lessened within the last few years by the invention of the "Daddow's patent squib and match combined," which is now used very extensively in the anthracite coal mines; nevertheless there is still a large percentage of accidents occurring from this source. The length of the match which is connected with the squib is regulated according to the distance the miner has to retreat to a place of safety, and it is upon his practical judgment alone that he must rely to measure the time necessary to be allowed. Through various causes the match oftentimes fails to ignite the powder in the squib as soon as the miner thinks it should. (This is often the case, as a large percentage of the holes cut small springs of water in passing through the various partings or slips which run at all angles through the coal seams.) Upon the impulse of the moment, from fear of losing the powder and also the labor of boring the hole out again, he rushes back to the face of his working place, without consulting his own safety, to apply another squib or match as the case may require, apparently unconscious that the jaws of death are almost ready to swallow him Nevertheless he knows the danger if a practical miner, for he is aware that these matches very often burn freely up to near the powder and then the fire almost burns out, but still continues to smoulder slowly, but so dimly that it cannot be seen until the miner is close upon it, or perhaps in the act of catching hold, when the powder becomes ignited. We have known cases when the miner has lived to tell the tale, that when in the act of taking the squib from the hole he has in doing so pressed the fire on to the powder, causing the explosion of the shot. When these accidents occur they are generally attended with fatal results.

There is also another source of danger which is connected with the use of powder in general. This danger is to be apprehended in mines generating explosive gases. In the first place, if the naked light is used it is dangerous to apply the open light to the match in lighting it, as there is always great risk of igniting feeders or blowers which the bored hole has liberated. In such cases there is danger of the burning gas igniting the powder in the squib before the miner has time to retreat to a place of safety.

There is also danger of explosions should there be any standing gas, (carbureted hydrogen;) but if in our most fiery mines the use of powder or other explosives was prohibited, the consequence would be that some of the most valuable collieries would have to be abandoned, or the consumers of this fuel would have to pay such high prices that it would be only very few that would have the pleasure of using anthracite coal.

Powder, as a matter of course, is used in bituminous coal mines, but not nearly to so large an extent as in the anthracite mines, and then only under very stringent rules. If it has been deemed necessary to have stringent laws passed in regard to the use of powder where it is only used in small quantities, we think it is much more important to have strict laws here where we use such large quantities. We are sorry to say that there is neither law nor discipline in the use of powder in the anthracite coal fields.

In comparison between the bituminous mines of Great Britain and the anthracite mines of Pennsylvania as to the number of tons produced per life lost, the waste raised from anthracite mines should be taken into consideration.

There is an important item which is not taken into consideration by those who condemn the management of anchracite mines, because we do not produce as much coal per life lost as is produced in the mines of Great Britain, and the neglect to take this item into consideration works great injustice to those engaged in mining anthracite coal.

In the first place nearly all the coal taken from the bituminous mines in Great Britain is weighed at the top of the shaft; as a general rule the miners cut the coal by the ton, and the number of tons produced by each colliery is taken from the weight or amount for which the miner is paid. If the estimates of the shipments of the collieries was calculated the same way here, (*i. e.*,) by weighing the coal before it passes the coal breaker, then we would be found to produce as much coal per life lost as they do in Great Britain.

We have statistics to show the discrepancy between the coal actually mined and the amount sent to market from some of the best producing collieries in this district in which the coal is mined altogether by the car, and sent out in the best condition possible. And we find that the loss or waste is fully twenty-five per cent. in preparation, and a colliery that markets seventy-five thousand tons has actually mined one hundred thousand tons.

We do not wish to convey the idea, however, that a large number of accidents may not be prevented by enforcing stricter mine discipline. Loose discipline is a fertile source of accidents in the anthracite mines, and while discipline is neglected accidents will continue to occur no matter what other precautions are taken. A large number of accidents occur from this source every year, and the numbers will not decrease until each colliery has a code of special and general rules, not only to look at but to be strictly enforced. At the present time it appears that in some places where special notices have been posted by the officials of collieries that they are more for the purpose of keeping themselves clear of the law than for the prevention of accidents.

Conveyance Under Ground.

The motive power at a large majority of the collieries in this district is supplied by mules. There are also a number of mine locomotives used, both inside and outside of the mines, which undoubtedly are superior as a motive power to mules; there are some serious objections however against the use of steam locomotives for hauling under ground, and these objections are not without reason.

In some instances there has not been that precaution used which is necessary to confine the gas and steam thrown off by the furnaces to the outlet, but they have been allowed to mingle with the intake air-current, thereby passing through the working places. Where this occurs it is very injurious to persons who have to breathe the air mixed with the gases and steam thrown off by the engines. This objection to the use of engines inside may be avoided to a very great extent, provided the proper care is taken in conducting the air-current, and by keeping the engine on the return outlet and not running it to places where persons are cutting or loading coal. These engines are not by any means safe in mines that generate fire-damp, (carbureted hydrogen gas.)

Recapitulation.

There are 604 steam boilers in use in this district.
There are 308 steam engines, with an aggregate horse power of 15,975.
There are 19 mine locomotives.
There are 58 steam pumps used for drainage.
There are 14 rod plunger pumps.
There are 56 coal breakers.
There are 46 surface slopes.
There are 12 inside slopes.
There are 7 shafts.
There are 27 drift openings.
There are 10,218 persons employed.

LIST OF FATAL AND NON-FATAL ACCIDENTS.

	Number killed.	Number injured.
Explosions of carbureted hydrogen gas	1	9
Falling into shafts or slopes	..	..
Falls of coal	10	13
Falls of roof	1	1
Explosions of blasting powder	..	*5
Crushed by mine cars	4	4
Miscellaneous under ground	8	8
Miscellaneous above ground	3	8
Total	27	48

RECAPITULATION, 1876.

Number of persons employed	10,218
Quantity of coal produced, tons	2,891,117
Number of fatal accidents	27
Number of lives lost by such accidents	27
Tons of coal produced per separate accident	107,078
Number of collieries	56

RECAPITULATION, 1875.

Number of persons employed	.....
Quantity of coal produced, tons	2,562,345
Number of fatal accidents	26
Number of lives lost by such accidents	26
Tons of coal produced per separate accident	98,551
Number of collieries	56

REPORT

OF THE INSPECTOR OF MINES FOR THE FIRST OR POTTSVILLE DISTRICT.

To His Excellency, JOHN F. HARTRANFT,
Governor of the State of Pennsylvania:

SIR:—In conformity with an act of General Assembly in such case made and provided, I have the honor to submit to you the result of the labor which the law imposes upon me as inspector of coal mines and collieries for the First or Pottsville district during the year ending December 31, 1876.

The number of fatal and non-fatal accidents which occurred during the year are ninety-one, of which number twenty-two were killed, six died subsequent to being injured, sixty-three others were seriously maimed and injured, and twenty others received but slight injuries not necessarily serious.

Of the twenty-eight fatal accidents that occurred, the character of which are here shown, it will be perceived that

Two persons lost their lives by falls of coal.

Three persons lost their lives by falls of rock and slate.

Five persons lost their lives by falling into slopes and shafts.

Ten persons lost their lives by explosions of fire-damp.

Two persons lost their lives by explosions of powder and crushed by wagons.

Five persons lost their lives by breaking of ropes and chains; and

One person lost his life by being crushed in machinery.

MAPS OF COLLIERIES.

With the exception of a few new collieries all have furnished maps in conformity with the requirements of the law, and their extensions and corrections are properly attended to.

The collieries are daily receiving such improvements as are deemed proper and necessary. Their condition as regards ventilation and drainage is satisfactory.

The following is

A STATEMENT of the coal tonnage of the respective collieries of the Pottsville district, owned and operated by the Philadelphia and Reading Coal and Iron Company, in the year ending November 30, 1876:

No.	NAME OF COLLIERIES.	LOCATION.	Annual tonnage.	December tonnage.	Aggregate tonnage for the year.
1....	Beechwood	Mt. Laffee	57,617	7,785	65,402
2....	East Franklin	Tremont, West	27,641	2,455	30,096
3....	Forestville	Minersville, West	21,382	985	22,367
4....	Glendower	Glencarbon	23,600	879	24,479
5....	Mine Hill Gap, Kear	Mine Hill Gap	74,157	6,668	80,825
6....	Otto	Branchdale	26,294	1,462	27,756
7....	Phœnix Park, No. 2	Phœnix Park	25,001	955	25,956
8....	Pine Forest	St. Clair	31,537	5,982	37,519
9....	Thomaston	Glencarbon	60,631	5,365	65,996
10....	Anchor	Glencarbon	29,875	2,017	31,892
11....	Richardson	Glencarbon	6,898	1,403	8,301
12....	Eagle Hill shaft	Eagle Hill	34,547	3	34,550
13....	Pottsville shafts	Pottsville, North	25,020	3,569	28,589
14....	Middle Creek shaft	Middle Creek	24,927	505	25,432
15....	Brookside, West	Brookside	154,543	.....	154,543
16....	Wadesville shaft	Wadesville	23,448	11,159	34,607
17....	Buckville	Buckville	Idle	.....	.....
18....	Live Oak	Mine Hill Gap	do	.....	.....
19....	Pine Knot, East	Glencarbon	do	.....	.....
20....	Rainbow	St. Clair	do	.....	.....
21....	Wabash	Tamaqua	do	.....	.....
22....	Oakdale	Glencarbon	do	.....	.....
			647,126	.....	698,210

TONNAGE of leased collieries owned and controlled by P. and R. Coal and Iron Company.

No.	Names of Collieries.	Location.	Landowners.	Tonnage.
	Brought forward			698,210
23..	Kalmia	Kalmia	P. & R. C. & I. Co.	55,555
24..	Lower Rauch Creek	Tremont, West	do	38,535
25..	Lincoln	Lorberry	do	62,498
26..	Swatara	Swatara	do	541
27..	Pyne	do	do	17,562
28..	Phœnix Park	Phœnix Park	do	69
29..	Diamond, No. 1	Forestville	do	19,357
30..	Lewis Tract	Minersville	do	230
31..	White Oak	Greenberry	do	7,542
32..	Ellsworth	do	do	9,595
33..	Hoffman drift	West Wood	do	353
34..	Raber drift	do	do	115
35..	Keenan	do	do	145
36..	Schuylkill Iron Company		do	12
37..	Phœnix, No. 1	Phœnix Park	do	115
38..	Magovern drift		do	75
39..	Monitor	Wadesville	do	3,394
40..	Hickory shaft	do	do	25,361
41..	Diamond, (Little)	do	do	457
42..	Eagle	St. Clair	do	43,389
43..	St. Clair, Jackson	do	do	1,998
44..	York, Edw'd	do	do	41
45..	Kentucky	Tuscarora	do	412
46..	Alaska, (two drifts)	Tamaqua	do	82
47..	Yoke	Tower City	do	545
48..	Phœnix, No. 3	Phœnix Park	do	22,488
49..	Bradley	Minersville	do	5
50..	Vipond	St. Clair	do	888
51..	Ledger Vein	Silver Creek	do	11,447
52..	Valley Furnace	do	do	53
53..	do No. 2	do	do	25
54..	do No. 3	do	do	2,339
55..	do No. 4	do	do	8,879
56..	King, Tyler & Co	Pottsville	do	6,090
57..	Valley Furnace drift	Silver Creek	do	
58..	West End	Donaldson	do	98
59..	Black Mine	Llewellyn	do	1,699
60..	Tremont	Tremont	do	291
61..	Rauch Creek	West Tremont	do	15,764
62..	Colket	Donaldson	do	11,209
63..	Eureka	do	do	9,093
64..	West Flowery Field	Wadesville	do	
65..	Egan	New Castle	do	
66..	Taylorville	Glen Carbon	do	
67..	West Pine Knot	do	do	
Eight small operations mined some				500
				1,076,556
Railway consumption				60,000
Seventy-five collieries mined and marketed				1,077,056
Local consumption of the same				530,000
Aggregate number of tons mined				1,667,056
Plus the assumed shipments of New Boston, Altomount, Greenwood lands and Lehigh Navigation mines, Coaldale, etc				650,000
The aggregate product of said collieries				2,317,056

Ratio of coal mined to each life lost is 82,752 tons.
Ratio of tons mined for each person employed is 273.
Ratio of tons mined for each serious injury is 27,917.

FATAL ACCIDENTS IN 1876.

DATE.	Names of the Killed.	Names of Collieries.	Wife.....	Childr'n.	Remarks.
Jan. 20....	John Devan.....	Forestville	.....	.....	Killed by an explosion of gas.
Feb. 23....	Adam Sherman	Black Mine.....	.....	.....	Killed by an explosion of powder and gas.
Mar. 2....	John Harris.....	.....do	.....	.....	Died from burns; explosion of powder and gas.
8....	J. D. Philips.....	Fisher Slope	1	6	Killed; he accidently fell down the slope.
8....	Jacob Deiter.....	West End.....	.....	.....	Killed; he accidently fell down the slope.
22....	Daniel Gallagher.....	Kear	.....	.....	Killed; he accidently fell down the slope.
Apr. 13....	Thomas Childs (boy)	Hickory Shaft.....	.....	.....	Killed; being crushed in machinery.
17....	Thomas Learge.....	New Boston.....	.....	.....	Killed on inside plane, by broken rope.
22....	Hugh Lynn	Black Mine.....	.....	.....	Killed in the mine by a fall of slate.
May 22....	Thomas Madden	Colket.....	.....	.....	Died from injuries in falling down the slope.
June 2....	John Williams	Phœnix, No. 2.....	1	6	Died; mortally burned by fire-damp.
6....	Martin Moore.....	.....do	.....	.....	Died; mortally burned by fire-damp.
8....	John Brannan.....	.....do	1	6	Died; mortally burned by fire-damp.
20....	John Darmer.....	.....do	1	4	Died; mortally burned by fire-damp.
Oct. 7....	Bernard Murry.....	Eagle Hill.....	1	4	Killed by the platform falling down the shaft.
7....	A miner.....	.....do	1	5	Killed by same accident.
7....	Thomas Jones.....	New Boston.....	1	6	Killed. These four men were standing at the foot of the slope when the rope broke, the fragments of the broken wagon killing them.
7....	Joseph Becker.....	.....do	.....	.....	
7....	William Bankes.....	.....do	1	.....	
7....	Edmund Knauss.....	.....do	1	1	
24....	Edward Mulhall	Anchor	1	7	Died; mortally burned by fire-damp.
28....	Hon. Wm. Lewis (boss) . .	Lower Rauch Creek.....	1	6	Killed in the slope; run over by wagon.
31....	Mathew Dermody.....	Hickory Shaft.....	1	7	Killed by an explosion of fire-damp.
Nov. 6....	John Walsh.....	.....do	.....	.....	Killed; was mortally burned by fire-damp.
Dec. 5....	Charles Oakam.....	Beechwood.....	.....	.....	Killed by a fall of rocks.
11....	Frank Betzs.....	Lower Rauch Creek.....	1	4	Killed by a fall of rocks.
16....	Martin Duffy.....	Eagle Slope	1	7	Killed by a fall of coal.
16....	Elias Donmoyer.....	Franklin.....	1	6	Died from loss of blood; a fall of coal cut an artery.
			15	75	

28 deaths, 8 of which died of injuries, subsequently.

NON-FATAL ACCIDENTS IN 1876.

DATE.	Names of the injured persons.	Names of the Collieries.	Remarks, etc.
Jan. 18....	George Martin	Anchor	Body crushed by wagons.
18....	John H. Brannan	....do	Body slightly crushed by same wagon.
21....	Luke M'Cabe	Diamond	Seriously injured by a fall of slate.
21....	Edward Tobin	....do	Seriously injured by a fall of slate.
23....	John Harris	Black Mine	Mortally injured—burned by powder; died.
Feb. 7....	Patrick Conners	Pottsville shafts	Severely burned by fire-damp.
8....	James Daugherty	Taggart's	Foot cut off by a train in motion.
29....	Thomas Watkins	Kear	Severely burned by fire-damp.
29....	James Birchill	Hickory shaft	Severely burned by fire-damp.
Mar. 27....	John Kirk	....do	Slightly burned by fire-damp.
27....	Patrick Grace	....do	Slightly burned by fire-damp.
April 2....	Simon Spangler	Lower Rauch Creek	Breast injured by a run-away wagon.
8....	John W. Brannan	West End	Crushed by wagons on the waste bank.
21....	Charles M'Henry	Phœnix, No. 2	Severely burned by fire-damp.
21....	Daniel M'Henry	....do	Severely burned by fire-damp.
22....	Hugh Lynn	Black Mine	Mortally injured by a fall of slate; died.
22....	Wm. Snyder	Coaldale	Head severely injured by a fall of coal.
22....	Edward Lawler	Colket	Head severely injured by a blast.
23....	George Engleman	Franklin	Leg severely injured by a fall of slate.
24....	Joseph Robson	Harris slope	Side severely injured—kicked by a mule.
24....	Wm. M'Gilroy	Forestville	Severely injured by a fall of coal.
May 4....	Wm. Whalen (boy)	Otto	Fingers cut off—run over by wagons.
4....	Richard Casey	Beechwood	Leg cut severely by wagons.
8....	Timothy Bierney	Otto	Severely burned by fire-damp.
8....	John Hause	Colket	Severely burned by a premature blast.
17....	Charles Williams	North America	Overcome by a rush of blood to his head.
17....	J. Mullin	West End	Hand shattered while blasting.
22....	Thomas Madden	Colket	Mortally injured by falling down the slope.
27....	Wm. Simms	Phœnix, No. 2	Severely burned by fire-damp.
27....	John Williams	....do	Severely burned by fire-damp; died.
27....	Charles Kavanagh	....do	Severely burned by fire-damp.
27....	John Donner	....do	Severely burned by fire-damp; died.
27....	Martin Moore	....do	Severely burned by fire-damp; died.
27....	John Brannan	....do	Severely burned by fire-damp; died.
28....	Peter Kerlman	Coaldale	Severely burned by fire-damp.
28....	Henry Sheafer	....do	Severely burned by fire-damp.
28....	George Dies	....do	Severely burned by fire-damp.

	28....	J. Miller	....do	Severely burned by fire-damp.
	28....	J. Cornow	....do	Severely burned by fire-damp.
	28....	Frank Boyle	....do	Severely burned by fire-damp.
	28....	Frank Andrews	....do	Severely burned by fire-damp.
	28....	John Leckett	....do	Severely burned by fire-damp.
	28....	Eli Taylor	....do	Severely burned by fire-damp.
	28....	Thos. Ratchford	Phœnix, No. 2	Severely burned by fire-damp.
	28....	Wm. Sullivan	....do	Severely burned by fire-damp.
	28....	John Barrett	....do	Severely burned by fire-damp.
	29....	Thomas Williams	New Boston	Severely injured by a fall of coal.
	29...	John Grace	Anchor	Severely burned by an explosion of fire-damp.
	29....	J. Davis	....do	Severely burned by an explosion of fire-damp.
Aug.	5....	John Haley	Franklin	Fingers cut off, is colliery carpenter.
	26....	Frederick Zimmerman	Colket	Head severely cut by falling down a chute.
Sept.	6....	Joseph Enters	Middle Creek	Head severely cut and leg broken.
	7....	Albert Elms	Franklin	Foot severely cut with an axe.
	21....	William Warfield	Kalmia	Arm broken while coupling wagons.
	22....	B. J. Stile	New Boston	Severely hurt by a fall of coal.
	22....	A miner	Beechwood	Severely burned by fire-damp gas.
Oct.	3....	Alfred Dry	Fisher slope	Severely injured by a fall of coal.
	6....	Elmer Hill	L. Rauch Creek	Hand injured while coupling wagons.
	6....	George Houghton (boy)	N. Boston	Injured by fragments of a runaway wagon.
	21....	James Doyle	Beechwood	Severely hurt in the mine.
	21....	James Fogarty	....do	Hand injured by a fall of coal.
	25....	Wm. Timmis	....do	Severely burned by fire-damp.
	25....	Chas. Touns	....do	Severely burned by fire-damp.
	25....	Joseph Evans	Middle Creek	Severely injured by a piece of coal.
	25....	A Polander	Eagle Hill	Arm cut off by a fall of slate.
	30....	Mathew Dermody	Hickory shaft	Mortally burned by fire-damp; died.
	30....	John Walsh	....do	Mortally burned by fire-damp; died.
	30....	Peter Rilley	....do	Severely burned by fire-damp; survived.
	31....	Michael Nolan	Beechwood	Leg broken, run over by wagons.
	31....	Geo. Harrison	....do	Arm broken, he fell down a chute.
	31....	Levi Kantner	Kantner slope	Foot crushed by a fall of coal.
	31....	Seth Zimmerman	L. Rauch Creek	Severely crushed by a fall of coal.
Nov.	13....	Jno. Hagerty	Diamond, No. 2	Severely injured by a fall of slate.
	16....	Wm. Oskins	Beechwood	Leg broken by a fall of coal.
Dec.	5....	John Shiebel	Franklin	Severely crushed by a fall of coal.
	10....	Christ Rohrbach	L. Rauch Creek	Severely crushed by a fall of rocks.

Sixty-six cases of non-fatal accidents occurred during the year.

Eight persons received mortal injuries, of which they died subsequently.

Nine others received slight injuries, not necessary fatal.

Eighty-three accidents of all sorts took place in and about the collieries of my district during the year ending December 31, A. D. 1876.

The accident of June 2d, at Phœnix Park, and that of October 7th, at New Boston, by which eight men lost their lives, increases greatly the list of fatal accidents. Had these men followed out the instructions of the Inspector and the foreman of the mines these accidents would not have occurred.

In concluding my report I beg leave to state that there is a marked improvement in the condition of the mines compared with that of last year. Operators and employees seem ready and willing to carry out my orders and comply with the provisions of the ventilation act—time is required to fulfill all its requirements. I trust that in my next report I will be able to show to a greater extent the benefits resulting therefrom.

Very respectfully,

SAMPSON PARTON,

Inspector of Mines for First or Pottsville District.

December 31, 1876.

REPORT

OF THE INSPECTOR OF COAL MINES FOR THE SOUTH DISTRICT OF LUZERNE AND CARBON COUNTIES FOR THE YEAR 1876.

To His Excellency, JOHN F. HARTRANFT,
Governor of the Commonwealth of Pennsylvania:

SIR:—In compliance with the requirements of an act, entitled "An Act providing for the health and safety of persons employed in coal mines," approved the 3d day of March, A. D. 1870, I beg to submit my second annual report, containing the particulars of the fatal accidents that have occurred in and connected with the collieries situated in the aforementioned district during the year ending December 31, 1876.

I regret that I have to report to you a greater loss of life during the year than in the preceding one. There were 37 lives sacrificed, an increase of 16 over the previous year; this increase has arisen from unusual and unforseen circumstances, which can be seen by a careful examination of the different tabular statements contained in this report.

The first important accident was the explosion of carbureted hydrogen gas at Room Run colliery, located at Nesquehoning, April 12, 1876, whereby the lives of four persons were sacrificed. An explanation of the casualty will be found in the accompanying report, together with a map of the workings. The causes of death under any circumstances cannot be too closely scrutinized. The miners whose lives are in danger should not hesitate to complain. It is quite common to hear the accident accounted for by the negligence or recklessness of the miners themselves, but many accidents occur annually for the want of proper timbering, and the operators are censurable when proper precautions are not taken to insure the safety for their employees. It is obvious therefore that care should be taken in opening new works to provide for every contingency which may possibly arise. I have frequently had to complain of the insufficient propping often neglected or inadequately performed. It is a fact which cannot be too generally made known that true economy consists in standing a sufficient number of props to support the roof. Nine persons lost their lives by want of such precautions the past year. This is a striking fact to substantiate the above, but of course it would be presuming too much to assert that all of that number would have been saved if a more rigid discipline and a greater care by the men and sufferers had been adopted. The act is evidently working for the benefit of all concerned, yet traces of ignorance and incapacity will, I fear, appear from time to time to darken the calendar of coal mining by fearful casualties which the most careful inspection, short of actual management, will never entirely remove.

In my previous report I advocated the use of fans for ventilation in lieu of the many defective modes then in use, since then a number of fans have been put up, and many more will probably be erected during the coming summer. Those parties who were opposed to fan ventilation have acknowledged their superiority since they have seen the benefits derived from them, and intend putting them up wherever required.

The inspectors of the anthracite coal mines of the State of Pennsylvania have the honor of presenting to you a subjoined tabulated statement of the number of men killed and injured during the year 1876, in each district, comprising the counties of Luzerne, Carbon, Schuylkill, Dauphin, Northumberland and Columbia. By it will be seen how each description of accident ranges in each respective district. Table No. 5 is a summary of colliery accidents since 1871, compiled from the Inspectors' reports. Also many other valuable tables are included in the report, which will be of great service to those interested in coal mining.

Having in my previous report given a general description of the different modes of working, system of ventilation, &c., I deem it unnecessary here to make a repetition. Trusting everything will be explicit and satisfactory,

I remain your most humble and obedient servent,

T. D. JONES,
Inspector of Coal Mines.

HAZLETON, *February* 26, 1877.

EXPLOSION OF CARBURETED HYDROGEN GAS.

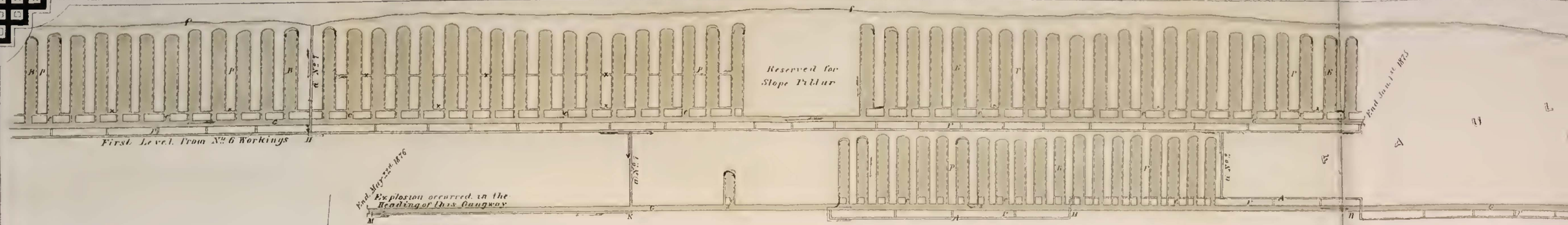
Accident Nos. 10, 11, 12 and 13, in the list, Thomas Sheilds, Hugh Gaffield, Charles Collans and Thomas M'Govern—ages, 56, 38, 22, 27, respectively, were instantly killed, (except Collans, who died the next day,) by an explosion of carbureted hydrogen gas, in Room Run slope, No. 3, Nesquehoning, April 12, 1876. I had visited this colliery October 16, 1875, and at the time I considered it one of the best ventilated mines in the district, and was at the time of the explosion, except the face of the gangway, which was partially due to the men changing the position of one of the 10-inch square air pipes, from the top of the gangway to the bottom of the same, (or on top of the other 10-inch air pipe,) both of which were expressly used for ventilating the face of the gangway, as can be seen by a superficial examination of the map accompanying this report, as the air circulating down inlet No. 2 (see map) was adequate to air the twenty breasts inside of said inlet, many of which were not working at the time, not making any allowance for the air that was circulating down inlet No. 3. There was but one breast opened inside of the terminus of the airway, and on my examining the condition of the mine the day after the explosion I found the ventilation to measure as follows :

At outlet No. 4, leading to a 16-foot diameter fan, 15,586 cubic feet per minute.

At inlet No. 1, (on map,) connecting with two 10-inch square air pipes, 8,400 cubic feet per minute.

At a point about 200 feet from the face of the gangway 1,187 cubic feet per minute. The leakage of 4,420 cubic feet from inlet No. 1, to the point of measurement, in air pipes, is due to the dilapidated condition of the air pipes after the explosion, and the leakage at the bottom of the hole.

At inlet No. 2 (on map) 5,580 cubic feet per minute, making in all 13,980 cubic feet, exclusive of the air that might have been circulating down in inlet No. 3, which was not measured at the time, neither was the volume circulating down the slope, which would compensate for the deficiency in the amount in the two inlets, and that of the outlet or place of exit. The aggregate number of men working in the slope or mine at the time were twenty, so that if the amount of air was circulating in the mine the day of the explosion as the day following there would be 396 cubic feet per minute for each



Reference Table

Main Slope	S
Main Gangways	G
Airways	A
Breasts	B
Air Holes	a
Tunnel through Rock	T
Doors	D
Sheets	s
Chutes	C
Cross Cuts	x
Out Crop of veins	f
Red Ash or Primrose vein	
Mammoth vein	
Over Through or Air Crossing	H
Pillars between Breasts	p
Pillars between Gangways and Airways	P
Main ways and Air Courses	
Two square 10" Air Pipes	M N
Fan 16' in Diameter	F
Course of Air currents	

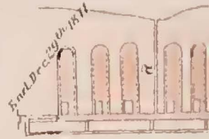
PLAN OF THE

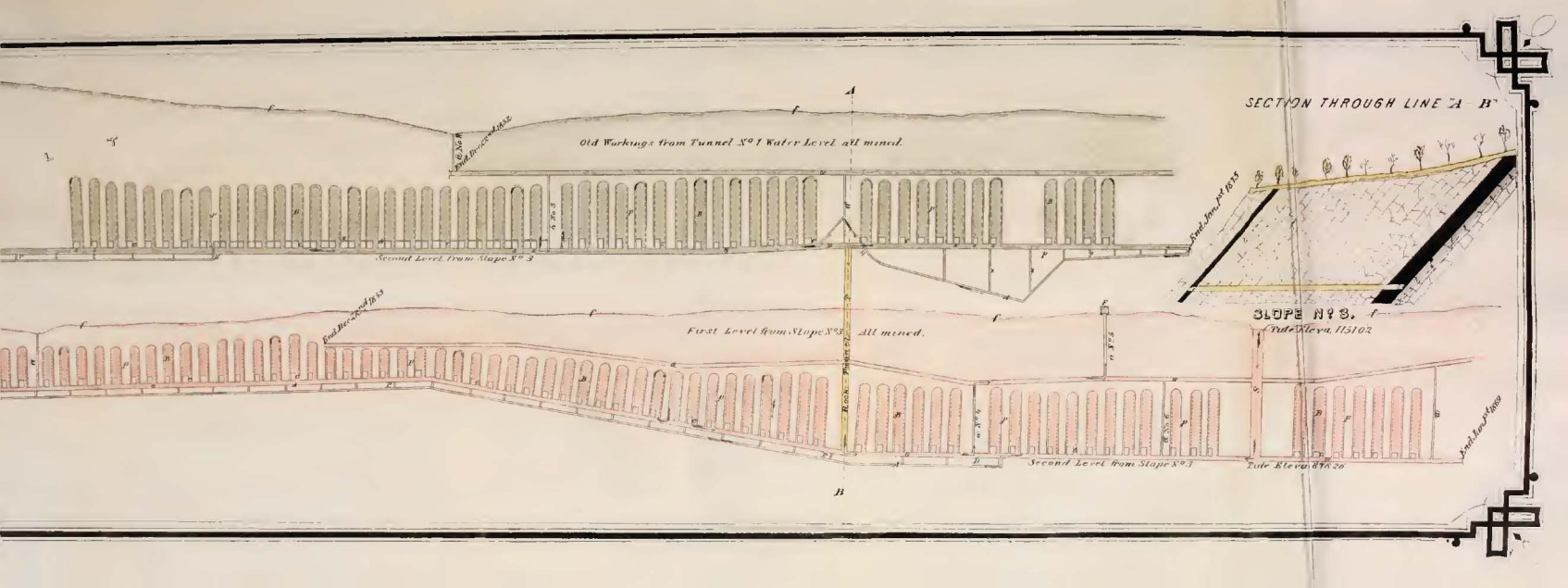
L. & W. B. COAL CO'S. SLOPE NO. 3 NESQUEHONING

Showing Methods of Working and Ventilating at time of Explosion, April 12, 1876.

T. D. Jones, Inspector of Mines.

SCALE: 200 FT. TO AN INCH.




A
B
Old Workings from Tunnel N° 1 Water Level all mined.
Second Level from Slope N° 3
First Level from Slope N°3 All mined.
Second Level from Slope N°3
SECTION THROUGH LINE A B
SLOPE N° 3.
Tide Eleva. 115102
Tide Eleva. 84 to 20

of the men in the face of the gangway, or, on the whole, 699 cubic feet for each man employed in the colliery. The assistant superintendent, fire boss and myself went to the face of the gangway the day following and remained there abount ten or fifteen minutes, testing the gas, which was about three feet below the collar of gangway, for a considerable distance back, and while looking around found two miners' lamps and two safety lamps (Clanney.) None of the latter were opened, but at the inquest it was stated that they had been in the habit of keeping a naked light in the air pipe, which was strictly forbidden by the foreman. On the morning of the accident the three men, who were engaged in driving the gangway, went to their work early, before anybody was around, so as to load the car, which was left in the face the night previous, before the driver got in, so they proceeded directly to their work and commenced to load the car, without any one examining the condition of that part of the mine, and had the car nearly loaded when they heard the driver coming, (as stated by Meyers at the inquest, one of the laborers working in the gangway at the time of the explosion, who fortunately got out scarcely any the worse,) and had no sooner said so than the explosion took place, consequently the driver could ot be very far from the face of the gangway, or else they could not have eard him, as the driver had no car with him. Richard Bowden testified hat the driver passed him at a point of about 400 feet from the face with a naked light and a safety lamp, and supposed the gas to ignite from the driver's naked light, and that it was probable that the gas extend further back than usual, owing to the men hurrying to load the car. It is therefore obvious to me that the explosion is attributable to the changing of the position of the air pipes, and that, had the gangway men conceded to the request of the foreman to discontinue working until the air pipes were replaced, it is probable that the calamity might have been avoided. The question may be asked, why did they discontinue driving the airway? The only reasons adduced by the assistant superintendent, Mr. Eustice, was, that previous to his taking charge Mr. John P. Jones, (deceased,) general inside foreman, at Summit Hill, under the same company, ordered the airway to be stopped, as they did not intend opening any more breasts until the upper gangway in tunnel No. 6 (see map) was finished, and also as the seam had become very thin at the terminus of the airway, in not allowing sufficient pillar between the two gangways, and in lieu thereof to drive air holes to the upper gangway whenever it would be required, and to ventilate the face of the gangway by means of air pipes, until the gangway was driven far enough to drive an air hole in line with inlet No. 7, or at a point of 140 feet from where the explosion occurred, (see map,) which has since been done, making it the main inlet hereafter, as the other inlets in course of time would become of no use, owing to the upper gangway being robbed of the pillars, &c. Suffice it to say that a superficial view of the map accompanying this report, together with a copy of the inquest will I hope be explicitly and satisfactorily understood.

The Inquest.

A jury being summoned a coroner's inquest was held in the school house at Nesquehoning, Benjamin Yeager, J. P., acting coroner. Jurors—Henry Watt, Thomas Meese, Owen M'Gorry, Hugo Ronamus, Benjamin Griffiths, Owen Garraghan.

Samuel Steventon, *sworn*.

I live at Nesquehoning; I am a miner; I worked in slope No. 3 last; those men were killed in No. 3 slope; I was present at the time of the ex-

plosion of fire-damp; I was asked what that was; I replied that I thought it was an explosion of fire-damp; Thomas Rees and Michael Cassidy went inside to where the explosion occurred, as I thought; I was talking to Patrick Callan, and M. Cassidy had returned at this time; he was exhausted in running; he could'nt run any further; Cassidy told me and Pat Callan for God sake to hurry and get some safety-lamps, that the men were all burnt inside; I ran to the bottom of the slope for some safety-lamps; some of the men told me there was none there; started up in a car to get some at the top; as I was going up the top-man was coming down with some safety-lamps; I returned again on car; when I came to the bottom Mr. Wm. Smitham, the boss, gave me a lamp; he told me to be careful; started to run in; I passed Thomas Meese coming out in a car, with Joseph Norwood and Jacob Meyer in the car; Thos. Meese jumped off the car and told some of the men to take it; Meese started back with me; on the turnout we met Thomas Reese; he had Richard Bowden in a car; myself and Meese went on, and I gave Meese my safety-lamp; got into where the explosion occurred, as we thought; I fell over the body of Thomas Shields; Meese and I went on and met the mules coming out; met Patrick and Hugh Callan carrying their brother Charles out; they told us that Levi Marsden was in a piece further; we went in and called him by name, and he answered us; Meese and I picked him up and I put him on Thomas Meese's back; carried him out; left him in the fresh air and went back again to look for the rest, but had to come out on account of after-damp; Thomas Meese, John Rowe, Mark Meese, Patrick Callan and myself went back again; we had to clear a good many of the air pipes out of the road; got near the heading; Mark Meese found one of the men; he was dead; we started to carry him back, and Mark Meese found the other man; he and his brother Thomas carried the body of one about forty yards; had to drop the body and four of us carried one body to the fresh air; some other men went in after the other body; we all came out together; we got the dead bodies in a car and brought them home; I was away about three-quarters of a mile from these men at the time the accident happened, as near as I can tell; I was to work in the mines at the time of the accident; the mines were well ventilated where I worked; I can't tell how it was where the accident occurred; I was not there for a year.

(Signed) SAMUEL STEVENTON.

Michael Cassidy, *sworn*.

I live in Nesquehoning; I am a miner; I work in slope No. 3; I was in No. 3 slope on the 12th day of April, 1876, the day the accident happened; as near as I can tell I was away about three-quarters of a mile from the place where the explosion was; I felt a draft of air, and seen sparks fly off the men's lamps that stood in front of me, I told the rest let us go in they might need our assistance; Thomas Reese said he would go, we went in, we saw sheets and things tore; first met Joseph Norwood and Richard Bowden they were all covered with mud; I saw blood on Bowden's face, Norwood told us Thomas Shields was in further, we went a past them in the dark; we called, but got no answer; Norwood told us that Charles Callan was lying in there; Norwood told us that Hugh Callan crawled in ahead of us. We went back to Bowden and Norwood; Thomas Reese carried Bowden, Norwood could walk some; I ran out, met Sam. Steventon and Patrick Callan, told them to get safety-lamps, then I went near to the bottom; some men went in with lamps, and I followed them in again; I met some men bringing Joseph Norwood and Meyer in a car; a piece further on I met Thomas Reese fetching Richard Bowden in a car, we changed Bowden from

one car to another, then Mark Meese and I went inside along with other men shoving a car to bring the dead and wounded; they told us to put our lights out, we should not come any nearer with the naked lamps; David B. Griffith went back for safety-lamps, I went with him to show him where he could light his lamp; I did not go back where the accident happened any more. I have worked in No. 3 slope about eight or nine years off and on; where I was at the time of the accident the air was good; I was in towards the heading of gangway on the morning of the 11th of April, 1876, where Thomas Shields, Joseph Norwood and Richard Bowden were working; Wm. Smitham, mine boss, was with them; I seen the men working with glass lamps; I mean the men in the heading. In my opinion I don't think No. 3 slope was properly ventilated, I mean the part where the accident occurred.

(Signed) MICHAEL CASSIDY.

Cornelius Zeangle, *sworn*.

I live in Nesquehoning; I am a miner; I was in slope No. 3, on the night shift of the night of 11th day of April, 1876; there was more sulphur there than there was the day before; we had no naked lamps; we sent the drivers out to clean the lamps; those lamps were safety-lamps; I considered it safe that night to work with safety-lamps in slope No. 3; I had a naked lamp in slope No. 3, and used it or had it lighted; I think I had a naked lamp in the night before the accident; I had the lamp in the air pipe about five yards from the heading or face; I did not think it dangerous at this time; I tried the sulphur with safety-lamp, but I could not reach it, therefore I considered it safe to leave the naked light in the air pipe; I considered the lamps I used this night safe; I was not in the slope when the accident happened; the air was not good the night I was in the slope; I was working in the heading of the gangway at or about the same place where Thomas Shields, Hugh Coffield and James M'Govern were killed the following day; in my opinion, I think, the sulphur came back further than usual; I think it was caused by moving the air pipes; I worked in slope No. 3 over two years; I considered it dangerous for the past two months; there was more sulphur than before; I knew the three men that were killed the 12th day of April, 1876.

(Signed) CORNELIUS ZEANGLE.

John M'Caffrey, *sworn*.

I live in Nesquehoning; I am an inside laborer for Cornelius Zeangle; I work in No. 3 slope; I was in said slope on the night of the 11th of April, 1876; I was laboring for Cornelius Zeangle; the air was worse that night than it had been before; I think the cause was of some pipes being down; I didn't think myself safe this night; I was more afraid than before; I worked in slope No. 3 off and on over four years; I never told any boss that I wasn't safe in slope No. 3; I was not in at the time the accident happened; I knew those men that were killed and wounded in slope No. 3; Cornelius Zeangle tested the sulphur with a glass lamp; we were working our shift this night; Shields, Bowden and Norwood told me and the other laborer, inside of them between that and the heading, there was sulphur; we had naked lamps lighted in the air pipe about three or four days before this accident happened.

(Signed) JOHN M'CAFFREY.

John Gilson, *sworn*.

I live in Nesquehoning; I am an inside laborer; I work in heading of No. 3 slope; I was in said slope on the night of the 11th of April; when

I was to work last the air was not very good; I seen Cornelius Zeangle try the sulphur with a glass lamp; he told me it was pretty bad; we worked our shift this night; I considered myself in danger; I feared the sulphur would explode; we came out the slope about 12 o'clock at night; everything appeared to be right when we left the slope; I did not consider it safe yet I did not consider it dangerous to work with the safety-lamps; I think we hadn't any naked lamps in this week; the week before I think we had a naked lamp in air pipe.

(Signed) JOHN GILSON.

Matthew Duke, *sworn.*

I live in Nesquehoning; I am an inside driver in slope No. 3, on the night shift; Wm. Smitham, mine boss, told me I should'nt go in heading of No. 3 slope with a naked lamp; he ordered me to take safety or glass lamp, that there was one in or on the pipe for me; I never went in with a naked lamp after I had been ordered not to; I think he said I could'nt take the naked lamp to the heading; about two or three months ago Mr. Smitham gave me those orders; I did'nt consider it safe to work there that night with those lamps; I did consider it safe with a good safety-lamp; I don't think I told any of the men about the orders Mr. Smitham gave me; I was not in the slope when the accident happened; I worked in slope No. 3 off and on about nine years; I heard some say it was not safe at the heading; I was in slope No. 3 last week with a naked light in heading; some of the men "hollowed" at me; I did not consider the trap-door safe; they sometimes would open when a shot would go off; the doors would fall in; I thought the blasting was the cause; I hung my naked lamp (lighted) about two hundred feet from heading.

(Signed) MATTHEW DUKE.

Henry Isaac Fisher, *sworn.*

I live in Nesquehoning; I am a miner; I work for L. and W. B. C. Co.; I work in No. 3 slope, vein 28; in this slope the accident happened, on the 12th day of April, A. D. 1876. I was sitting at the diamond, on the east side; Thomas Reese was passing by; he told me that he wanted me, and told me to come on quick; when I got up he told me the fire had exploded; he said there was five men inside; we hurried on as fast as we could, and the teamster hitched on to an empty car and took us into the turnout; when I got there met Michael Cassidy; I asked how things were inside; he told me he did not know; in a few minutes a car came out; Levi Marsden and Charles Callan were in the car; John Jenkins and Hugh Callan called for a coat; I gave them mine; I helped to shift them on the loaded track, in order to get two empty cars past; I helped to shove one inside to where the dead men were; when we got in as far as the cross-cut I told them to blow out their lights; we went on till we met Wm. Smitham with a safety-lamp; Mr. Smitham told us to stop; after we stopped the car he told us to put the body of Thomas Shields in the car; stopped about five minutes; then we heard some one coming and we went and met them; they had Jas. M'Govern; took him out and then went in after Hugh Coffield; Patrick Callan had to turn back; the after-damp was too strong; we found Hugh Coffield lying on his face on the middle of the track; carried him back and put him in the car; then we took the car out on the turnout; James M'Cann run two cars to the bottom and they were hoisted up with the dead men, Thomas Shields, Hugh Coffield and James M'Govern; I worked in slope No. 3 on the 12th day of April, 1876, the day the accident happened; I was a little over three-quarters of a mile away from where the explosion

took place; when the door is shut the air is pretty well where I was; I could not account for the other side—I mean I couldn't say how the air was before the accident, because I was not there; outside the inside air-shaft the air was good; after the explosion the air was poor inside the air-hole; I considered it dangerous inside or past the air-hole; Wm. Smitham is the mine boss at present; he gave me orders at the time of the explosion not to go there with a naked light; I did not consider there was any danger where I was working last, of sulphur; the mine boss never cautioned me about taking a naked light inside where the sulphur was.

(Signed) HENRY ISAAC FISHER.

Hugh Callan, *sworn*.

I live in Nesquehoning; I am a miner; I work for L. and W. B. C. Co.; I was in slope No. 3 on the 12th day of April, 1876, the day the accident happened; the air was as good as usual; I was about a quarter of a mile from place where the explosion took place; the air was pretty good where I was; I found the air poor where the explosion took place; I mean where those men were killed, or near the place; I knew the men that were killed; I considered it dangerous where the men were killed for about a month; in one part of the slope the air was good; in the other part the air was poor; I was in with Mr. Smitham some time ago in the heading.

(Signed) HUGH CALLAN.

Patrick Callan, *sworn*.

I live in Nesquehoning; I am a miner; I work for L. & W. B. C. Co.; I mine in slope No. 3; I was in said slope on the day the accident happened; I was about three-quarters of a mile from the place where the explosion took place; I can't tell how the explosion took place; the air was good where I worked, on the 12th day of April last; I was in toward the heading after the accident; I found the air bad and turned back to where we left Thomas Shields; Thomas Reese was with me; I considered the air bad toward the heading as long as it was carried in pipes and as long as they swung on wire or straps; I knew those men that were killed; I am a brother of one of the men that died; I worked in slope No. 3 since it was sunk as a miner.

(Signed) PATRICK CALLAN.

Joseph Norwood, *sworn*.

I live in Nesquehoning; I am a miner; I was in slope No. 3 on the 12th day of April, 1876; I was going toward the heading at the time the accident happened; I have no idea how the accident happened—which way it ignited I can't tell; I had a naked lamp and a safety lamp with me; I was about fifty yards inside the air shaft; we were on our way to go to our work; there was three men working at the heading; I seen the driver pass us before we got to the air shaft; the driver had a glass lamp in his hand; don't know whether the glass lamp was lighted; I was not to the heading for a month until the day before the accident; I seen a naked lamp in the air pipe lighted that day; we were moving air pipes the day before the accident and intended laying the rest of the pipes, and the explosion took place; the sulphur must have been back farther then usual; I think by moving the pipes that it might have had a bearing to drive the sulphur back; I have worked in No. 3 slope about two or three years; we had about seventeen lengths of pipe to take down yet; I found the air all right at the air shaft; I did not consider it dangerous while I worked there, except from the place where the pipes were disconnected; I worked in there

at different times and did not see anything further back; it was not very dangerous in there the day before the accident—we were working with naked lights.

(Signed) JOSEPH His × mark. NORWOOD.

Jacob Meyer, *sworn*.

I live in Nesquehoning; I am a laborer inside; I work in No. 3 slope; I was in said slope on 12th day of April, 1876; I was in face of gangway; we used glass lamps; there wasn't much sulphur in face, but behind us; I think it ignited through the drivers; Hugh Coffield and myself walked in about half an hour before the explosion took place; we didn't examine or try the sulphur, but went right to work; we had a naked light in the pipe the day before; I was shoveling in the car, when the explosion took place, at the face of the gangway; the first man I met was Charles Callan; I can't tell how far it was from the face; I crawled out on my hands and feet; I did not consider it dangerous with safety lamps; I seen Joseph Norwood, Richard Bowden and Thomas Shields work at the pipes the day before with naked lights; I worked in No. 3 slope two years off and on; Hugh Coffield and James M'Govern were working with me at the time of explosion; they were killed.

(Signed) JACOB MEYER.

Richard Bowden, *sworn*.

I live in Nesquehoning; I am a miner; I work in slope No. 3; I was in said slope at the time the explosion took place; I was about 400 feet from the heading at the time; Thomas Shields was next to me; he was killed; when Charles Callen passed me he had a naked lamp; it was lit; he lit his safety-lamp at the turnout; I think it ignited by the driver's light; I think the sulphur came back further than usual; I think it caught from the naked lights; I did not think the air was bad the day before the accident; I have worked in slope No. 3 about four or five years off and on; I never considered it dangerous to work there; I saw no sulphur where I was the day before the accident happened.

(Signed) RICHARD His × mark. BOWDEN.

William Smitham, *sworn*.

I live in Nesquehoning; I am inside foreman or mine boss in slope No. 3; I was in said slope the 12th day of April, 1876, at the time the explosion; I was away from the place about one and a-quarter mile (1¼) when the accident happened; the slope was in good condition as regards ventilation; I was at heading on the 11th day of April last; the air wasn't as good as usual that day on account of moving some of the pipes; I was not near the heading the day the accident happened; on the morning of the 13th, after the explosion, I was within twenty yards of the heading; all miners and laborers are working under my instructions; my orders were not to carry a naked light to face; the drivers I ordered not to take a naked light within from 400 to 500 feet from the face; I don't think an explosion could have happened if the naked lights were kept that distance from the face; I think the sulphur must have been set off with a naked light; some one must have went too near to it; if my orders had been obeyed this accident would not have occurred; I don't think the men obeyed my orders; I have charge of safety-lamps; the lamps were in pretty good condition; I considered them safe; I frequently asked the miners how low the sulphur was down when they came in in the morning and often tell them to try the sulphur; in my opinion slope No. 3 was well

ventilated; I told Hugh Coffield and his laborers on the 10th of April last they had better stop their work until the air pipes were repaired; the inside air shaft is about 600 feet from the heading; the day after the explosion I saw two hats found with common lamps on each of them at the heading; it was contrary to my orders to have those lamps at heading and have them burning; I have been inside foreman for eight or nine years in slope No. 3; when I suspected that there was any sulphur I had a man to test it.

(Signed) WILLIAM SMITHAM.

T. D. Jones, *sworn*.

I live in Hazleton, Luzerne county; my occupation is inspector of coal mines; was notified on the afternoon of 12th day of April of three men being killed in slope No. 3 at Nesquehoning; repaired to the scene of the accident on the morning of the 13th and made the necessary investigation, and offered such suggestions as appeared necessary for the safety of the men; examined the mine in company with Mr. R. Eustice, superintendent; found circulating in the outlet 15,586 cubic feet of air per minute; proceeded to the turn-out; there we procured safety-lamps; went in as far as the upper pipe extended; there measured the air circulating through those pipes; found it to be 1,187 cubic feet—396 cubic feet for each of the men working in the face of the gangway; then we proceeded to the face or heading; there picked up two hats with a lamp on each; stopped about ten or fifteen minutes; then we proceeded outward, to the inside inlet, and measured the air and found 8,400 cubic feet of air circulating; then we proceeded to second inlet and measured 5,580 cubic feet of air circulating; adding the amount circulating down the two inlets, and dividing by 20, the number of men and boys employed in this gangway, we have 699 cubic feet for each man employed; the amount required by law for each man, 66 cubic feet per minute, or as much more as circumstances may require; when I first inspected slope No. 3 I considered it safe; did not apprehend any danger five months ago.

(Signed) T. D. JONES, *Mine Inspector*.

COMMONWEALTH OF PENNSYLVANIA, *Carbon County*, } ss:

An inquisition indited and taken at Nesquehoning, in the county of Carbon, the 12th day of April, A. D. 1876, before me, Benjamin Yeager, a justice of the peace in and for the county of Carbon, upon view of the bodies of Thomas Shields, Hugh Coffield and James M'Govern, then and there lying dead, upon oath of Henry Watt, Thomas Meese, Owen M'Gorry, Hugo Ronamus, Benjamin Griffith and Owen Garrahan, good and lawful men of the county aforesaid, who being duly sworn to inquire on the part of the Commonwealth when, where, how and after what manner the said Thomas Shields, Hugh Coffield and James M'Govern came to their death, do say that on the 12th day of April, in the year of our Lord one thousand eight hundred and seventy-six, at Nesquehoning, and in the county aforesaid, by an explosion of gas or fire-damp in West 28-ft. gangway, near the heading or face of slope No. 3, Nesquehoning mines, while working inside said mine or slope, belonging or worked by the Lehigh and Wilkesbarre Coal Company.

We the undersigned, jurors, find that Thomas Shields, Hugh Coffield and James M'Govern came to their death on the morning of April 12, 1876, by an explosion of gas or fire-damp in West 28-ft. gangway, near the heading

or face of gangway in slope No. 3, Nesquehoning mines, worked by the Lehigh and Wilkesbarre Coal Company.

We believe the gas was ignited by a "naked" light, being brought in contact with the gas, on the heads or in the hands of one or more of the workmen (unknown to the jury) employed in West 28-ft. gangway, which was a violation of the law and of established rules.

No blame rests on any of the parties concerned, save only a want of proper precaution on the part of the workmen employed in that part of said mine.

In witness whereof, as well the aforesaid justice as the jurors aforesaid, have to this inquisition put their hand and seals this 18th day of April, A. D. 1876.

BENJAMIN YEAGER, *J. P., Acting Coroner.*

Jurors—Henry Watt, Thomas Meese, Owen M'Gorry, Hugo Ronamus, Benjamin Griffith, Owen Garrahan.

FALLS OF COAL AND SLATE.

Accident Nos. 2 and 3 on the list —John Erwin and William Boyd, aged 38 and 45 respectively, the former was instantly killed and the latter died in two days after the happening. Their occupation was timbering at night. They had taken out two sets of timber before standing one, thereby leaving too great a space between the other sets, (12 feet,) which resulted in about three cars of the 18-inch slate falling. The practice of taking out two sets of timber at one time should by all means be prohibited, as it leaves, in a great many cases, too much vacant space above the timbers, which must necessarily be blocked up to the solid, in order that the timber may receive the weight of the strata evenly, and also to steady the timbers to prevent many accidents. The foreman told the inspector that he had repeatedly told them not to do so. It is customary for the foreman to select the places of working for the timbermen, by marking the timbers to be changed by chalk mark, (should he not happen to see them,) but in this case they did not work at the timbers marked, as they deemed it more necessary to change the timbers which resulted in their death.

Accident No. 7 on the list.—Neal Dougherty, laborer, aged 35 years, instantly killed while he and the miner were loading a car off the gangway, the latter fortunately escaped uninjured. The uninjured miner said he had just commenced to open the breast, and fired a blast about an hour previous to the happening, also sounded the top, which indicated to be perfectly sound, and apprehended no danger whatever. The seam at this point was unusually thick (12 feet), and the coal mined in the gangway, from top to bottom rock, thinking perhaps to avoid timbering, which in my opinion should have been done. The accident was attributed by the foreman and miner to a spring of water, which burst forth from a crevice between the slate and top rock, causing it to fall without warning. It was the first day the deceased worked in the colliery.

Accident No. 14.—Charles White, miner, aged 38 years, was dangerously injured by a lump of coal rolling out of the side of the gangway, close to the face, crushing him so severely that he died shortly afterward. He was engaged in drilling a hole in the face on the lower side of the gangway in the bottom bench of coal, where the accident occurred.

Accident No. 17.—Neal M'Cole, miner, instantly killed by a fall of coal while starting to open a breast. The deceased had fired a blast in the side of the gangway, and on returning, immediately after the blast, about two

cars of coal fell upon him, resulting as stated. Many accidents occur in this way, the miner not allowing a sufficient time for everything to settle before returning to work. In the Wharton or D seam, which is about nine feet thick, I have strictly requested the parties in charge to stand two centre props on each side of the chute before commencing to open the chamber, which will, I believe, prevent a number of accidents, especially where the seam is at a high angle.

Accident No. 18.—John Boyle, laborer, aged 40 years, instantly killed by a fall of slate, while in the act of loading a car. The miner had been told by the foreman to stand some centre-props previous to the accident, but he neglected doing so and narrowly escaped. Upon being questioned as to why he did not timber the top, he answered that he intended doing so as soon as the car was loaded. Thus it is, many lives are annually lost by procrastination, such as "wait till I load this car," or "until I drill this hole," or something else in the same line, is the prevailing excuse, but if the foreman understood his duty he would not allow such to be the case, and would undoubtedly be more thought of by the employees by so doing.

Accident No. 19.—Philmon Stare, laborer, instantly killed by a fall of coal. The deceased and his partner were in the act of loading a car when a slip of coal (7-foot bench) slid off the pillar. They were starting to open a breast from a gangway driven across the pitch of the seam, near to the face of the old breast which had been abandoned for some years. As it is well understood that there is more danger in connection with starting work in an old place than a new one the foreman should consequently be more careful and watchful over the employees.

Accident No. 21.—John Gilbert, miner, aged 45, instantly killed by a fall of coal (2-foot bench) while collecting tamping wherewith to tamp a hole in the face of the breast. The breast had been driven up thirty feet from the gangway and twenty-two feet wide, and was mining the four and two-foot benches, leaving the top coal to be worked back from the face, which is customary in this region, providing the top coal will allow such to be done. His partner apprehended danger, and thought of blasting down the 2 and 7-foot benches after firing said blast.

Accident No. 22.—Henry Daugherty, laborer, aged 28, instantly killed by a fall of (7-foot bench) coal. The breast was worked a distance of 120 feet from the gangway and 30 feet wide. They had mined about 15 feet on the 4 and 2-foot benches, and, as the miner stated, had fired seven blasts in the 7-foot bench in order to have it down, and finding it not likely to fall re-commenced working on the face, thereby leaving the laborer who was killed in imminent danger. The miner escaped with slight injuries, and another laborer working with them had a leg broken.

Accident No. 23.—Patrick Kerman, miner, aged 26, instantly killed by a fall of coal. The deceased and his brother were working together in widening an air-hole for a breast in the Wharton seam, and had fired a blast in the bottom coal, and were then mining the loose coal when the top bench fell on him with the above result.

Accident No. 24.—Wm. P. Williams, aged 17, "Patch" with the teamster, instantly killed by a fall of coal. As the team was about starting the trip of empty cars standing on a very short curve the boy jumped into the front car, and the start being so rapid caused the first car to jump the track, knocking out the centre prop supporting one and a-half cars of coal, resulting as stated.

Accident No. 25.—Patrick Ward, laborer, aged 31 years, had his skull fractured by a fall of coal. The accident happened September 9th, and he died on the 6th of October.

Accident No. 26.—Thos. P. Thomas, miner, aged 41 years, killed by a fall of coal. He had fired a blast in the face of the breast, and in crossing the breast to the manway, it is supposed, slipped and fell into the battery, where he was covered and probably smothered by the loose coal and dirt brought down by the blast. He was not missed for some time.

Accident No. 27.—Jas. C. Boyle, miner, aged 35, killed by a fall of coal (7-foot bench) while loading a car. His partner stated that the deceased had examined said bench previous to commencing to load the car and pronounced it all right. Great caution is exercised in and about this colliery, and wherever the top coal will not admit of the breast being worked eight yards wide with safety they are immediately reduced to that which is considered practicable.

Accident No. 28 —Sebastian Wagner, miner, aged 45, instantly killed by a fall of the dividing slate. He had fired a blast in the face of the breast, and upon returning to work he was struck on the head and so badly crushed that he expired almost instantaneously.

Accident No. 31.—Wm. Wallace, miner, aged 25 years, dangerously injured by a fall of coal November 1st, died November 5th. He was working in the breast when some top coal fell, injuring him so seriously that it resulted in his death.

Accidents Nos. 34 and 35.—Martin Rimbach and Adam Hobert, both miners, aged 48 and 38 years respectively. The former was instantly killed and the latter so crushed that he died shortly afterward. These two men were working together in another breast, and left their work to see how a fellow miner was getting along, who was commencing to open a new breast off the gangway. When they reached the spot a fall of the 22 inch slate and some loose coal fell upon them with the stated result. The miner who was opening the breast was in the face of the chute working in the 4-foot bench when the accident happened, and narrowly escaped sharing the same fate.

Falling In or Down Shafts and Slopes.

Accident No. 1 on the list.—The deceased, Mr. M'Cafferty, received a fracture on the knee January 31, and died in the hospital March 31. He was descending the slope, accompanied by four men, to pick up some tools, the car being stopped twice in order to facilitate the work. The second stop the car or rope stuck on the slope until about fifty feet of slack was out, at which time the car started, and when reaching the end of the slack he was thrown against the side of the slope, resulting as stated. Fortunately the other three escaped uninjured.

Accident No. 36 on the list.—John Malloy, laborer, aged 23, fell off the spreader of the bridle chain while coming up the slope in company with three other men, two of whom were inside the car. Deceased and other man were riding in front of the car with their faces downward. It is supposed that the rope was jerked and Malloy's feet slipped off the bumper of the car, precipitating him to the bottom, which resulted in his immediate death. An inquest was held by Squire Kreider, and the jury rendered a verdict of accidental death.

Explosions of Blasting Powder.

Accident No. 5 on the list.—Robert Cunningham, miner, aged 40, was instantly killed by the explosion of a keg of powder. It is supposed that he fell with a cartridge of powder in his hand and when he was about leaving the cross-cut (where he kept the powder) to go up the breast, and perhaps fell igniting the cartridge, from which the keg of powder exploded. He was so terribly burned that he could not be recognized. Many accidents of this kind might be avoided if the parties themselves would use the necessary precaution by hanging their naked lights on the props or some convenient place so as to be far enough away from the powder while making their cartridge. An instance of this kind came under my observation on my tour of inspection at slope No. 4, Buck Mountain, whereby four men were burned by the explosion of a keg of powder. At the time it was supposed that they were seriously burned but subsequently it proved otherwise, as they were able to be at work the next day. The general inside foreman, inside foreman and myself, had been a few minutes previous in the face of the gangway and back a considerable distance in the air-way but could not get through to the other gangway owing to too much water lodging in the return air-way. We were obliged to return back to the face of the main gangway, thence back towards the bottom of the slope. We had scarcely reached a distance of 200 feet when our lights were blown out by the terrific wind made by the explosion. I suspected what had happened, as I had been remonstrating with a miner whom I noticed was filling a cartridge of powder with a naked light on his head as I was passing by; but it so happened to be ignited by another miner who was making a cartridge at the same time. Fortunately no one was any the worse, for indeed it was miraculous as no less than six men might have been hurled into eternity without a moment's warning by the culpable negligence of such men.

Crushed by Mine Cars.

Accident No. 4 on the list.—John Gallagher, miner, aged 40, killed January 21, at Buck Mountain slope, No. 6, by jumping off the mine car on top of the slope. The deceased had rode up the slope upon a loaded car and while in the act of getting off he fell under the car crushing him so severely that he died shortly afterwards. The foreman stated that he had repeatedly told him not to do so. I had been informed that such practice as that of riding on loaded cars on slopes, and more than the required number (ten) being permitted to ride at one time, at two of the collieries in the district are being done. I had occasion to prosecute four men for the violation of the law in this particular case at Ebervale slope, No. 1, but owing to the parties pleading ignorance of the law they were permitted to go free by paying the usual cost; but hereafter such will not be the case as I intend punishing the first offender and giving him or them the extent of the law.

Accident No. 9.—Hugh Martin, aged 23, killed by mine car at Tresckow slope, No. 6, April 12. The deceased was a laborer in the gangway and had gone back to the head of the balance plane to assist the driver to change some cars on the turnout, and in order to do so the cars had to be changed by running them to the apex of the plane. It is supposed, as the driver stated, that he thought the car had too much headway and likely to run down the plane so he ran along the upper side of the turnout to sprag the car and his foot slipped on the bottom slate precipitating him under the car.

Accident No. 16 on the list.—John Carr, laborer, killed by mine car at Tresckow slope, No. 6, May 17. The deceased, in company with two other men, had been loading a car of sills or railroad ties on the plane, and when they were ready the deceased gave the usual signal to the man running the plane to go ahead, and after the car was started he jumped on to the track where the loaded car was coming down and was run over. Had the parties given the signal to the plane man to stop it is probable that his life might have been rescued. He was considered to be very active and had been in the employ of the company as road-man for many years. Just a little while previous to the accident he had told the other two men to be cautious for he could take care of himself.

Accident No. 20 on the list.—Thomas Davis, miner, aged 45, killed by a mine car descending the slope at Upper Lehigh, No. 4, August 4. The deceased was employed in sinking a double track slope which had been sunk a distance for two lifts which was working at the time in opening breasts and driving gangway, &c., at the same time the sinking of the slope to the cynclinal was continued by one track but leaving room enough for two tracks to be put in at the completion of the sinking. Davis and his two laborers when leaving work at night walked up the slope to the second lift where a car was descending the slope. The deceased became bewildered and jumped into the track where the empty car was descending instead of standing with his laborers where he would have been perfectly safe. The second opening had been made but not completed at the time of the accident.

Accident No. 28 on the list.—Frank O'Donnell, driver, aged 21 years, crushed by mine car, at Beaver Brook slope No. 2, October 23, and died October 27. The deceased was squeezed between the car and centre prop. At the time of the accident did not deem it very serious.

Accident No. 32 on the list.—David Zimmerman, laborer, aged 28 years, crushed by mine car at Highland slope No. 1, November 2, and died November 11. The deceased was in the act of measuring a plank on the gangway, when a car was being drawn from the face by the mules and somehow he was caught between the end of the platform and car, where he received a severe crushing, resulting as stated.

Accident No. 33 on the list.—William Linskee, driver, aged 18, crushed by mine car, at Stockton slope No. 5, November 24, and died the same evening. The deceased was employed as driver at bottom of the slope. As the car was being hoisted on the slope the side hook broke letting the car back to the bottom. It is supposed that he thought the empty car was descending, as he left the safety hole, where the bottom men generally stay in while the car is being hoisted, to hitch his mule to the car, but unfortunately it happened to be otherwise.

Miscellaneous Underground.

Accident No. 6 on the list.—Isaac H. Morgan, miner, aged 45, was killed by the caving in of an air hole at Harligh slope No. 2, February 11. The deceased and Silas Ferridy, who was seriously injured at the time, were employed to drive a proving hole, (which would afterwards serve for an air hole,) from the face of an old breast to the surface. This part of the mine had been abandoned for some time, and the company finding the coal becoming scarce deemed it expedient to re-work this part of the colliery. These two men were set to work to drive the hole before mentioned to ascertain how much coal was left from the face of the old breast to the surface. The breast had been driven up at an angle of 40 degrees, a distance

of about 210 feet to the face, where the hole commenced, which was driven 75 feet in coal, thence 51 feet in clay, and was timbered every 3 or 4 feet apart, and mud-sills made of plank placed on the bottom. The collar was 3 feet long between the notches, and 7 to 8 inches in thickness; legs 5 feet long, 5 to 7 inches in diameter. Silas Ferridy stated that the hole had run on them before, and that he apprehended danger, owing to the water bursting forth, causing the timbers to give way. Mr. Loyde, the foreman, stated that as the two men were practical miners and that they had their own way in driving the hole, and he had visited the place twice to see how they were getting along, and finding not as much work done as he had expected, had reasons to complain of them in not doing more work. In the morning, not finding the men in bed as usual, (as they boarded with him,) he went in search of them, and upon arriving at the place discovered that the hole had caved in, caused by a spring of water displacing seven sets of timbers and precipitating the deceased and Ferridy down the empty breast into the gangway where they were found by Loyde. Ferridy was in a precarious condition, while Morgan was probably drowned or killed by the fall, as the gangway was about one-third full of clay and water when discovered.

Accident No. 8.—John Gafigan, laborer, aged 28, instantly killed, at Beaver Brook slope No. 2, April 4, by the breaking of the clevic of the hoisting rope. The deceased was employed at hitching on the cars at the bottom of the slope, and was in the act of crossing the slope, *i. e.* from the east to west side, when the car struck him. The rope had been cut and the two ends connected by two shackles and a clevic, which is entirely wrong when the rope has to make short angles as in this case. Since the accident happened I have strictly requested the parties in charge not to make such connection, that if the rope is not good enough to be spliced it certainly ought to be replaced by a new one.

Thickness of wire rope, $1\frac{1}{4}$ inches; number of strands, 6; number of wire in each strand, 19.

MISCELLANEOUS ABOVE GROUND.

Accident No. 30.—Frank Schmidt, boy, aged 14, was seriously crushed by the counter screen, at breaker No. 6, Tresckow, November 22, and died the same evening. The deceased was employed in attending to the hopper and left his work to go to see what time it was, and in order to do so (as the clock was in the engine house) he went through some very intricate passages among the machinery, to evade the detection of the slate picker boss, and fell into the screen. On being questioned how it happened he said he did not know, but subsequently told his mother it had to be so.

Accident No. 37.—Dennis Kennedy, slate picker, aged 65, fell down a distance of 17 feet into the breaker "pocket," at Stockton No. 5, December 17, and died the same evening. The deceased was going to his work in the morning before daylight, and there being no one on the breaker at the time, except the man who was oiling the machinery preparatory to starting to work, and upon hearing the old gentleman fall he went immediately to his rescue. An inquest was held by Wm. F. Roberts, justice of the peace, acting coroner, and the jury rendered the following verdict: That the deceased came to his death by going up to the coal breaker yesterday morning in the dark and walked into one of the chutes, which resulted in his death, at about a quarter past three the same afternoon.

DAMAGES TO PROPERTY.

A breaker was burned down at Stockton February 15, 1876, called the East Sugar Loaf breaker, No. 2. Supposed to have taken fire from the stove-pipe, which extended out through the roof of the engine house.

Another breaker burned down at Yorktown November 27, 1876, called the Spring Brook, No. 5, belonging to the firm of A. L. Mumper & Co. The fire originated in the boiler room at about 7 P. M. by the bursting of one of the boilers, attributed to the fireman cleaning the fires and pumping water into them at one time, thereby necessitating the boilers to contract too rapidly, as is the custom too frequently to be seen among the firemen, and should strictly be forbidden by the parties in charge. Ample provisions had previously been made to meet such emergencies, by having hose and pipes attached to the pump, which was used for pumping water unto the breaker for washing the coal, but there being no one on the premises at the time except the engineer and fireman, who, instead of starting the pump, became bewildered and ran to town (about half mile from the scene) to tell the superintendent of the occurrence, and upon their arrival the foreman too hastily put the full head of steam on the pump, causing it to give out immediately; consequently they had done all they could to save the breaker, and had to clear to secure their own lives, as the fire by this time was falling upon them from the roof of the boiler house. It is presumed that had there been a whistle at the colliery to give the alarm the breaker might have been saved. Suffice it to say that it is a common error to erect steam boilers, as is often the case, so close to the breaker, as they should be far enough away from the breaker in case of either taking fire one of them may be saved. The loss is estimated at about $60,000; partially insured, ($30,000.)

The fire in the Stockton mines is still burning, but not near as fierce as at the time of writing my previous report. The No. 5 or Sandy Run gangway, which heretofore was on fire, is now approachable to the face, and the fire stopped off at the region of its origin, in slope No. 1.

Also, the fire in tunnel No. 6, Panther Creek valley, near Summit Hill, is still burning, but not making much headway.

Also, the fire called "the burning mines," slope No. 1, at Summit Hill, which occurred on February 15, 1859, or about eighteen years ago, and supposed to be the work of an incendiary, as stated by Mr. Nathan Pattenson, who was at the time general superintendent for the Lehigh Coal and Navigation Company, for there happened to be no fire in the slope at the time. This slope is sunk three lifts to the cynclinal, at an angle of about 20°, a depth of 780 feet; the seam is about 50 feet thick. The progress of the fire has not been very great by any means, for during a period of 18 years it only covers an area of about 12 acres. Allow me here to state that I merely make the above brief statement so as to have the same recorded for the benefit of whom it may concern, and will probably write an account of such fires sometime in the future.

Boiler Examinations.

There are 882 cylindrical steam boilers in the South district of Luzerne and Carbon counties, averaging 27 feet in length and 33 inches diameter. They have been examined and reported to be safe and in good condition, as can be seen by a superficial view of the tabular statement of the number of steam engines and steam boilers accompanying this report. I have had occasion to return some of the reports furnished me by the superintendents, as the examination dated back four and five months; hence I could not tell whether the boilers would be examined within the specified time according to law or not. Subsequently they have had their boilers examined in the latter part of December or the commencement of January, and in the latter part of June or the beginning of July.

Circumstances require many boilers to be examined oftener than every six months, as they are necessitated to use swamp and alum water directly from the mines, which is very destructive to the boilers.

During the drought last summer some of the collieries had to resort to using the mine water, which proved very ruinous to the boilers, and many had to be dispensed with. Some of the engineers and firemen are commendable in such cases of emergencies for the necessary precaution they exercised in blowing off the boilers in proper time and not allowing sufficient time for them to corrode, whilst others are censurable for their neglect in not keeping the water gauges all opened instead of using only one or two, and also in not grinding down their safety valves in lieu of piling on extra weights on the lever, &c.

Another very injurious thing which is too common to be seen at many of the collieries, is the opening of the fire doors when the steam commences to blow off and should be strictly forbidden, as this should be regulated by the damper; but as many of those dampers are so poorly constructed that it is with difficulty they can be put down at all, it is not surprising when the fireman takes the easiest way of checking the surplus of steam, not thinking, perhaps, of the serious results caused by too rapid contraction due to the cold air rushing at a great velocity under the boilers to take the place of the lighter air. It is evident that if a little more attention was given to the damper a great deal of coal could be saved annually and an injurious practice overcome. However, we have been very fortunate indeed in relation to explosion of steam boilers. There has been but one boiler explosion in the district during the last two years to cause great damage to property, and that happened at Yorktown colliery November 27, 1876. Luckily no one was injured. An explanation of the explosion can be seen in another part of this report.

It is a cognizable fact, as suggested by Mr. T. M. Williams, inspector for the Middle or Wilkesbarre district, that an inspector of steam boilers ought to be appointed for this district as well as that of Schuylkill county, and I fully corroborate with his views on the subject. By doing so it would eventually allow the inspectors more time to inspect the interior workings. Much time is now taken up by the inspection of the breaker machinery, hoisting machinery, boilers, &c., that could be applied in visiting the mines oftener to see that the workings are properly timbered, that the airways are made large enough, also that cross-cuts are driven through the pillars whenever required, and that sufficient ventilation is made to circulate to the face of each and every working place for the health and safety of the men, &c.

JANUARY 30, 1877.

T. D. JONES, Esq.,
Inspector of Coal Mines for South District of Luzerne and Carbon Counties:

SIR:—The following is a true report of air measurements for the month of January, 1877:

LOCAL NAME OF EACH SPLIT.	Mode of ventilation...	Fan revolutions per minute.....	Number of splits or currents.....	Number of cubic feet in inlet.....	Number of cubic feet in face of gangway..	Number of cubic feet at outlet.....	Number of men and boys in each current.	Number of mules.....	Temperature above ground.....	Temperature in face of gangway.....
Slope No. 3, east gangway.....	Steam exhaust	.....	3	17,900	3,400	16,200	16	9	39	60
Slope No. 3, west gangway.....	.....do.....	.....	.....	.....	5,300	.....	32	....	39	67
Slope No. 3, east counter gangway.	.....do.....	.....	.....	.....	3,500	.....	19	....	39	62
Slope No. -, west gangway.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....
Total measurements for week ending January 9, 1877.....	.....	.....	.....	17,900	12,200	16,200	65	9	.....	.....
Slope No. 3, east gangway.....	Steam exhaust	.....	3	17,700	2,900	15,900	16	9	45	67
Slope No. 3, west gangway.....	.....do.....	.....	.....	.....	4,200	.....	32	....	45	72
Slope No. 3, east counter gangway.	.....do.....	.....	.....	.....	3,600	.....	19	....	45	70
Slope No. -, west gangway.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....
Total measurements for week ending January 16, 1877.....	.....	.....	.....	17,700	10,700	15,900	65	9	.....	.....
Slope No. 3, east gangway.....	Steam exhaust	.....	3	18,800	3,400	16,700	16	9	50	70
Slope No. 3, west gangway.....	.....do.....	.....	.....	.....	5,600	.....	32	....	50	78
Slope No. 3, east counter gangway.	.....do.....	.....	.....	.....	5,200	.....	19	....	50	75
Slope No. -, west gangway.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....
Total measurements for week ending January 23, 1877.....	.....	.....	.....	18,800	14,200	16,700	65	9	.....	.....
Slope No. 3, east gangway.....	Steam exhaust	.....	3	18,700	3,320	16,800	16	9	35	62
Slope No. 3, west gangway.....	.....do.....	.....	.....	.....	5,200	.....	32	....	35	65
Slope No. 3, east counter gangway.	.....do.....	.....	.....	.....	5,020	.....	19	....	35	68
Slope No. -, west gangway.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....
Total measurements for week ending January 30, 1877.....	.....	.....	.....	18,700	13,540	16,800	65	9	.....	.....

WILLIAM JAMES,
Inside Foreman, at Humboldt colliery, for Linderman, Skeer & Co.

N. B.—This report is to contain four measurements in each month from as many mines, slopes, shafts or drifts as there are place for in the blank, commencing first week of the month, and are expected to be sent to the inspector before the 5th of the following month.

☞Some of the air escaping through the old workings could not be measured accurately.

T. D. JONES,
Inspector of Coal Mines.

JANUARY 30, 1877.

T. D. JONES, Esq.,
Inspector of Coal Mines for South District of Luzerne and Carbon Counties:

SIR:—The following is a true report of air measurements for the month of January, 1877:

LOCAL NAME OF EACH SPLIT.	Mode of ventilation	Fan revolutions per minute	Number of splits or currents	Number of cubic feet in bbld.	Number of cubic feet in face of gangway	Number of cubic feet at outlet	Number of men and boys in each current	Number of mules	Temperature above ground	Temperature in face of gangway
Slope No. 4, east gangway	Fan	69	2	23,000	10,050	20,000	120	7	50	64
Slope No. 4, west gangway	do				8,000		50	7	50	64
Slope No. -, east gangway										
Slope No. -, west gangway										
Total measurements for week ending January 9, 1877				23,000	18,050	20,000	170	14		
Slope No. 4, east gangway	Fan	65	2	25,000	11,750	22,000	120	7	52	60
Slope No. 4, west gangway	do				8,234		50	7	52	63
Slope No. -, east gangway										
Slope No. -, west gangway										
Total measurements for week ending January 16, 1877				25,000	19,984	22,000	170	14		
Slope No. 4, east gangway	Fan	63	2	24,000	10,430	21,602	120	7	43	55
Slope No. 4, west gangway	do				9,240		50	7	43	58
Slope No. -, east gangway										
Slope No. -, west gangway										
Total measurements for week ending January 23, 1877				24,000	19,670	21,602	170	14		
Slope No. 4, east gangway	Fan	68	2	26,300	12,740	22,670	120	7	56	61
Slope No. 4, west gangway	do				10,360		50	7	56	61
Slope No. -, east gangway										
Slope No. -, west gangway										
Total measurements for week ending January 30, 1877				26,300	23,100	22,670	170	14		

DAVID LAWSON,
Inside Foreman, at Slope No. 4, for L. & W. B. Coal Co.

N. B.—This report is to contain four measurements in each month from as many mines, slopes, shafts or drifts as there are place for in the blank, commencing first week of the month, and are expected to be sent to the Inspector before the 5th of the following month.

☞Owing to repairing the outlet could not accurately measure the air in the outlet.

T. D. JONES,
Inspector of Coal Mines.

The following table is the maximum, minimum and mean temperatures (Fah. thermometer) for each month during the year 1876:

	Maximum temperature.	Minimum temperature.	Mean temperature.
Temperature in January	39	23	31
Do.....February	37	19.4	28.2
Do.....March	37.5	26.5	32
Do.....April	57.4	33.4	45.4
Do.....May	71	44.2	57.6
Do.....June	82.8	57.6	70.2
Do.....July	87.1	60.1	73.6
Do.....August	82.7	55.7	69.2
Do.....September	65.9	46.3	56.1
Do.....October	54.2	34.6	44.4
Do.....November	43.9	28.4	36.15
Do..... December	25.4	11.2	18.3

T. D. JONES.

TABLE No. 1.—List of fatal colliery accidents and loss of life arising therefrom December

DATE.	Number of accidents.....	NAME OF COLLIERY.	LOCATION.	NAME OF OWNER OR LESSEE.	NAME OF PERSON KILLED.
Jan. 13....	1	Beaver Brook	Frenchtown	Beaver Brook Coal Co.....	Dinnes M'Clafferty,
21....	2	Tunnel, No. 9.....	Summit Hill	L. & W. B. Coal Co.....	John Erwin .....
21....	3	....do..... do.....	.....do	....do..... do	William Boyde.....
22....	4	Slope No. 6	Buck Mountain ...	Buck Mountain Coal Co....	John Gallagher .....
22....	5	Spring Brook.....	Yorktown	A. L. Mumper & Co.....	Robert Cunningham
Feb. 11....	6	Slope No. 2	Harleigh.....	Harleigh Coal Co	Isaac H. Morgans...
Mar. 28....	7	Slope No. 3	Humboldt	Linderman, Skeer & Co....	Neal Dangherty ....
Apr. 4....	8	Beaver Brook	Frenchtown.....	Beaver Brook Coal Co.....	John Gaffigan .....
12....	9	Slope No. 6	Treskow.....	L. & W. B. Coal Co.....	Hugh Martin.....
12....	10	Room Run.....	Nesquehoning.....	....do..... do	Thomas Shields.....
12....	11	.....do	.....do	....do.....do	Hugh Gaffield.....
12 ...	12	.....do	.... do	....do.....do	Charles Collan .....
12....	13	.....do	.....do	....do.....do	Thomas M'Govern..
25....	14	Slope No. 2.....	Mt. Pleasant	Pardee & Sons	Charles White .....
May 8. ..	15	Breaker No. 5.....	Summit Hill	L. & W. B. Coal Co.....	James A. Gallagher
17....	16	Slope No. 6.....	Treskow.....	....do. .....do.....	John Carr .....
22....	17	Coleraine, No. 4	Beaver Meadow...	W. T. Carter & Co.....	Neal M'Cole .....
June 2....	18	Spring Brook.....	Yorktown	A. L. Mumper & Co.....	John Boyle.....
15....	19	Slope No. 1.....	Harleigh	Harleigh Coal Co	Philmore Stare.....
Aug. 4....	20	Slope No. 4.....	Upper Lehigh.....	Upper Lehigh Coal Co	Thomas Davis .....
10....	21	Slope No. 1.....	Ebervale	Ebervale Coal Co	John Gilbert .....
30....	22	Slope No. 4.....	Jeanesville	J. C. Hayden & Co.....	Henry Daugherty ..
Sept. 12....	23	Slope No. 5.....	.....do	....do.....do	Patrick Kiernan....
13....	24	Cross Creek, No. 1..	Drifton	Coxe Bros. & Co	Wm. P. Williams..
9 ...	25	Slope No. -.....	Ebervale	Ebervale Coal Co	Patrick Ward.....
Oct. 13....	26	Tunnel, No. 6.....	Summit Hill	L. & W. B. Coal Co.....	Thomas P. Thomas,
13....	27	Slope No. 2.	Lattimer	Pardee Bros. & Co.....	James C. Boyle.....
23....	28	Beaver Brook	Frenchtown.....	Beaver Brook Coal Co.... .	Frank O'Donnell ...
27....	29	Council Ridge.....	Eckley.....	J. Leisenring & Co.....	Sebastian Wagner ..
Nov. 22....	30	Slope No. 6.....	Treskow.....	L. & W. B. Coal Co.....	Frank Shmidt.....
1....	31	Slope No. 1.....	Highland	G. B. Markle & Co	William Walace ....
2....	32	Slope No. 1.....	.....do	....do.....do.....	Daniel Zimmerman
21....	33	East Sugar Loaf	Stockton	Linderman, Skeer & Co....	William Linskoe....
Dec. 11....	34	Crystal Ridge.....	Hazleton	A. Pardee & Co	William Rimback ..
11....	35	.....do	.....do	....do.....do	Adam Hobart.....
15....	36	Slope No. 7	Milnesville	Stout Coal Co	John Mallony .....
27....	37	East Sugar Loaf	Stockton	Linderman, Skeer & Co....	Daniel Kennedy ....

in the Southern district of Luzerne and Carbon counties during the year ending 31, 1876.

Number of accidents	Occupation.	Age.	Widows.	Orphans.	Cause of Death.	Explosion of carbureted hydrogen gas.	Falls of coal.	Falling into shaft.	Falling into slope.	Explosion of blasting powder.	Crushed by mine car.	Miscellaneous under ground.	Above ground.	Falls of roof.	Total deaths.
1..	Laborer	23	..	..	Thrown off the car; died March 13	....	..	..	1	..	..	..	..	..	..
2..	....do	38	1	2	Fall of slate while standing a set of timbers on gangway	....	2	..	..	..	..	..	..	..	..
3..	....do	35	1	2											
4..	Miner	10	1	4	Jumping off loaded car on top of slope	....	..	..	..	..	1	..	..	..	..
5..	....do	40	1	5	Explosion of a full keg of powder—spark from lamp	....	..	..	..	1	..	..	..	..	..
6..	....do	45	1	1	Caving in of an air hole	....	..	..	..	..	..	1	..	..	..
7..	Laborer	35	1	..	Fall of slate in gangway	....	1	..	..	..	..	..	..	..	..
8..	....do	28	1	..	Breaking of the clevic of the hoisting rope	....	..	..	..	..	..	1	..	..	..
9..	....do	23	..	..	Struck by mine car on the balance plane	....	..	..	..	..	1	..	..	..	..
10..	Miner	56	1	4	These four men were killed by an explosion of carbureted hydrogen gas, supposed to have ignited from the driver's naked light	4	..	..	..	..	..	..	..	..	..
11..	....do	38	1	4											
12..	Driver	27	..	..											
13..	Laborer	22	..	..											
14..	Miner	38	1	6	Lump of coal rolled out from side of gangway close to face	....	1	..	..	..	..	..	..	..	..
15..	Slate picker,	13	..	..	By breaker machinery—caught in screen head	....	..	..	..	..	..	..	1	..	..
16..	Laborer	32	1	2	Struck by a car on balance plane while fixing roads	....	..	..	..	..	1	..	..	..	..
17..	Miner	50	1	6	Fall of coal by starting to open breast	....	1	..	..	..	..	..	..	..	..
18..	Laborer	40	1	6	Killed by a fall of slate	....	1	..	..	..	..	..	..	..	..
19..	....do	21	..	..	Killed by a fall of coal	....	1	..	..	..	..	..	..	..	..
20..	Miner	45	1	4	Struck by a car by coming up the slope	....	..	..	..	..	1	..	..	..	..
21..	....do	..	..	..	Killed by a fall of coal	....	1	..	..	..	..	..	..	..	..
22..	Laborer	28	..	..	Killed by a fall of coal	....	1	..	..	..	..	..	..	..	..
23..	Miner	26	..	..	Killed by a fall of coal	....	1	..	..	..	..	..	..	..	..
24..	Driver	17	..	..	Fall of coal; car jumped the track knocking out a prop supporting loose coal	....	1	..	..	..	..	..	..	..	..
25..	Laborer	31	..	..	Skull cracked by a piece of coal; died on 6th of October	....	1	..	..	..	..	..	..	..	..
26..	Miner	41	1	3	Fall of coal from blast; fell down the breast and drawn through the battery	....	1	..	..	..	..	..	..	..	..
27..	....do	35	1	4	Killed by a fall of coal	....	1	..	..	..	..	..	..	..	..
28..	Driver	21	..	..	Crushed between car and prop	....	..	..	..	..	1	..	..	..	..
29..	Miner	45	1	1	Killed by a fall of the dividing slate	....	1	..	..	..	..	..	..	..	..
30..	Slate picker,	14	..	..	Fell into counter screen and was crushed	....	..	..	..	..	..	..	1	..	..
31..	Miner	25	..	..	Fall of coal; died November 5	....	1	..	..	..	..	..	..	..	..
32..	Laborer	28	1	2	Crushed between car and platform	....	..	..	..	..	1	..	..	..	..
33..	Driver	18	..	..	Side hook on car broke letting car back on slope	....	..	..	..	..	1	..	..	..	..
34..	Miner	48	1	6	Left their work to see how a fellow miner was getting along, and upon reaching the place a fall of coal took place, killing them both	....	2	..	..	..	..	..	..	..	..
35..	....do	28	1	6											
36..	Laborer	23	..	..	Fell off car coming up slope	....	..	..	1	..	..	..	..	..	..
37..	Slate picker,	65	1	3	Fell into breaker "pocket"	....	..	..	..	..	..	..	1	..	..
		21	71		Aggregate	4	18	..	2	1	7	2	3	..	37

RECAPITULATION.

		Percentage due to causes.	
		1876.	1875.
By explosion of carbureted hydrogen gas	4	10.8	9.5
By falling into slope	2	5.4	.....
By falls of coal	13	35.1	38.0
By falls of slate	5	13.5	9.5
By mine cars	7	19.0	.....
By blasting powder	1	2.7	.....
By hoisting rope breaking	1	2.7	4.8
By breaker machinery	2	5.4	4.8
By sundries above ground	1	2.7	4.8
By sundries under ground	1	2.7	11.5
	37		

TABLE No. 2.—List of Accidents not proving fatal in the South District of Luzerne and Carbon counties during year ending Dec. 31, 1876.

No. of accidents.	Date.	Location of Collieries.	Slope No...	Tunnel No.	Name of the Person Injured.	Nature and Causes of Accidents.
1....	Jan. 13..	Sugar Loaf	2	.....	John Dick	Slightly burned by carbureted hydrogen gas in his breast.
2....	20..	Ebervale	3	.....	Philip Feist	Seriously injured by a fall of coal while sinking new slope.
3....	26..	Milnesville	7	.....	Hugh Dolon	Slightly burned by blasting powder while making a cartridge.
4....	Feb. 2..	East Crystal Ridge	4	.....	Edwin Willoughby	Slightly injured by a fall of coal in gangway.
5....	26..	Yorktown	6	.....	Thomas Jones	Slightly injured by a fall of slate.
6....	11..	Harleigh	2	.....	Silas Ferredy	Seriously injured by the caving in of an air-hole driven in face of an old breast.
7....	Mar. 20..	Hollywood	1	.....	Martin Carey	Seriously injured by falling into the crank-pit of the pumping engine.
8....	21..	.....do	1	.....	William Guckavan	Leg broken by a piece of coal falling down slope from the car.
9....	April 10..	.....do	1	.....	John Basque	Leg broken and ankle dislocated by dumping the slate car outside.
10....	10..	Sugar Loaf	2	.....	William Thomas	Seriously burned by carbureted hydrogen gas. These two men were working together, and had commenced opening a chute, and before starting to work started to brush the gas while another man was standing in the gangway with a naked light, from which the gas ignited, burning both severely.
11....	10..	.....do	2	.....	Levi Harris	
12....	12..	Nesquehoning	3	.....	Levi Marsden	These four men were in the explosion of carbureted hydrogen gas which resulted in the death of four others, (see fatal accident report.) Levi Marsden is the only one of these four who was seriously burned. The rest were around in a short time afterwards.
13....	.....	.....	.....	.....	Richard Bowden	
14....	.....	.....	.....	.....	Joseph Norwood	
15....	.....	.....	.....	.....	Jacob Meyers	
16....	April 21..	Yorktown	6	.....	Charles Burns	Driver inside—injured in the abdomen by being jammed between the cars and the door frame.
17....	May 3..	Sugar Loaf	2	.....	Edward Edwards	Seriously burned by explosion of carbureted hydrogen gas.
18....	6..	Summit Hill	.....	.....	James Kennedy	Leg broken—jammed between two mine cars on dirt bank.
19....	15..	Buck Mountain	.....	.....	Daniel Brislin	Leg broken by a fall of slate.
20....	30..	.....do	.....	.....	Frank Cull	Leg broken by a fall of coal.
21....	26..	Nesquehoning shaft	1	.....	Thomas M'Laughlin	Injured by a premature blast while driving rock tunnel.
22....	26..	.....do	1	.....	John Haggany	
23....	June 2..	Cross Creek, Drifton	1	.....	Thomas Williams	Injured by a fall of the dividing slate.
24....	16..	Summit Hill	4	.....	William Hammon	Severely burned by an explosion of carbureted hydrogen gas.
25....	17..	.....do	4	.....	Thomas Kinley	Slightly burned by an explosion of carbureted hydrogen gas.
26....	17..	.....do	4	.....	Dennis Higgins	Dangerously burned by carbureted hydrogen gas.
27....	28..	Milnesville	7	.....	John Fallon	Leg badly cut—jammed between car and prop.
28....	June	Summit Hill	4	.....	James Brennan	Severely burned by an explosion of carbureted hydrogen gas.
29....	June	.....do	4	.....	Hugh Kennedy	Severely burned by an explosion of carbureted hydrogen gas.
30....	July 22..	Buck Mountain	2	.....	John Mellet	Severely injured by the car running back on the slope.
31....	22..	.....do	2	.....	Michael Wynn	
32....	22..	.....do	2	.....	Patrick Cunningham	
33....	July.....	Jeddo, Oak Dale	1	.....	Robert Seinyard	Arm broken—caught between cape rail of car and slope collar.
34....	July 31..	Sugar Loaf	2	.....	Philip Ross	Seriously injured by a fall of coal.
35....	Aug. 2..	Summit Hill, (breaker No. 9,)	.....	.....	Thomas Boyle	Collar-bone broken—fell from No. 1 to No. 3 table. (Slate-picker.)
36....	6..	.....do	.....	6	Bernard P. Boyle	Leg broken by a fall of coal. [a breast.
37....	8..	Nesquehoning	.....	2	William Branch	Slightly burned by explosion of carbureted hydrogen gas by commencing to open
38....	10..	Lattimer	.....	.....	John Conlin	Leg broken—the fackle chain broke while hoisting timber up his breast.
39....	30..	Jeanesville	4	.....	Patrick M'Hugh	Leg broken by a fall of coal; likely to necessitate amputation.
40....	30..	.....do	4	.....	John M'Fadden	Seriously injured by a fall of coal; negligence in not taking down top coal.
41....	Sept. 7..	Jeddo, Oak Dale	1	.....	Thomas Sayers	Injured by assisting the driver to unloose his mules.
42....	18..	Harleigh	1	.....	Frank Mullherln	Severely crushed between the car and prop while riding up the slope.
43....	22..	Summit Hill	4	.....	John Treasurer	These three men were severely burned by an explosion of carbureted hydrogen gas while opening a breast. The fire boss had warned them a few minutes previous to be careful until their man-way would be connected for the free passage of the air. He had retired but ten minutes when an explosion took place, resulting as stated.
44....	22..	.....do	4	.....	Robert Williams	
45....	22..	.....do	4	.....	Mordecai Richards	

46....		25..	Hazleton mines	1	.....	Henry Hugo	Injured by a piece of coal falling from the battery.
47....	Sept.	.....	.....do	3	.....	Mat. Miller	Injured by a fall of rock. His injuries are not considered of a serious nature.
48....	Sept.	39..	South Sugar Loaf	3	.....	William Dodds	Severely injured by a fall of coal.
49....	Sept.	...	Ebervale	.....	.....	Frank Curren	Severely cut in the wrist by a piece of coal; likely to cause amputation.
50....	Oct.	.....	Stockton	5	.....	John Airey	Both injured by a fall of coal. Indications favorable for an early recovery.
51....	Oct.	.....	.....do	5	.....	James Airey	
52....	Oct.	3..	Yorktown	6	.....	Morgan Jones	Leg broken by a fall of slate while starting to open a breast.
53....	Oct.	.....	.....do	6	.....	David Williams	Leg broken by a fall of slate while starting to open a breast.
54....	Oct.	10..	Summit Hill	.....	9	Daniel Kelley	Seriously injured by putting a car on the track on breaker plane.
55....		10..	.....do	.....	9	Patrick M'Call	Dangerously injured by putting a car on the track on breaker plane.
56....		12..	Ebervale	.....	.....	John Kelley	Both collar-bones broke by attempting to jump off the platform into an empty trip of cars while in motion, and was crushed between the platform and car.
57....		12..	.....do	.....	.....	Thomas Shovelin	Severely hurt by a fall of coal in his breast.
58....		12..	Sugar Loaf	2	.....	Emil Filbert	Severely injured—a car jumped the track and went over a high embankment.
59....		24..	Upper Lehigh	.....	.....	William Parry (boy)	Foot crushed by breaker machinery. He removed the covering and accidently got his foot into the cog-wheel.
60....		20..	Summit Hill	.....	9	John Sweeney	Collar-bone broke by attempting to jump on a car outside.
61....		24..	South Sugar Loaf	3	.....	Richard Goldsworthy	Severely injured in the head by a fall of coal.
62....	Nov.	6..	Cranberry	1	.....	Patrick Morrison	Hurt by a fall of coal; not deemed of a serious character.
63....		16..	Beaver Brook	.....	.....	Edward M'Cadden	Hurt on the hip by a fall of slate.
64....		19..	Drifton, Cross Creek	1	.....	Patrick Carey	Leg run over by attempting to jump on a car as to necessitate amputation.
65....		24..	.....do.....do	1	.....	Thomas P. Williams	Leg broken by being thrown from the mule while riding from the mines.
66....		25..	Mount Pleasant	1	.....	William Boyle	Slightly injured by a fall of slate.
67....		28..	Summit Hill	4	.....	Robert Michael	Driver on dirt bank. Arm broken by falling in front of the car.
68....		28..	Yorktown	.....	.....	Hugh Dugan	Seriously injured by blast, the match being too short to allow him time for escape.
69....		28..	Drifton, Cross Creek	1	.....	Michael Sweeney	Both legs broken by a fall of coal; he is doing well.
70....	Dec.	8..	Sugar Loaf	.....	.....	Nicholas Williams	Crushed by a car on the slope while attending to the pulleys.
71....		8..	Coleraine	.....	.....	Nathan Kempt	Rib broken by a fall of slate.
72....		13..	Ebervale	2	.....	Peter Jerren	Leg broken by attempting to jump on the car in the gangway.
73....		18..	Coleraine	.....	.....	Peter Curren	Foot crushed by fall of slate, causing the amputation of two toes.
74....		22..	Beaver Brook	.....	.....	James Rogers	Thigh probably broken by a fall of coal.

RECAPITULATION.

Of the above colliery casualties—
- 1 had collar bone broken by mine cars.
- 5 had legs broken by falls of coal.
- 13 were injured by falls of coal.
- 7 were injured by mine cars.
- 1 had an arm broken by mine cars.
- 17 were burned by carbureted hydrogen gas.
- 1 had a leg broken by timber.
- 2 were injured by sundries inside.
- 7 were injured by falls of rock and slate.
- 3 had their legs broken by falls of slate.
- 3 were injured by premature blasts.
- 1 was injured by blasting powder.
- 3 had their legs broken by mine cars.

61 total underground.

- 3 were injured by mine cars outside.
- 2 were injured by breaker machinery.
- 2 had their collar-bones broken.
- 1 had a leg broken.
- 1 had an arm broken.
- 1 had a leg broken by being thrown from a mule.

10 total above ground,

74 aggregate,

		Percentage of accidents due to causes.
By explosion of carbureted hydrogen gas	17	23
By falls of roof	..	..
By falls of coal and slate	28	38
By falling into slopes, &c	..	..
By explosion of blasting powder	1	1.4
By being crushed by mine cars	12	16.2
By miscellaneous underground	5	6.8
By blasts	3	4
Miscellaneous above ground—		
By falling into crank-pit of engine	1	1.1
By being crushed by mine cars	5	6.8
Sundries outside	2	2.7
Aggregate	74	

TABLE No. 3.—The Inspectors of the Anthracite Coal Mines of the State of Pennsylvania have the honor to subjoin a tabular statement of the number of separate colliery accidents, and loss of life occasioned by such accidents, during the year ending December 31, 1876.

Names of Inspectors.	Names of the Districts for which they are appointed.	Number of Separate Accidents.									Number of Lives Lost by the Accidents									Tonnage of coal produced in each district	Number of tons of coal produced to each life lost
		Explosions of carburetted hydrogen gas	Falls of roof	Falls of coal	Falling into shafts	Falling into slopes	Explosions of blasting powder	Crushed by mine cars.	Miscellaneous, under ground	Above ground	Total number of non-fatal accidents	Explosions of carburetted hydrogen gas	Falls of roof	Falls of coal	Falling into shafts	Falling into slopes	Explosion of blasting powder	Crushed by mine cars.	Miscellaneous, under ground	Above ground	Total number of fatal accidents		
T. D. Jones	South District of Luzerne and Carbon counties	17	....	28	....	....	1	12	8	8	74	4	....	18	...	2	1	7	2	3	37	3,503,118	94,679
T. M. Williams	Mid. District of Luzerne and Carbon counties	19	....	17	....	....	5	15	25	5	87	7	....	23	1	....	3	4	14	3	55	.....	.....
Wm. S. Jones	Eastern District of Luzerne county	21	29	15	....	....	12	19	19	5	120	6	16	4	2	....	3	2	2	2	44	.....	.....
Samuel Gay	Second or Shenandoah district	9	1	13	....	....	5	4	8	3	48	1	1	10	....	....	....	4	4	3	27	2,891,117	107,078
Wm. Hemingray	Third or Shamokin district	13	6	16	....	...	6	11	7	2	61	1	3	11	....	....	11	4	7	....	37	3,188,726	86,182
Sampson Parton	First or Pottsville district	.....	....	....	....	....	.....	....	.....	....	.....	.....	....	....	....	....	.....	....	.....	....	.....	.....	.....
Aggregate in the anthracite coal mines of Pennsylvania for 1876		.....	....	....	....	....	.....	....	.....	....	.....	.....	....	....	....	....	.....	....	.....	....	.....	.....	.....

TABLE No. 3½.—The following table shows the quantity of coal produced, number of persons employed, and the number of lives lost in the Southern district of Luzerne and Carbon counties, during the years ending December 31, 1875 and 1876; also the ratio of said production to each person employed, also to each life lost, and the ratio of persons employed to each life lost.

	1875.	1876.	Total.
Coal produced in tons per year	2,555,888	3,503,118	6,059,006
Number of persons employed	8,516	9,648	.....
Ratio of coal produced in tons to each employé	300.1	363.0	.....

	1875.	1876.	Average.
Number of lives lost each year	21	37	29
Ratio of coal produced per life lost	121,709	94,679	108,194
Ratio of persons employed per life lost	405.4	260.76	333.0

TABLE OF COMPARISON.

	England.		Nova Scotia.		Anthracite Coal Mines of Pennsylvania.	
	1874.	1875.	1874.	1875.	1874.	1875.
Coal produced in tons per year	140,713,832	147,730,313	872,720	781,165	21,516,248	22,000,000
Number of persons employed	538,829	535,845	4,282	3,777	61,403	69,589
Ratio of coal produced in tons to each employé	261.0	275.6	203.8	206.82	350.41	316.0
Number of lives lost each year	1,056	1,244	7	2	265	283
Ratio of coal produced per life lost	133,251	118,754	135,063	390,582	81,198	92,437
Ratio of persons employed per life lost	510.0	430.0	611.0	1,888.0	231.7	292.0

TABLE No. 4.—Number of persons killed and injured during the years 1871-2-3-4-5-6 in the South District of Luzerne and Carbon counties. The following table is intended to exhibit in a comprehensive manner the causes of and the liability of accidents:

	1871.		1872.		1873.		1874.		1875.		1876.		Total killed	Total injured
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured		
Explosion of carbureted hydrogen gas	....	1	1	5	1	5	2	8	2	3	4	17	10	39
Falls of roof	....	....	....	....	....	....	5	....	1	....	....	....	6	.....
Falls of rock, slate and coal:														
Falls of coal	10	13	13	9	17	....	6	12	8	36	13	16	67	86
Falls of slate	1	3	2	1	4	....	....	....	2	3	5	12	14	19
Sundries	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
	11	17	16	15	22	5	13	20	13	42	22	45	97	144
Falling into Shafts and Slopes:														
Falling into shafts	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
Falling into slopes	1	....	....	1	1	....	....	4	....	1	2	....	4	6
Hoisting machinery breaking	....	....	....	....	....	....	4	....	1	3	1	....	6	3
Sundries in slopes	3	3	1	....	1	....	....	....	....	....	....	....	5	3
Total in slopes	4	3	1	1	2	....	4	4	1	4	3	....	15	12
Miscellaneous Under Ground:														
Explosion of blasting powder	2	2	1	2	....	....	....	1	....	1	1	1	4	7
Suffocation in Stockton mine fire	1	....	....	....	....	....	....	....	4	....	....	....	5	.....
Crushed by mules	....	....	....	....	1	1	....	....	....	2	....	....	1	3
Crushed by mine cars	5	6	3	2	2	....	6	8	....	18	7	12	23	46
Premature blasts	2	6	2	2	4	....	....	2	....	2	....	3	8	15
Sundries	....	....	....	14	2	43	5	3	1	5	1	5	9	70
Total miscellaneous under ground	10	14	6	20	9	44	11	14	5	28	9	21	50	141
Total under ground	25	34	23	36	33	49	28	38	19	74	34	66	162	297
Above Ground:														
By machinery	....	....	1	....	1	....	....	....	1	....	2	1	5	1
Suffocation in breaker chutes	2	....	....	....	....	....	....	....	....	....	....	....	2	.....
Crushed by cars	2	....	1	2	3	....	....	....	1	....	....	5	7	7
Sundries	....	1	....	....	1	....	3	....	....	3	1	2	5	6
Total above ground	4	1	2	2	5	....	3	....	2	3	3	8	19	14
Gross total	29	35	25	38	38	49	31	38	21	77	37	74	181	311

TABLE No. 5.—This tabular statement is compiled from the inspectors' reports since the year 1871 to December 31, 1876.

	T. D. Jones, inspector Lehigh district, Luzerne and Carbon counties.				T. M. Williams, inspector Middle district, Luzerne county.				William S. Jones, inspector Eastern district, Luzerne county.				Samuel Gay, inspector Shenandoah district.				William Hemingray, inspector Shamokin district, Schuylkill county.				Sampson Parton, inspector Pottsville district, Schuylkill county.				Total during each year.			
	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....	Killed.....	Injured.....	Widows.....	Orphans.....
1871....	29	35	8	40	53	90	21	80	*60	133	38	108	56	168	24	97	33	120	24	95	30	118	18	65	271	664	136	485
1872....	25	38	12	33	40	121	21	61	67	187	39	119	42	89	25	68	32	102	15	60	17	74	9	41	223	611	121	352
1873....	38	49	20	48	46	91	18	60	56	169	30	78	53	161	31	141	44	101	28	98	29	117	15	61	266	688	142	486
1874....	31	38	13	29	57	105	28	71	69	89	38	112	44	95	20	71	26	159	19	49	35	81	14	65	262	558	131	397
1875....	21	77	12	20	63	100	13	44	62	102	36	118	26	114	11	48	38	106	13	49	28	88	17	62	238	587	102	341
1876....	37	74	21	71	55	87	.....	.....	44	120	.....	.....	27	48	.....	.....	37	61	.....	.....	†	.....	.....	.....	200	390	21	71
Total.	181	311	88	241	314	594	104	316	358	800	181	535	248	675	111	425	220	610	99	351	139	478	73	294	1,460	3,498	656	2,162

* Estimated; no report made from that district for that year. The number of widows and orphans for the year 1876 are omitted, as the necessary data could not be furnished in time for this report.

† Could not be furnished in time for this report.

Total number killed in six years..... 1,460
Total number injured in six years..... 3,498
Total number of widows in six years..... 656
Total number of orphans in six years..... 2,162

TABLE No. 6.—Exhibiting the number of slopes and breakers in actual use, and the amount of coal shipped to market, and the number of days worked at the breakers during the year ending Dec. 31, 1876; also the number of kegs of powder used to mine said tonnage of coal, estimate capacity of breakers, and the number of men and boys employed in and about the mines; also the number of mules at each colliery, &c.

LOCATION OF COLLIERIES.	Number of slopes in actual use	Number of breakers in actual use	Number of tunnels in actual use	Coal shipped to market during the year ending December 31, 1876	Number of days worked at the breaker	Number of kegs of powder used	Estimate capacity of breaker in tons per day	Number of actual miners	Number of laborers inside	Number of driver and door boys in mines	Number of mechanics	Number of breaker men	Number of drivers and slate-picker boys outside	Number of men and boys employed in and about the colliery	Number of mules
1. Upper Lehigh, Luzerne county	4	2	.....	250,576.18	445	4,525	1,600	118	126	27	14	23	110	418	58
2. Woodside, Luzerne county	1	1	.....	31,155	123	648	400	36	28	5	3	19	14	105	13
3. Drifton, (Cross Creek,) Luzerne county	1	1	.....	117,719.12	177¼	2,100	850	107	54	16	12	55	47	291	33
4. Jeddo, Oakdale, Luzerne county	1	1	.....	121,104.21	270	1,807	1,000	150	18	34	8	32	89	331	58
5. Highland, Luzerne county	3	2	.....	107,991.14	283	2,263	1,000	111	17	15	8	31	88	270	29
6. Buck Mountain, Luzerne county	3	1	.....	113,267.16	164½	2,400	825	123	66	28	23	65	41	316	71
7. Eckley, Council Ridge, Luzerne county	3	2	.....	117,311.10	333	2,196	1,400	104	81	37	21	25	92	360	53
8. Ebervale, Luzerne county	3	2	.....	213,316.14	337	4,837	1,500	123	106	9	16	92	71	417	55
9. Harleigh, Luzerne county	2	2	.....	120,937.14	282⅝	2,203	950	80	132	32	12	28	106	390	34
10. Lattimer, Luzerne county	2	2	.....	126,000	250	1,990	1,000	97	40	16	8	12	193	366	48
11. Milnesville, Luzerne county	2	2	.....	110,416.17	294	1,575	950	58	70	9	9	68	47	261	22
12. Hollywood, Luzerne county	2	1	.....	58,973.11	129	941	500	26	19	5	10	20	44	121	12
13. Stockton, Luzerne county	4	3	.....	179,932	487	3,652	1,600	142	131	19	25	70	83	470	47
14. Hazleton collieries, Luzerne county	3	3	.....	137,395.04	309	2,016	1,600	130	88	19	23	92	147	499	71
15. Sugar Loaf collieries, Luzerne county	3	2	.....	59,129.15	259⅜	1,285	1,000	90	43	13	10	65	82	303	25
16. Cranberry and Crystal Ridge, Luzerne county	2	2	.....	75,931.06	204½	1,514	1,100	97	47	10	15	46	77	292	34
17. Mt. Pleasant, Luzerne county	1	1	.....	35,504.02	115	859	500	40	38	9	9	23	25	144	20
18. Humboldt, Luzerne county	1	1	.....	37,848.03	136	1,043	500	47	24	11	7	23	29	141	18
19. Gowen, Luzerne county	1	1	T. 1	8,007	136	120	300	19	13	4	3	11	17	67	5
20. Gowen, (Stanton,) Luzerne county	.....	chute	D. 2	294	26	10	150	4	1	1	1	5	4	16	2
21. Beaver Meadow, (Stafford,) Carbon county	2	1	.....	67,885.13	120	1,585	700	44	47	10	5	7	52	165	14
22. Coleraine, Carbon county	3	2	D. 1	123,378	376	2,158	950	72	56	15	13	33	72	261	21
23. Jeanesville, (Spring Mountain,) Luzerne and Carbon counties	4	3	D. 1	252,305	552	4,476	1,900	138	174	38	18	61	153	582	62
24. Beaver Brook, Luzerne county	2	2	.....	110,000	420	3,300	750	96	80	24	13	28	60	301	35
25. Yorktown, (Spring Brook,) Carbon county	2	2	.....	115,497.02	330	3,110	900	106	129	24	21	58	81	419	28
26. Treskow, (South Spring Mountain,) Carbon county	2	1	.....	115,379.18	193¼	3,028	700	119	100	28	6	42	65	360	35
27. Summit Hill, Carbon county	3	5	T. 5	328,035	724¼	2,408	3,400	287	318	118	57	244	556	1,610	158
28. Nesquehoning, Carbon county	2	1	T. 1 S. 1	108,334.05	196¼	975	500	61	61	19	20	68	87	316	40
29. Sandy Run, Luzerne county*	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	7	6	.....	17	.....
30. Kocher's Notch, Luzerne county	.....	.....	.....	.....	.....	.....	.....	.....	2	4	.....	.....	.....	.....	6	.....
Aggregate during the year ending December 31, 1876	68	51	12	3,243,628.15	7,679	50,027	28,520	2,629	2,143	595	397	1,352	2,532	9,648	1,101
Aggregate during the year ending December 31, 1875	63	48	7	2,323,535.15	5,975	40,760	24,125	2,384	2,026	514	415	1,298	1,879	8,516	1,081
Increase	5	3	5	920,093	1,704	18,267	4,395	245	117	81	.....	54	653	1,132	20

*Newly started; sinking slope. T.—tunnels. S.—shaft. D.—drift. The above table is the actual shipments of coal, &c., in 1876 from the Lehigh district, and can be relied upon as being accurate. No. of openings:—No. of slopes in actual use in 1876, 68; No. of slopes idle in 1876, 3; No. of tunnels in actual use in 1876, 7; No. of drifts in actual use in 1876, 4; total number of openings, 82. Total No. of breakers or *collieries* in the district, 52, one of which was not working last year. I have limited the word *colliery* in this table to a place having a breaker, irrespective of No. of slopes, &c., for in many cases we have 3 and 4 slopes producing coal to one breaker; hence we could not call each a colliery.

TABLE No. 7.—List of collieries where accidents have taken place during the year ending December 31, 1876.

NAME OF COLLIERY.	LOCATION.	OWNER OR LESSEE.	Total deaths.	Quantity of coal produced.	Tons of coal produced to each life lost.	Deaths per million tons of coal produced.
Beaver Brook	Frenchtown	Beaver Brook Coal Company	*3	121,200	40,400	24.75
Tunnel No. 9	Summit Hill	Lehigh and Wilkesbarre Coal Company	2	117,105	58,552½	17.08
Tunnel No. 6	....do	....do....do....do	1	73,475	73,495	13.61
Breaker No. 5	....do	....do....do....do...	1	84,521	84,521	11.84
Slope No. 2	Mt. Pleasant	Pardee Sons & Co	1	38,344	38,341	26.08
Slope Nos. 2, 4 and 6	Buck Mountain	Buck Mountain Coal Company	1	122,567	122,567	8.16
Slope Nos. 5 and 6 (Spring Brook)	Yorktown	A. L. Mumper & Co	*2	127,797	63,898½	15.65
Slope No. 6	Treskekow	Lehigh and Wilkesbarre Coal Company	3	122,977	40,992½	24.39
Cross Creek No. 1	Drifton	Coxe Brothers & Co	1	191,936	191,936	5.21
Slope No. 1	Ebervale	Ebervale Coal Company	2	228,248	111,124	8.76
Slope No. 2	Laltimer	Pardee Brothers & Co	1	68,000	68,000	14.70
Spring Mountain No. 4	Jeanesville	J. C. Hayden & Co	1	104,075	104,075	9.60
Spring Mountain No. 5	....do	....do....do	1	106,251	106,254	9.41
Slope No. 4	Upper Lehigh	Upper Lehigh Coal Company	1	92,517	92,517	10.81
Slope No. 1	Highland	G. B. Markle & Co	2	93,204	46,602	21.46
Slope Nos. 1 and 2	Harleigh	Harleigh Coal Company	*2	130,462	65,231	15.33
Slope No. 4	Coleraine	William T. Carter & Co	1	62,613	62,613	15.97
East Sugar Loaf No. 5	Stockton	G. B. Linderman & Co	2	97,702	48,851	20.47
Crystal Ridge No. 4	Hazleton	A. Pardee & Co	*2	82,002	41,001	24.39
Slope No. 7	Milnsville	Stout Coal Company	1	83,412	83,412	11.98
Room Run No. 3	Nesquehoning	Lehigh and Wilkesbarre Coal Company	4	116,010	29,002½	34.48
Slope No. 3	Humboldt	Linderman & Skeer	1	44,288	44,288	22.58
Council Ridge	Eckley	J. Leisenring & Co	1	86,336	86,336	11.58
			37			

* Coal produced from two collieries.

Where the coal consumed at the collieries, &c., was not returned in, 8 per cent. has been added to the coal shipped to equal coal produced in the above calculations.

The ratio of coal produced, on the whole, to each death, is	94,679 tons.
Total coal produced in 1876	3,503,118 tons.
Total coal shipped to market in 1876	3,243,628 tons.

TABLE No. 8.—*Shows the number and dimensions of steam and pole pumps at some of the collieries in the Lehigh district; also the approximate quantities of water pumped to the surface during the time worked, and the ratio of tons of water pumped to each ton of coal produced in 1876:*

LOCATION OF COLLIERIES.	Slope number	Number pumping engines	Horse-power of pumping engines	Number pumps and pumping engines	Pressure of steam per square inch	Diameter of pump in inches	Length of stroke in inches	Absolute capacity of pumps during the 24 hours	Approximate number of gallons of water pumped per 24 hours	Approximate number of cubic feet of water pumped per 24 hours	Approximate number tons of water pumped in 24 hours	Approximate number of tons of water pumped during the time worked in 1876	Number of days worked in 1876	Vertical height of column in feet	Number of tons of coal produced during the time worked in 1876	Number of tons of water pumped to each ton of coal produced	NAME OF PUMPS OR MAKERS.
1. Upper Lehigh	1	3	234	75	12,14,16,	48,72,72,	4,199,040	834,240	111,521	3,111	724,863	233	181	167,481	4.32	Roberts' steam pump.
	2												210			
2. Do	3	3	78	75	14,4.8,	72,10.36,	2,410,560	282,211	37,726	1,052	223,024	212	86	92,517	2.41	Roberts' steam pump.
	4															
3. Eckley Co'l R'ge	2	2	100	75	12,12½,	72,72,	2,016,000	1,010,720	135,114	3,770	640,900	170	310	86,337	7.42	Thatcher and Bradly steam pumps.
4. Do	4	1	40	60	12,	72,	912,960	888,960	118,836	3,315	417,778	126	210	38,298	10.91	Bradly steam pump.
5. Do	5	1	70	75	12,	48, duplex,	1,296,000	126,000	16,923	472	17,464	37	.....	7,404	2.36	Roberts' steam pump.
6. Beaver's Brook	2	2	90	60	8,14,	72,	2,160,000	545,000	72,856	2,033	447,260	220	130	.....	5.73	Allison and Roberts' steam pumps
7. Do	4	2	80	60	8,10,	72,48,	1,620,000	330,000	44,114	1,231	247,431	201	370	121,200		Roberts' steam pumps.
8. Jeanesville	4	1	50	75	14,	72,	3,456,000	720,000	96,250	2,685	491,446	183	283	104,075	4.72	Allison steam pump.
9. Do	1	5	360	75	20,12,	3-12D.2-72,	6,882,000	2,400,000	320,833	8,852	1,656,120	185	230	77,708	21.31	4 plunger and 1 Allison steam pumps.
10. Do	5	2	100	75	14,14,	72,72,	3,456,000	1,440,000	192,500	5,371	988,264	184	229	106,254	9.3	Allison steam pumps.
11. Lattimer	2	2	120	80	17,17,	48, double acting	4,929,600	906,336	121,159	3,380	425,880	126	297	82,000	5.19	Thatcher steam pumps.
12. Stockton	4	3	292	65	12,18,14,	72,72,72,	7,885,440	2,419,200	323,400	9,023	1,967,014	218	261	104,541	18.81	Thatcher and Allison's steam pumps.
	5															
13. Yorktown	5	2	150	80	14,12½,	72,72,	2,304,000	1,073,000	143,430	4,002	672,336	168	276	127,797	8.87	Thatcher and Allison's steam pumps.
14. Do	6	1	100	70	17,	48, double acting	1,086,048	763,200	102,025	2,846	461,165	162	255	.....		Thatcher and Allison's steam pumps.
15. Highland	1	3	120	60	12,10,8,	72,72,72,	1,704,960	1,704,960	227,920	6,359	1,297,236	204	319	99,728	13.	2 Thatcher & 1 Camron's st'm pumps.
16. Jeddo Oakdale	1	1	40	80	14,	60,	1,152,000	576,000	77,000	2,148	292,128	136	313	68,851	4.24	Roberts' steam pump.
17. Do	2	4	250	80	6,6,8,8,	36,36,36,36,	3,312,000	1,656,000	221,375	6,177	827,718	134	295	60,731	13.63	Albright & Stroh.
18. Tresckow	6	1	90	70	16,	96,	864,000	792,760	105,976	2,957	589,182	199¼	224	122,977	4.79	Pole pump.
19. Nesquehoning	1	5	725	75	20,16,8,12,8,	120,72.24,72,24,	2,878,560	1,438,780	192,337	5,366	1,053,077	196¼	288	116,010	9.07	Carter, Allen & Co., L. and W. B. Coal Company, 2 Knowls' and 1. H. Salkill.
	2															
	3															
20. Drifton 'C's C'k'	1	2	350	70	12,12,	72,72,	2,217,600	1,104,000	147,583	4,118	729,915	177¼	237	136,647	5.34	Meyriek and Wren steam pumps.
21. Woodside	1	2	350	70	10,10,	96,96,	1,310,400	648,000	86,625	2,417	297,291	123	136	34,455	8.63	D. Clark & Co., Hazleton, Pa., steam pumps.
22. Beaver Meadow	1	3	230	80	12,	72,	1,842,000	1,322,880	176,843	4,935	592,200	129	75	73,428	8.06	Reese's vacuum & Wren steam pumps.
	2												225			
23. Summit Hill	4	4	1,289	90	20,20,20,20,	120,120,72,72,	5,342,400	2,671,200	357,087	9,963	1,442,253	141¾	1620	66,264	21.31	Roberts' and Salkill, Carter and Allen.
24. Do	5	1	50	90	16,	72,	907,200	576,000	77,000	2,148	384,492	179	265	84,521	4.55	Roberts' and Salkill steam pumps.
25. Coleraine	2	2	210	60	16,10,	72,72,	1,058,400	751,680	100,485	2,804	555,192	198	230	67,565	8.21	Wm. T. Carter & Co. steam pump.
26. Ebervale	1	3	380	85	14,12,8,	72,48,48, duplex,	3,007,204	2,585,204	345,591	9,642	3,249,364	337	281	228,248	14.23	D. Clark and 1 Camron steam pumps.
	2															
	3															
27. Harleigh	1	4	345	75	12,12,13,11½,	60,72,60,48,	3,456,000	2,101,853	280,977	7,840	2,216,760	282¾	312	130,462	16.99	Allison steam pumps.
	3															
28. Hazleton collier's	1	5	110		13,11,10,14,	60,60,60,60,	4,497,120	869,280	116,206	3,242.	*A 353,702	109 1-10	.....	D148,386	12.08	1 piston pump and 4 pole pumps.

29. Laurel Hill coll's	5	7	.....	80	18,16,15,12½,10,	84,84,72,72,96,	5,403,600	2,533,080	338,623	0,448	B1,108,054	116½				2 duplex, 2 Thatcher and 3 pole pumps.
30. Sugar Loaf coll's	1, 2, 3	6	.....	65	12½,18,12,12½,16	72,84,72,72,84,	3,391,200	1,458,360	194,954	5,449	1,414,400	269	.....	63,859	22.15	2 Thatcher, 3 pole and 1 piston pump.
31. Hazleton collier's	3	8	.....	65	13,11,10,14,	60,60,60,60,	1,834,568	1,084,020	144,912	4,043	C335,569	83				4 duplex steam and 4 pole pumps.
32. E. Crystal R'e col	1	2	.....	70	12½,16,	72,72,	576,000	532,800	71,225	1,987	189,758	95½	.....	82,005	7.99	2 Thatcher steam pumps.
33. Crystal Ridge col	2	1	.....	45	18.	72,	207,200	56,886	7,604	212	23,108	109				1 pole pump.
34. Cranberry coll's	1	4	.....	65	14,14,14,15,	84,84,84,72,	2,725,920	1,088,640	145,530	4,061	442,649	109				3 pole and 1 Thatcher steam pump.
35. Mt. Pleasant	2	3	.....	70	12,14,	96,84,	2,108,100	554,480	75,460	2,105	242,075	115	.....	38,341	6.31	2 duplex steam and 1 pole pump.
36. Hollywood.....	2	2	.....	70	14,12½,18,	60,96,84,	2,808,000	643,980	86,088	2,402	309,858	129	.....	63,691	4.86	1 piston, 1 Thatcher & 1 plunger pump.

*A, B, C are added together and divided by D. † Two lifts. ‡ No 1 pump; No. 2, 1,728,000.

The quantity of water lost through the valves has not been taken into consideration, which quantity is usually termed the slip of the valve—is rarely equal in any two pumps of same dimensions.

The pressure upon the plunger as indicated by the pressure gauge at Harleigh slope, No. 3, was 135 pounds per square inch when standing still, and when the pump was put in motion the gauge indicated a pressure of 145 pounds, showing an increase of 10 pounds due to friction. The vertical lift of column was about 312 feet. The pressure was the same on the working barrel as it was on the column pipe, (145 pounds,) and as the gauge viberated considerable a small air hole was bored in the tail pipe and the gauge became stationary indicating 145 pounds.

The weight upon the plunger or solid piston is also proportional to the area and vertical height of column.

The indications of the pressure gauge at No. 1 Harleigh, (as stated by Mr. Andrew Lee, M. M.,) when the pump was not in motion, was 65 pounds per square inch, and the vertical height of column 150 feet.

I deem it proper to make the above table to show the manner in which the mines in this district are drained, &c., which is a very important part in mining. There are a great variety of pumps in use and all are capable of doing the work required. The parties in charge of the pumps and machinery, as required by section 8 of the Ventilation Act, are considered practical and competent men.

T. D. JONES.

TABLE No. 9.—The following table affords a means of ascertaining the useful effect of the power spent on fan ventilation.

DATE.	No. of experiments.	No. of revolutions of engine per minute	Position of shutter	Indicated H. P. applied	Indications of anemometer in upcast 22'	Velocity of air a minute calculated by formula $v = .97 R + 40$	No. of cubic feet of air per minute	Water-gauge at No. 1 station, area 35 feet	Calculated useful effect in H. P.	Calculated per cent. useful effect on the whole power applied	Pressure indicated by steam gauge on steam cylinders	WATER-GAUGES. No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
December 14, 1876	1	20	1	1.40	200	234	8,190	.18	.23	16.43	5	.18	.16	.08	.04	.03	.00	.02
Do do	2	42	1	2.69	320	350	12,250	.20	.39	14.50	6	.20	.18	.10	.07	.06	.01	.04
Do do	3	50	1	4.90	425	452	15,820	.45	1.12	22.86	7	.45	.39	.20	.18	.21	.04	.05
Do do	4	70	1	9.30	610	632	22,120	1.05	3.66	39.35	9½	1.05	.75	.50	.32	.39	.05	.09
Do do	5	80	1	12.32	650	671	23,485	1.20	4.44	36.01	11	1.20	1.02	.62	.45	.55	.08	.12
Do do	6	85	1	14.27	710	729	25,515	1.47	5 91	41.42	12	1.47	1.15	.70	.48	.60	.09	.16
Do do	7	90	1	16.37	750	767	26,845	1.57	6.64	40.57	13	1.57	1.30	.80	.50	.65	.05	06
Do do	8	95	1	19.94	775	792	27,720	1.59	6.94	34.80	15	1.59	1.35	.81	.52	.67	.02	.09
Do do	9	100	1	22.39	810	826	28,910	2.05	9.34	41.71	16	2.05	1.55	1 00	.63	.80	.03	.15
Do do	10	105	1	26.45	880	894	31,290	2.32	11.44	43.25	18	2.32	1.71	1.03	.70	.90	.03	.19
Do do	*11	95	1	27.97	711	730	40,380	.....	9.66	34.54	21	.....	1.5	.....	.....	.....	.....	.....
Do do	12	95	1	19.91	401	429	24,024	.....	3.79	19.04	15	.....	1.	.....	.....	.....	.....	.....

Figures 1 and 2 indicate the positions of the water-gauges.
* The door was left open and the steam raised to 21 pounds, but ought to have been left at 18 pounds.

The above experiments were made on a Gubal fan at Room Run colliery, December 14, 1876, by the Inspector and the Assistant Superintendent R. Eustice, Esq. Previous trials had been made by Messrs. Blacket, Eustice, Smith and myself. The two former gentlemen were the assistant superintendents, and Mr. Smith, C. and M. E. for the L. and W. B. coal company at Summit Hill. Owing to the shutter being fastened permanently instead of making it adjustable it was proposed to postpone the experiments for some future day; during the interval Mr. Eustice experimented in trying to find the best position for the shutter, and found it to give the best results placed about the centre of the fan shaft. The results obtained by the intermediate positions of the shutter were not recorded, and only that of the highest and lowest being observed. Each position should have been recorded, however about 12 per cent. more air was obtained by placing the shutter about the centre of the fan shaft. The shutter is used for enlarging or diminishing the outlet. The volume of air drawn by the fan can be so regulated as to suit the requirements of the mines and produce the greatest economical effect. If the outlet is made too small the air cannot get quickly enough away, and if the outlet is made too large air will be drawn back into the fan, hence the necessity of experimenting to find the best proportions of stacks, and also the best position for the shutter. This fan is so constructed as to receive the air on both sides, which is not usually the case with the *Gubal* fan, by placing a band of sheet iron on the centre of the shaft, extending to the commencement of the vanes, or equal in circumference and diameter to the opening of the fan. This is supposed to be an advantage to the fan as a means to prevent the two currents of air coming in contact with each other; as to the percentage gained by such appliance I am not prepared to state. The distance from the inlet to the *fan* is 2.9 miles, and when run up to 128 revolutions per minute the water-gauge indicated 2 5-10 inches. The airway makes fourteen right angles, and offers 464,500 square feet of rubbing surface. The quantity of air exhausted when the fan was running 128 revolutions per minute was 31,130 cubic feet, and the average area of airway was 35 feet, and the lineal velocity of the air was 889.43 feet per minute. The fan is 16 feet diameter and 5 feet wide, and is driven by a vertical steam engine coupled direct to a crank on the fan shaft. The engine is calculated to be 40-horse power, and has a 14 inch cylinder with 18 inch stroke. The steam for running the engine is supplied from two tubular boilers 27.6 feet long, 32 inch diameter.

Temperature above ground, 45°.
Temperature under ground in outlet leading to fan, 52°.
Indications of barometer above ground, 28.66.
Indications of barometer in outlet leading to fan, 28.68.
The weight of a cubic foot of air due to a temperature of 52° = .0743822 lbs.
The weight of a cubic foot of air due to a temperature of 45° = .0753607 lbs.

Difference ..... .0009785 lbs.

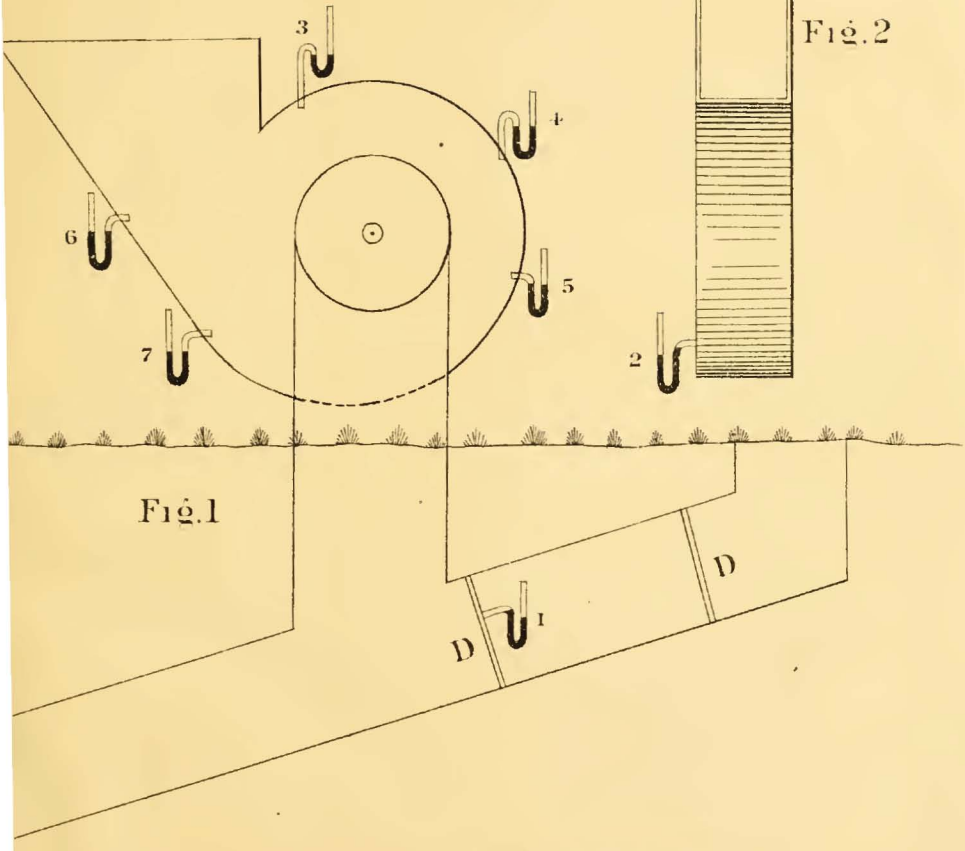


Fig. 1

Fig. 2

"D D" *Doors leading to Outlet at bottom of Fan*

SCALE: 10 FT. TO AN INCH.

TABLE No. 9—*Continued.*

DIAMETER AND CIRCUMFERENCE OF FAN.		NO. OF REVOLUTIONS A MINUTE.		Indications of water-gauge, (h.)	Theoretical water-gauge, (h'.)	$\frac{h}{h'}$
D.	C.	Revolutions of fan....	Distance in lineal ft..			
16	50.26	50	2,513.	.45	.40	1.12
16	50.26	70	3,518.2	1.05	.79	1.33
16	50.26	80	4,020.8	1.20	1.03	1.16
16	50.26	90	4,523.4	1.57	1.31	1.19
16	50.26	128	6.433.28	2.5	2.6	.96

* There was 4,350 cubic feet of air per minute circulating through the up-cast, due to the power of rarefaction in the workings. Now, if we take the difference in the weight of a cubic foot of air between the inlet and the outlet, (.0009785 lbs.,) × 300 feet, the depth of the shaft, and the product by the number of cubic feet of air per minute (4350') circulating and divide by 33,000 we obtain .038+H. P., due to natural causes.

F. N. Spon, furnishes the following formula for ascertaining the theoretical water-gauges: $h'=\frac{v^2}{29} \cdot \frac{12}{815}$ inches of water column. Where $v=$ velocity of extremity of the vanes in feet per second. The shutter was not varied in each case, as it ought to be to produce the best results. If $\frac{h}{h'}$ is multiplied by the number of revolutions, (no alteration being made in the pressure of steam nor in the opening of the regulator-valve,) is an indication of the best position of the shutter when such product gives the highest results, for it shows that the minimum resistance is offered to the fan at the same time that a maximum water-gauge is obtained. It is upon this principle that the position of the shutter can be experimentally tried, for the production of the best economical effect.

TABLE No. 10.—Report of the condition of steam boilers and steam engines in the South district of Luzerne and Carbon counties for the year ending December 31, 1876.

Number of slopes	Location.	Slope No.	Number of boilers	Dimensions. Length in feet	Dimensions. Diameter in inches	Pressure per square inch—pounds.	Kind of Steam Gauge Used.	Date of Boiler Examination.	Present condition, i. e. safe or unsafe	Number and Horse Power of Engines. Hoisting. Number	Hoisting. Horse power	Breaker. Number	Breaker. Horse power	Pumping. Number	Pumping. Horse power	Fan. Number	Fan. Horse power	Total number of engines	Aggregate horse power	Number of locomotives above ground	Number of locomotives used in mines	Number of locomotives above ground
1..	Upper Lehigh	1	8	35	34	75	Belfield	December 6, 1876..	Safe..	3	144	1	60	3	234	1	25	8	463	....	....	....
2..	do	2	16	26	34	75	Allen	do 5, 1876..	"	2	116	1	60	3	78	1	40	7	294	....	1	
3..	do	3	4	36	34	75	Belfield	do 5, 1876..	"													
4..	do	4	8	36	34	75	do	do 5, 1876..	"													
	do (Saw Mill)	..	2	36	34	75		November 29, 1876..	"													
	do (Water Works)	..	2	26	34	65	Allen	December 3, 1877..	"													
	do (Locomotive)	..	1	9	28	90	Belfield	do 18, 1876..	"													
5..	Woodside	1	1	32	34	20	American Steam Gauge Co.	do 22, 1876..	"	1	40	1	20	2	160	....	....	4	220	....	....	
			6	22	34	70																
6..	Drifton Cross Creek	1	12	36	34	70	Shuffield, and 1 of C. G. Willing..	do 22, 1876..	"	3	160	1	30	2	350	2	80	8	620	....	....	
7..	do do	2	6	36	34	....	Not in use															
8..	Highland	1	12	22	33	65	Allen	February 1, 1877..	Safe..	2	90	1	30	..	....	....	....	3	120	....	....	
9..	do	2	9	22	33	60	do	January 31, 1877..	"	2	80	1	30	..	....	....	....	3	110	....	....	
10..	Jeddo Oak Dale	1	12	22	33	60	do	do 30, 1877..	"	2	80	1	30	..	....	....	....	3	110	....	2	
	do do (Old Jeddo)	..	2	22	33	55	do	do 31, 1877..	"													
11..	do do	2	4	17	51	80	do	do 31, 1877..	"	2	90	1	30	..	....	....	....	3	120	....	....	
12..	do do	..	15	22	33	80	do	do 30, 1877..	"													
13..	Buck Mountain	2	20	*27	30	70	Belfield	do 20, 1877..	"	9	390	1	30	1	60	1	40	12	520	....	....	
14..	do	4	8	30	34	70	do	do 22, 1877..	"													
	do (hoisting plane)	..	4	40	36	80	do	do 19, 1877..	"													
15..	do	6	12	30	34	70	do	do 21, 1877..	"													
16..	do (sand spring)	..	2	30 / 15½	30	70	do	do 26, 1877..	"													
	do (breaker)	..	3	25	30	65	do	December 27, 1876..	"													
17..	Eckley Council Ridge	2	16	36	34	75	Ashcroft	do —, 1876..	"	3	125	1	40	..	....	1	7	5	172	....	....	
18..	do do (inside)	..	3	22	32	50	Belfield	January —, 1877..	"													
19	do do	4	6	26	32	60	Ashcroft	December —, 1876..	"	3	160	1	25	1	40	1	7	6	232	....	....	
20..	do do	5	9	36	34	75	Belfield	do —, 1876..	"	2	120	1	50	..	....	....	....	3	170	....	....	
21..	Ebervale	1	9	22	33	65	do	January 5, 1877..	"													
22..	do	2	20	23	34	80	do	do 5, 1877..	"	5	230	2	50	5	320	1	50	13	585	2	....	
23..	do	3	15	22	33	75	do	do 5, 1877..	"													
24..	do	4	6	22	34	60	R. Bates'	do 5, 1877..	"													
25..	Lattimer	1	14	22	33	80	Allen	December —, 1876..	"	1	120	1	30	2	120	....	....	4	270	1	....	
26..	do	2	12	22	33	80	Potter & H	do —, 1876..	"	1	120	1	25	2	200	....	....	4	345	....	....	
28..	Milnsville	7	9	22	33	65	Belfield	January 1, 1877..	"	2	90	1	40	..	....	....	....	3	130	....	....	

29..	......do	6	17	22	33	65	....do	....do...... 3, 1877..	"	1	60	1	40					2	100		
30..	Hollywood	1	8	22	33	70	....do	....do...... —, 1877..	"	3	390	1	40	2	130			6	560		
31..	......do	2	8	22	33	70	....do	....do...... —, 1877..	"												
32..	Humboldt	1	10	22	33	65	....do	December —, 1876..	"												
33..	......do	3	8	22	33	65	....do	....do...... —, 1876..	"	2	60	1	25	1	60			4	145		
	Stoney Creek and Mill	..	8	22	33	40		....do...... —, 1876—	"												
34..	Stockton	2	4 15	22 36	33	70	Allenson Imp'em't,	November —, 1876..	"	2	100	1	15	1	60			4	175		
	....do....(kept for pumping)	3	2 7	12 36	33	60	.... do	....do...... —, 1876..	"												
35..	....do	3	12	22	33	80	..........do	....do...... —, 1876..	"	2	80	1	15	1	60	1	7	5	162		
36..	....do	4	13	36	33	65	..........do	....do...... —, 1876..	"												
37..	....do	5	2 16	12 36	33	60	..........do	....do...... —, 1876..	"	3	160	1	25	3	220	1	20	5	425		
	....do....(machine shop)	..	2	24	33	50	Safety valve	....do...... —, 1876..	"	1	30							1	30		
	....do....(saw mill)	..	2	24	33	50	......do	January —, 1877..	"	1	25							1	25		
38..	Coleraine	1	6	35	34	60	Ashcroft	....do...... —, 1877..	"	1	50	1	30	3	210			5	290		
39..	....do	2	9	31	34	60	....do	....do...... —, 1877..	"	2	100							2	100		
40..	....do	4	4	30	34	75	Bicketton	....do...... —, 1877..	"	1	60	1	50	2	120			4	230		
	....do .....(breaker)	..	4	30	34	65	Ashcroft	....do...... —, 1877..	"	2	60							2	60		
41..	Jeanesville	1	16	30	34	60	Belfield	....do...... —, 1877..	"	1	80	1	30	3	260			5	370		
42..	....do	4	15	30	34	75	....do	....do...... —, 1877..	"	2	80	1	30	2	100			5	210		
43..	....do	5	15	30	34	75	....do	....do...... —, 1877..	"	2	80	2	40	2	100			6	220		
44..	....do ......(drift)	3	3	30	34	75	....do	....do...... —, 1877..	"	1	40							1	140		
45..	Tresckow	6	12	30	34	70	....do	December —, 1876..	"	3	180	2	60	1	90			6	330		
46..	....do	2	10	30	34	70	....do	January —, 1877..	"												
47..	Yorktown	5	20	30	34	80	Allenson	....do...... —, 1877..	"	1	60	1	40	2	150			4	250		
48..	....do	4	4	30	34	70	....do	December 27, 1876..	"												
	....do .....(used for pumping)	6	14	30	34	70	Springfield	....do...... 27, 1876..	"	2	100	1	30	1	100			4	230		
49..	Beaver Brook	1	10	30	34	75	Belfield	January —, 1877..	"	2	125	1	30	4	250			7	405		
50..	.... do	2	16	30	34	60	....do	....do...... —, 1877..	"	2	150	1	30	4	450	1	10	8	640		
51..	.... do	4	4	30	34	60	....do	....do...... —, 1877..	"												
52..	.... do	6	4	30	34	60	....do	....do...... —, 1877..	"												
53..	Gowen	1	2 3	30 22	36 30	75 40	H. Belfield Allenson	Not in use													
54 55	Nesquehoning shaft	4 1	8	36	32	75	Expansion	Dec. 3, 10, 17, 1876..	Safe..	4	235	1	45	5	727	3	63	13	1,070	1	1
56..	......do..........do	3	9	28	32	55	Pressure	....do..........do	"												
	......do..........do...(breaker)	..	4	33	32	75	....do	....do..........do	"												
	......do..........do...(fan engine)	..	2	27	36	40	Expansion	Newly erected	"												
57..	Summit Hill	4	2 27	36 32	32	65 90	Belfield	December 31, 1876..	"	2	312	1	28	4	1,289	1	28	8	1,657		1
58..	.... do	5	4	34	24	65	....do	....do...... 31, 1876..	"	4	158	2	70	1	50	1	15	8	293	1	
59..	.... do	7	9	32	32	90	....do	....do...... 31, 1876..	"												
60..	.... do	6	4	30 26	28 32	60	....do	....do...... 31, 1876..	"	2	44					1	6	3	50	1	
61..	.... do	9	10	40	32	75	....do	....do...... 31, 1876..	"	6	348	2	92	1	28	2	48	11	516	2	
	.... do....(breaker)	..	2 3	36 40	32	90	....do	....do...... 31, 1876..	"												
	.... do ......do.....(flue boiler)	..	4	30	48	65	....do	....do...... 31, 1876..	"												
62..	Harleigh	1	11	23	34	60	Cleveland	....do...... —, 1876..	"	3	105	1	25	2	125			6	255		
63..	....do	3	13	26½	40	75	....do	January —, 1877..	"	3	90	1	25	2	200			6	315		
64..	Hazleton colliery	1	7 4	22¼ 22¼	30 33	35 110	Belfield	Dec. 3 and 8, 1876..	"	1	60	1	20	1	60			3	140		
65..	Laurel Hill colliery	5	24	22¼	33	75 80	..do	....do...... 25, 1876..	"	4	170	1	25	1	15	1	15	7	270	1	
66..	Hazleton colliery	3	15	22¼	33	40 65	..do	Dec. 3, 9, 17, 1876..	"	4	670	1	15	2	150			7	835		
	....do ....do	..	6	36	33	65	....do	Dec. 3 and 5, 1876..	"												

TABLE No. 10.—*Continued.*

Number of slopes	Location.	Slope No.	Number of boilers	Dimensions. Length in feet	Dimensions. Diameter in inches	Pressure per square inch—pounds.	Kind of steam gauge used.	Date of boiler examination.	Present condition, i. e. safe or unsafe	Number and horse power of engines. Hoisting. Number	Hoisting. Horse power	Breaker. Number	Breaker. Horse power	Pumping. Number	Pumping. Horse power	Fan. Number	Fan. Horse power	Total number of engines	Aggregate horse power	Number of locomotives used in mines	Number of locomotives above ground
67..	Sugar Loaf colliery	4	3	22¼	36	60	Belfield	December —, 1876..	Safe..	3	120	1	40	2	120	.....	.....	6	280	....	....
68..		2 3	20	22¼	33	65															
68..	South Sugar Loaf colliery		8	22¼	33	60	....do	Dec. 3 and 17, 1876..	"	1	90	1	25	..	.....	1	15	3	130	....	....
69..	Cranberry colliery	1	15	22¼	33	50 65	..do	....do.....do	"	1	60	1	20	1	60	Saw 1	mill. 20	4	160	....	....
70..	Crystal Ridge (for pumping)	2	6	22¼	33	45	....do	....do.....do	"	1	40	..	.....	1	60	.....	.....	2	100	....	....
71..	East Crystal Ridge colliery	4	11	22¼	33	70	....do	....do.....do	"	2	80	1	25	..	.....	.....	.....	3	105	....	....
72..	Mt. Pleasant colliery	2	9	30	33	73	....do	Jan. 4 and 7, 1877..	"	1	50	2	35	1	60	Saw 1	mill. 20	5	165	....	....
73..	Beaver Meadow Stafford colliery	1	12	30	36	75	....do	December —, 1876..	†	1	120	1	40	2	130	.....	.....	7	290	....	1
74..	.....do.....do.....	2	4 6	30 34	36	80	....do	....do..... —, 1876..	‡	2	80	..	.....	1	100	.....	.....	3	180	....	....
75..	Sandy Run colliery	1	4	36	34	65	New colliery, boilers erected January, 1877,		.....	2	80	..	.....	..	.....	.....	.....	2	80	....	....
76..	Kocker's Notch	..	.....	.....	.....	.....	Contemplate building breaker in spring..		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Hanto	..	20	32	34	90	Belfield	January —, 1877..	Safe..	2	120	1	50	..	.....	.....	.....	3	170	....	....
	Total	..	882	.....	....	....				132	7,272	54	1,690	80	7,141	23	481	289	16,530	11	4
	Average	..	.....	27	33	61				....	55.09	..	31.29	..	89 26	.....	20.91	....	57.92	....	....

* Average.

† 10 safe, 2 out for repairs.

‡ 4 safe, 2 need repairing.

Boilers in lineal feet equal 24,255 equal 4.59 miles.

TABLE No. 11.—An account of breakers which have burned down in the Lehigh Region, causes of and the loss sustained thereby.

DATE.	Number of breakers burned down.....	NAME OF PLACE WHERE BREAKER WAS BURNED DOWN.	CAUSE OF BREAKER BURNING DOWN.	Value of breaker at time of burning down.....	Amount insured.....	Approximate loss †..	
1866.....	1	Jeddo.....	Fire from boiler stove	$31,500	$15,500	$6,000	Re-built but since abandoned.
Oct. 27, 1869..	1	Upper Lehigh...	Unknown; originated in the boiler house.....	40,000	30,000	10,000	Re-built and commenced work March 9, 1870.
Oct. 29, 1872..	1	Ebervale.....	Supposed to have taken fire from boiler flue.....	36,000	27,000	9,000	
Feb. 15, 1876..	1	Stockton	Supposed to have taken fire from the stove-pipe in the engine house.....	*30,000	.....	.....	Re-built and commenced work August, 1876.
Nov. 27, 1876..	1	Yorktown	Bursting of one of the steam boilers and throwing the fire against the roof of the boiler house,	60,000	30,000	30,000	Re-built and commenced work in the spring of 1877.
.....	2	Hucklebarney or Old Tunnel....	The work of an incendiary. Cannot ascertain the date of the burning; about the year 1865.....	*120,000	.....	.....	
	7			317,500			

* Estimated.
† The actual loss sustained by delays of shipments of coal, &c., could not be obtained.

TABLE No. 13.—This table is intended to show the number of fans in use in the district, date of erection, cost of, and the approximate quantity of air produced per minute, &c.

No.	Location of Colliery.	Diameter of fan	Diameter of opening on side of fan	Number of openings	Width of fan	Number of years in use	Cost of fan, including engine	Direct or belt acting	Vertical or horizontal engine	Number of revolutions of fan	No. of revolutions of anemometer per minute	Velocity calculated by formula $v=1.017\sqrt{R+30}$	Area of air-way	Total number of cubic feet of air exhausted per minute	Resistance of the mine in inches of water gauge	Useful effect of the power spent in H. P.	Velocity of the air in miles per hour	Force of the air in proportion to its velocity on each square foot	Temper'e under ground, Fah.	Temper'e above ground, Fah.	Opened or closed at periphery of fan	Number of vanes in fan
1	Upper Lehigh, No. 1	12	5	2	4	4	$1,500	Belt	Horizontal	105	1,600	1,658	31½	52,227	.65	5.35	18.84	1.774	72	67	Opened	.....
2	....do.....No. 4	12	5	2	4	1	1,000	..do	....do	79	950	996	38	37,848	.45	2.69	10.98	.603	74	67	..do	.....
3	Drifton, Cross Creek, No. 1	16	8	2	5	1	1,020	Direct	Vertical	74	1,400	1,454	36	52,344	.60	4.95	16.52	1.36	62	85	Closed	8
4	....do.....No. 1	16	8	2	5	1	1,020	..do	....do	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..do	8
5	Buck Mountain, No. 4	16	8	2	5	1	1,020	..do	....do	80	.....	.....	.....	26,775	.....	.....	.....	.....	68	44½	..do	8
6	Ebervale, No. 1	16	8	2	5	.....	1,020	Not	finished	.....	.....	.....	.....	.....	.....	.....	.....	.....	70	61	..do	8
7	Stockton, No. 5	16	8	1	5	2	1,020	Direct	Vertical	90	2,160	2,226	25	55,650	1.00	8.76	25.29	3.197	65	70	..do	8
8	....do....No. 7	7	4	1	3	2	300	Belt	Horizontal	140	520	559	25	12,975	.20	.44	6.35	.202	60	85	..do	4
9	South Sugar Loaf, No. 3	16	8	2	5	1	1,020	Direct	Vertical	80	520	559	41.7	23,310	1.15	4.22	6.35	.202	61	60	..do	8
10	Beaver Meadow, No. 1	.....	.....	.....	.....	.....	.....	Not	finished	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	56½	..do	.....
11	Beaver Brook, No. 6	10	3.5	2	3	1	350	Belt	Horizontal	106½	1,600	1,657	†12.5	20,712	.38	1.24	18.83	1.772	63	19	..do	6
12	Nesquehoning, No. 1	15	8	2	5	6	900	..do	....do	90	1,666	1,721	24.	41,376	1.10	7.17	19.59	1.918	68	53	..do	8
13	....do.....No. 1	16	6	2	.....	1	900	Direct	Vertical	128	1,100	1,148	28.3	32,488	2.45	12.54	13.04	.85	52	45	..do	8
14	....do.....No. 3	15	8	2	2	6	900	Belt	Horizontal	90	1,130	1,179	36	42,444	1.00	6.69	13.40	.897	52	41	..do	8
15	Summit Hill, No. 4	15	6	2	.....	4	900	Direct	Vertical	90	820	864	52	44,928	.80	5.66	9.82	.382	64	50	..do	8
16	....do.....No. 9	16	8	2	2	1½	900	..do	....do	90	670	712	50	35,600	.80	4.48	8.1	.328	55	34½	..do	16
17	....do.....No. 9	12	6	2	.....	1½	750	Belt	Horizontal	90	1,130	1,179	36	42,444	.50	3.34	13.4	.897	70	34	..do	‡12
18	....do.....No. 6	16	8	2	2	6	900	..do	....do	83	1,100	1,148	32	36,736	1.10	6.36	13.4	.850	65	65	..do	8
19	....do.....No. 5*	16	8	2	.....	1	1,200	..do	....do	77	570	610	84	51,240	.90	7.26	6.93	.240	65	58	..do	8

*Two fans on the one shaft. †At discharge. ‡Fan to ventilate where locomotive travels.

Fan No. 13 is connected to an air-way 2.9 miles in length from inlet to outlet, and offers 464,500 square feet of rubbing surface.

Fan No. 7.—The number of cubic feet of air is estimated. It could not be accurately measured, owing to the sulphur in the outlet from the boiler fires located inside. The current was terrific, and the heat was so great that it melted the anemometer. It receives its air only on one side.

Fan No. 19 is a double fan erected on the one shaft, placed directly over the outlet. The useful effect in H. P. is only calculated that due to one fan.

Fan No. 13 is a Guibal fan, but receives the air on both sides.

NOTE.—In case of horizontal fan engines using belt wheels, the size of these wheels is about two to one, i. e., one foot in diameter on fan shaft to two feet on engine shaft.

The above fans, including engine, can be bought now for about $850.

I am not prepared to state for which of the above fans I have preference, as I did not have the requisite means to ascertain the horse-power spent, &c. Fan No. 13 undoubtedly shows the best results, and is evidently the best constructed; suffice to say that either of the 16-foot fans will produce adequate ventilation for any of the mines in my district, except fans Nos. 8 and 11.

TABLE No. 13.—Shows the number of tons of coal produced to each keg of powder used, &c.

	Coal shipped to market from the Lehigh region in 1876.	Total coal produced in the Lehigh region in 1876.....	Number of kegs of powder used in each seam.....	Ratio of coal produced in tons to each keg used	Ratio of coal produced in tons to each lb. of powder used.	Percentage of the different kinds of coals sent to market
Total from Mammoth seam	2,198,573	2,374,458	36,535	64.99	2.5996	67.78
Total from Buck Mountain seam	738,022	797,065	14,132	56.40	2.256	22.75
Total from Wharton seam.....	307,033	331,595	8,360	39.66	1.586	9.47
Aggregate	3,243,628	3,503,118	59,027	59.34	2.37	.....

Number of tons of powder used, 658.78.
Ratio of coal produced in tons to each ton of powder used, 5,317.58.

TABLE No. 14.—The following is a table of fatal colliery accidents which were omitted in the report of the South District of Luzerne and Carbon counties during the year ending December 31, 1874:

DATE.	No. of accident	LOCATION.	Slope No.	Tunnel No	NAME OF PERSON KILLED OR INJURED.	Age	Widows.	Orphans.	CAUSE OF DEATH.	DATE OF EXAMINATIONS.
Jan. 12..	1	Stockton	4	....	John Ward	43	1	....	By a fall of coal; died the day following	Examined on the 14th.
Mar. 21..	2	Summit Hill	....	9	John Boyle	43	1	2	Falling under the cars; died in ten days.	
June 1..	3	....do	4	....	John Thomas	35	1	4	Falling down the air-way; died in six hours	....do.... 4th.
5..	4	Ebervale	2	....	Frederick Hess	30	....	....	Falling under the cars on the slope	....do.... 6th.
5..	5	Buck Mountain	4	....	John Hill	28	....	....	Falling under the cars on the outside plane	....do.... 8th.
9..	6	Jeanesville	5	....	Dennis Boyle	30	1	1	Fall of coal; instant death	....do.... 11th.
11..	7	Harleigh	1	....	Conrad O'Donnell	49	1	....	Fall of coal in air-way; fatally injured	....do.... 12th.
16..	8	Eckley	4	....	Patrick M'Hugh	18	....	....	Crushed by mine cars	....do.... 17th.
30..	9	Summit Hill	....	9	Hugh Kennedy	24	....	....	Dangerously burned by gas; died in sixteen days.	
July 20..	10	Sugar Loaf	3	....	Henry Smith	20	1	....	Fell off the platform; instant death	....do.... 23d.
21..	11	Eckley	2	....	John Campbell	14	....	....	Crushed by mine cars in the gangway; instant death	....do.... 22d.
23..	12	Cranberry	1	....	Lawrney Holler	26	....	....	Crushed by fall of coal; died instantly	....do.... 24th.
23..	13	Laurel Hill	4	....	William Christian	....	1	....	Fall of coal; instant death	....do.... 24th.
Aug. 5..	14	Highland	1	....	August Gyster	29	1	2	Fall of coal; instant death	....do.... 9th.
8..	15	....do	1	....	Joseph Holt	45	1	6	Explosion of fire-damp; died the day following	....do.... 10th.
25..	16	Summit Hill	....	9	Thomas Priece	55	1	1	Instantly killed by the breaking of the hoisting rope. These three men were changing a car at the bottom of the slope, *i. e.* taking the car from the one side of the slope to the other while the slope was in motion, and when the car was near the apex the rope broke resulting as stated.	
25..	17	....do	....	....	Jas. Heggarty	46	1	3		
25..	18	....do	....	....	Benjamin Williams	19	....	....		
Sept. 1..	19	Harleigh	....	....	William Reiley	12	....	....	Crushed by breaker machinery; fell into fly-wheel pit.	
12..	20	Buck Mountain	....	....	Charles Hailen	45	1	4	Fall of slate; instant death	....do.... 15th.
Oct. 2..	21	Tresckow	....	....	Christopher Greswield	22	....	....	Kicked by a mule; died in two days.	
3..	22	Snmmit Hill	....	....	Patrick Fighe	25	....	....	Jammed by mine cars	....do.... 5th.
6..	23	Ebervale	....	....	Hugh Tinney	22	....	....	Breaking of the hoisting rope	....do.... 10th.
7..	24	Coleraine	....	....	Neil Gallagher	18	....	....	Struck by fly-wheel of breaker engine	....do.... 13th.
Nov. 9..	25	Dritton	1	....	Dinnes Housten	28	1	....	Crushed by mine cars	....do.... 10th.
10..	26	Tresckow	2	....	Peter M'Donnet	....	1	....	Fall of slate	....do.... 11th.
28..	27	Drifton	1	....	Michael Boyle	28	....	....	Fall of coal	....do.... 30th.
Dec. 10..	28	Summit Hill	....	5	Thomas M'Tagen	12	....	....	Falling into dirt chute in the breaker	....do.... 11th.
11..	29	Eckley	2	....	Patrick Sweeney	42	....	....	Fall of the dividing slate; negligence in not propping	....do.... 12th.
21..	30	Yorktown	6	....	Charles Manealus	35	1	6	These two men were killed by a fall of rock and slate while sinking slope	....do.... 22d.
21..	31	....do	6	....	John M'Gee	30	....	....		.... do.... 22d.
Total	....	....	....	....	....	....	15	29		

RECAPITULATION:

Explosion of carbureted hydrogen gas	2
Falls of roof	5
Falls of coal	6
Crushed by mine cars	6
Miscellaneous under ground	5
Miscellaneous above ground	3
Hoisting machinery breaking	4
	31

Copied from the books of my predecessor John T. Evans.

T. D. JONES, *Inspector of Mines.*

TABLE No. 15.—The following is a table of non-fatal accidents, which were omitted in the report of the South district of Luzerne and Carbon counties, during the year ending December 31, 1874.

DATE.	LOCATION.	NAME OF PERSON INJURED.	NATURE AND CAUSE OF ACCIDENT.
Jan. 23...	Humboldt slope, No. 1....	John Davy	Injured on the hand by a fall of coal.
Feb. 5...	Highland slope, No. 1.....	Conrad Siple	Shoulder dislocated, crushed by mine cars on slope.
5...	Summit Hill slope, No. 4	Daniel O'Donald	Struck on the head by a piece of timber.
23...	Summit Hill tunnel, No. 5.....	Richard Davis.....	Severely hurt on the hand by closing ventilation door.
24...	Treseckow slope, No. 2	Patrick Burns.....	Seriously injured by a fall of coal.
March 9...	Hazleton, "S. S. Loaf," No. 3	William Airey	Burned by explosion of carbureted hydrogen gas.
31...	Summit Hill, No. 9	William Lewis.....	Injured by a fall of coal.
April 27...	Lattimer slope, No. 1.....	Nicholas Fatcher.....	Burned and cut on the hands by a premature blast.
28...	Summit Hill, No. 4.....	William L. Lewis.....	Burned by explosion of carbureted hydrogen gas.
28...	....do.....do.....	William Evans.....	Burned by explosion of carbureted hydrogen gas.
28...	....do.....do.....	Patrick Condal	Burned by explosion of carbureted hydrogen gas.
28...	....do.....do.....	Peter Hayly.....	Burned by explosion of carbureted hydrogen gas.
28...	....do.....do.....	John Gallagher	Blown by the concussion from said gas.
28...	....do.....do.....	John York	Leg broken by falling from the hoisting cage.
May 6...	....do.....do.....	John Gallagher	Burned by an explosion of a keg of powder.
8...	Cranberry, No. 1	John Cunachan	Crushed by mine cars.
10...	Summit Hill, No. 9.....	Condy Melley	Dangerously injured by a fall of coal.
12...	Sugar Loaf, No. 3	Christain Wolfskill	Severely cut on the leg by starting battery.
26...	Treseckow, No. 6.....	Oron Dolan.....	Leg fractured by a fall of coal.
June 9...	Jeanesville, No. 5.....	Hugh Boyle..... ..	Leg fractured by a fall of coal.
19...	Hazleton, No. 1	John Bether.....	Injured on the face, kicked by a mule.
July 20...	Sugar Loaf, No. 2	Robert Stevens.....	Seriously injured by falling down the slope by scaffold breaking.
20...	Sugar Loaf, No. 2	Nicholas Williams	Seriously injured by falling down the slope by scaffold breaking.
22...	Oak Dale, No. 1	Edward Johnson	Leg and arm fractured, jammed by mine cars.
Aug. 8...	Highland, No. 1	Fred. Rheine.....	Burned on the hands and face by gas.
21...	Hazleton, No. 1	Pat Herly	Badly injured by falling down slope.
Sept. 7...	Cranberry, No. 1	John Rake	Leg broken by attempting to jump into a car while in motion.
12...	Buck Mountain.....	James Deveny	Back dislocated by a fall of coal.
21...	Laurel Hill, No. 5.....	John Rush	Injured by a fall of coal.
Oct. 20...	Oak Dale, No. 2	James Boyle	Injured by a fall of coal.
24...	Hollywood, No. 1	Geo. H. Broast	Severely injured by premature blast.

TABLE No. 15.—*Continued.*

DATE.	LOCATION.	NAME OF PERSON INJURED.	NATURE AND CAUSE OF ACCIDENT.
Oct. 25...	Eckley, No. 4	John Finley	Leg fractured by fall of coal, necessitating amputation.
25...	Eckley, No. 2	L. Conrad Boner	Hurt by a fall of coal.
Nov. 16...	Laurel Hill, No. 5	John Koons	Slightly injured, jammed by mine cars.
16...	Sugar Loaf	Thomas D. Thomas	Slightly burned by gas.
23...	Crystal Ridge	Cormick Conopan	Injured by mine car on slope.
Dec. 1...	Nesquehoning	Nicholas Holpin	Injured by mine car on slope.
18...	Nesquehoning	Michael Holpin	Injured by mine car on slope.

RECAPITULATION.

By falls of coal	12
By mine cars	8
Sundries	3
Explosion of carbureted hydrogen gas	8
By premature blasts	2
By falling into slope	4
By blasting powder	1
Total	38

T. D. JONES, *Inspector of Mines.*

REPORT

OF INSPECTOR OF COAL MINES FOR THE MIDDLE DISTRICT OF LUZERNE AND CARBON COUNTIES FOR THE YEAR 1876.

OFFICE OF INSPECTOR OF COAL MINES,
WILKES-BARRE, PA., *March* 21, 1877.

His Excellency JNO. F. HARTRANFT,
Governor of the Commonwealth of Pennsylvania:

SIR:—I have the honor to submit herewith my annual report, for the Wilkes-Barre or Middle district of Luzerne and Carbon counties, for the year ending December 31, 1876.

The condition of this district is still improving in relation to the requirements of the ventilation law of 1870, and with very few exceptions no cause for complaint exists, to my knowledge.

The descriptive part of my present report relating to accidents resembles my report of 1871.

There were fifty-five lives lost during the year, against sixty-three last year.

The coal production was 4,615,386 tons, against 4,261,263 tons last year. This shows that 83,916 tons of coal were produced per life lost, against 67,629 tons per life lost last year.

The collieries of the district were operated but 163.51 days of a general average, thus leaving 149.49 days to have been idle. This shows that if the district could produce 4,615,386 tons when the mines were operated only 163.51 days, that it is capable of producing 7,627,741 tons when working full time. In this case the accidents would no doubt increase to some extent, but I think not in proportion to the increase of production or time worked.

I have endeavored to show in the present report, as near as I could, the actual condition of this district at the close of the year 1876. By the aid of the accompanying tables and descriptions a pretty fair idea can be formed of the same.

TABLE No. 1.—Shows the name and location of each colliery; name and average thickness of each seam of coal worked; number of employees inside and outside; number of coal breakers and days operated; tons of coal shipped; number of kegs of blasting powder used; number of pounds of powder to each ton of coal shipped, &c., in the Wilkesbarre district during 1876:

NAME OF COLLIERY.	LOCATION OF COLLIERY.	NAME OF COAL SEAM.	Thickness of coal seam	EMPLOYEES. Inside	EMPLOYEES. Outside	COAL BREAKERS. Number of	COAL BREAKERS. Days operated	Coal produced in 1876	Blasting powder used in kegs	Blasting powder used per ton of coal mined	Tons of coal shipped to each pound of powder
			Ft. Ins					*Tons.*		*Lbs.*	
Hocanaqua colliery	Shickshinny					1				N	ot working.
Paxton colliery	do		8 4	87	67	1	175	34,500	1,200	.87	1.15
No. 1 breaker	East Nanticoke	Red Ash	6 8	242	218	1	249¾	178,280	5,775	.81	1.23
No. 2 breaker	do	Abbott Hillman Baltimore Ross Red Ash	6 8 8 9 5 6 5 5 6 8	530	177	1	232½	257,254	8,213	.79	1.25
No. 3 breaker	West Nanticoke	do	21 6	263	221	1	243¼	147,836	3,942	.66	1.51
Warrior Run colliery	Warrior Run	do E D C	9 0 16 0 7 0 6 0	104	63	1	147	56,150	2,911	.85	1.17
Franklin colliery	Near Wilkesbarre	Baltimore	16 0	132	142	1	164¼	94,633	2,539	.68	1.47
Hillman colliery	Plains township	Hillman	8 0	77	22	1	172	41,000	1,400	.85	1.11
Maltby colliery	Near Wyoming					1				N	ot working.
Hutchison colliery	Near Kingston	Baltimore	7 0 8 0	190	70	1	229	90,000	3,000	.83	1.2
East Boston colliery	do	do	7 0 8 0	167	58	1	188¾	91,002	2,275	.7	1.42
Waterman, Beaver & Co. No. 2 colliery	do	Baltimore split	8 0 10 0	279	161	1	176	177,807	5,164	.73	1.38
Do No. 1 colliery	do	do	8 0 10 0	157	91	1	195¼	125,515	3,094	.62	.162
Chauncey colliery	Near Plymouth	Red Ash	21 6			1				No returns made.	
Boston colliery	Near Kingston	Baltimore	8 0 10 0	175	92	1	174½	100,030	2,129	.53	1.88
Jersey colliery	Near Plymouth	Red Ash	22 0			1	12½	4,763	110	.57	1.8
Avondale colliery	do	do	21 6	200	117	1	193 8-10	120,605	2,494	.51	1.9
Enterprise colliery	Plainsville	Baltimore	7 0 7 5	253	84	1	175¼	76,478	2,719	.89	1.11
Wyoming colliery	do	do	8 0 7 0	267	165	1	126¼	128,411	4,021	.78	1.27
Forty Fort colliery	Near Wyoming		5 0 7 0	314	197	1	183½	132,652	4,770	.89	1.11
Hollenback colliery	Plains township	Hillman	7 6	65	30	1	178	34,857	1,039	.75	1.34
Henry colliery	do	Baltimore	8 3 7 0	161	62	1	202¼	112,069	3,056	.77	1.29
Midvale colliery	do	Abbott Hillman	8 0 7 6	119	48	1	183¾	58,000	2,260	.88	1.03

Mineral Spring colliery	Plains township	Baltimore	7 4 7 3	158	85	1	160¾	75,076	2,296	.76	1.3
Prospect colliery	do	do	8 0 7 0	170	54	1	92½	26,000	615	.59	1.6
Exeter colliery	West Pittston	do	11 0	310	148	1	201¼	155,000	5,985	.96	1.04
Ellenwold colliery	Near Kingston	Red Ash Ross Bennett	9 0 13 0 10 0	95	68	1	96	50,000	1,920	.96	1.04
Mill Creek colliery	Near Miners Station	Baltimore	8 0 8 0	256	128	1	167	123,253	Averages taken for 1874-5.	.68	1.45
Pine Ridge colliery	do	do	8 0 8 0	243	85	1	197½	120,432	do	.76	1.31
Laurel Run colliery	do	do	7 4 7 3	209	84	1	143	88,694	do	.82	1.19
No. 3 Baltimore colliery	do	do	17 0	160	94	1	14¼	8,677	do	.66	1.50
No. 1	do	Near Wilkesbarre	do	17 0	235	93	1	175	92,051	do	.85	1.17
No. 1 Delaware and Hudson colliery	Near Plymouth	Lance Cooper	6 0 8 0	172	73		102	50,075	do	1.14	.87
No. 2	do do	do	5 0 5 6	197	77	1	62¾	26,830	do	1.28	.78
No. 3	do do	do				1			Not working.		
No. 4	do do	do	Red Ash			1			do		
No. 5	do do	do	Baltimore	7 0 10 0	182	95	1	189½	117,702	do	.68	1.46
No. 1 Lehigh and Wilkesbarre colliery	Wanamie			18 0 7 0	334	379	1	148	109,625	3,328	.76	1.52
No. 2	do do	do		7 0			1			Not working.		
Espey colliery		Hanover township		7 0			1			do		
No. 1 Jersey colliery		Near Ashley					1			do		
No. 2	do	do	Ross do Red Ash	8 0 8 0 12 0			1			do		
No. 9 colliery		Sugar Notch	Ross	7 0			1			do		
No. 10 colliery		do	Abbott Hillman	7 0 8 0	182	122	1	157¼	82,261	2,743	.83	1.2
Hartford colliery		Ashley	Red Ash Ross Baltimore	12 0 18 0 16 0	332	181	1	140	118,257	3,423	.73	1.38
No. 5 breaker		Near Empire	do	17 0			1			Not working.		
Empire Shaft colliery		do	do Hillman	17 0 7 6	461	217	1	168¼	205,562	4,604	.56	1.78
Hollenback No. 2 colliery		do	Baltimore	17 0	135	105	1	175	69,448			
Do. No. 3 colliery		do	Hillman	7 6	179		1	149	160,016	3,563	.55	1.79
Diamond colliery		Near Wilkesbarre	Baltimore	17 0	275	121						
Audenried colliery		do	do	17 0	236	122	1	142½	70,510	1,712	.61	1.64
Dodson colliery		Near Plymouth	do	7 6 8 0			1					Idle.
Lance colliery		do	Lance Cooper	6 0 8 0	208	92	1	148¾	91,162	3,174	.87	1.15
Gaylord colliery		do	Baltimore	16 0	224	110	1	180 2-10	132,460	3,796	.72	1.4
Nottingham colliery		do	Red Ash	22 0	334	200	1	165 7-10	162,940	4,257	.65	1.53
Washington colliery		do	do	22 0	159	115	1	150¾	75,653	2,080	.68	1.45
Conyngham colliery		Near Wilkesbarre	Hillman Baltimore	7 6 15 0	39	11				No shipments.		
Young's colliery		do	Hillman	7 6			1					Idle.
Totals					9,376	4,941	57		4,273,508	105,640		
Averages								157.98			.72	1.38

Table No. 1 gives the name and location of each colliery in the district, name and thickness of seam of coal worked, number of employees inside and outside, number of coal breakers and days operated, coal production for the year 1876, number of kegs of blasting powder used—containing twenty-five pounds each, and the amount of blasting powder used in each mine in pounds per ton of coal produced, as also the number of tons to the pound of powder.

At first sight it may appear somewhat strange that such a table as this is here presented, but I hope that any person that may peruse the same and the remarks relating thereto may see the propriety of the same at least. My prime object in preparing this table was to show to the public in general, but more particularly to our mining experts and others seeking information upon mining, what an important factor the use of blasting powder is in the matter of the "health and safety" of persons employed in our anthracite coal mines. To show this matter fairly I thought it was the best way to give the details as above described and as indicated in the table, so that whatever discrepency there might be in the quantities used, &c., its explanation could be found by examining the table for the name and thickness of seam, &c., thus, in the writer's opinion, avoiding the possibility of casting reflections upon any one party. The officers of the Delaware and Hudson canal company did not give, in the returns, the quantity of powder consumed in their mines for 1876, hence the blank in that part of the table. An average of the powder used, as per returns, for the years 1874 and 1875, is given in the percentage used for each mine.

If that the quantity of powder consumed at each colliery should be given, and the name and thickness of seam worked not given, it would appear to some people, perhaps, as though the managing possibly was at fault. To avoid this error most particularly those items are given ; the thickness of seam in some cases is only approximated.

The above table shows that on an average, taking the thin and thick, good and bad seams together, it requires about three quarters of a pound to each ton of coal mined, or more correctly seventy-two hundreth of a pound.

Let us see what effect this enormous use of blasting powder has upon the ventilation of a colliery producing say eight hundred (800) tons of coal per day. According to the average above given .72 pounds is consumed per ton, hence $800 \times .72 = 576$ lbs., or twenty-three (23) kegs per day. The above is only the general average, we have cases where the amount consumed exceeds one pound to the ton of coal produced, and in such a case the consumption of powder for eight hundred tons would exceed eight hundred (800) pounds, or over thirty-two (32) kegs daily. The 576 pounds of blasting powder is all or nearly all to be exploded inside of about eight or ten hours. It is true that a small proportion of it is used at night, when there is the usual quantity of ventilation and only a small number of persons inside the mine, yet the said amount is not enough to change our general average as here employed. We will assume that it requires ten hours of time to explode the above amount of powder in the manner described; therefore, $10 \times 60 = 600$ minutes, this would give .96 lb. of blasting powder to be exploded each minute of the ten hours.

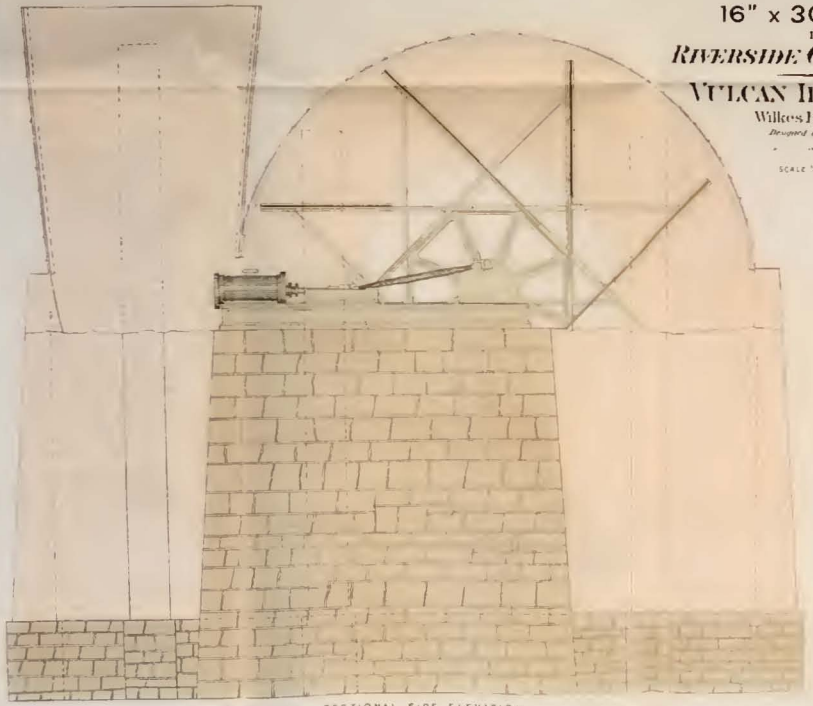
In "Andres' " work on mining it is given that the combustion of one pound of blasting powder produces .30 lb. of carbonic acid gas; hence the weight of a cubic foot of said gas being .1164 lbs., it follows that $\frac{.300}{.1164} = 2.58$ cubic feet of carbonic acid gas.

The said gas being dangerous to life, in quantities larger than .35 per cent., it follows, that to cause the 2.58 cubic feet of carbonic acid gas, fit

25 FT. FAN
AND
16" x 30" ENGINE
FOR
RIVERSIDE COAL COMPANY.

VULCAN IRON WORKS
Wilkes Barre, Penna.
Designed by JAS B. MILLER

SCALE ½" TO THE FOOT



SECTIONAL SIDE ELEVATION

CROSS SECTION

ing on the periphery is cast-iron segments, and sides and chimney are built of brick. It is driven by a horizontal direct-acting single engine, 16 by 30 inches. So far as experiments have been made upon this fan it appears to give pretty good results.

The fan shown in plan No. 2 is erected at No. 2 slope, of the Susquehanna Coal Company, to ventilate No. 2 and No. 4 slopes, East Nanticoke, and is built similar in some respects to the fan shown on plan No 1.

This fan is twenty (20) feet diameter, six (6) feet face, and has but one side opening or inlet, eight and one-half (8½) feet diameter; also has an expanding chimney and a regulator or shutter attached.

The casing and frame is entirely of wood, resting upon a stone foundation. The vanes are of wood, one and one-quarter inches thick, secured by bolts to angle iron arms, which are bolted to two cast iron spiders or centres, and also braced by angle irons to the same. The arms are also braced laterally by light angle iron behind the vanes. Upon both ends of the vanes a sheet iron disk of the entire width of the vanes is attached, and runs within one-half inch of the inside of the casing, their outer edges being strengthened by a curved bar of iron 1½″×1½″. The inner peripheries of each disk is provided with a turned wooden ring that fits closely to the sides of the casing, and a piece of gum belting, about two inches wide, is laid around upon the inside of the casing and inlet, so as to overlap the ring and form a valve, to prevent the passage of air between the disks and casing. The advantages claimed by the use of these disks, enclosed in the casing as above described, are as follow: The balancing of the fan from lateral pressure, less resistance from friction, the prevention of leakage past the vanes and smoothness of running at high speeds.

Judging from the experiments conducted upon this fan, independent of the engine, which is a single horizontal direct acting 16″×20″, the results appear very satisfactory; but for want of an indicator no experiments were made with the engine to find the power applied, without which the percentage of useful effect to power expended cannot be given.

In the table giving the work of the various fans, two trials of this fan are recorded. Below will be found some additional tests upon the same fan.

Fan speed, 50 revolutions per minute; air exhausted, 83,565 cubic feet .75 inches W. G.

Fan speed, 57 revolutions; air exhausted, .95 W. G.

Fan speed, 70 resolutions per minute; air exhausted, 110,160 cubic feet 1.50 inches W. G.

Fan speed, 72 revolutions per minute; air exhausted, 1.60 W. G.

Fan speed, 80 revolutions per minute; air exhausted, 135,363 cubic feet 1.95 inches W. G.

I also insert a table, &c., containing a series of other experiments made in 1872. The reason why those were not reported in my report sooner is this, the result shown by the said figures in the table was not what I expected to find, and as a test, a short time subsequently, I made other trials, but having no indicator to test the engine, work, &c., did not feel satisfied to publish. I therefore laid it over for the time being, with the intention of completing the experiments some time soon thereafter. Not having been able to do so ever since, and inasmuch as I was inserting so much relating to fans, and their work, in this report, I concluded to insert, with a promise that as soon as an opportunity is had further trials will be made in the same direction.

When the fans were run up to the highest speed had 130 revolutions per minute, the closed fan appear to give the best result. In the table the reverse is the case, but the speed was comparatively low. Whatever differ-

20 Ft. Ventilating Fan

DRIVEN BY

HORIZONTAL ENGINE 16" x 24"

DESIGNED FOR

The Susquehanna Coal Co.

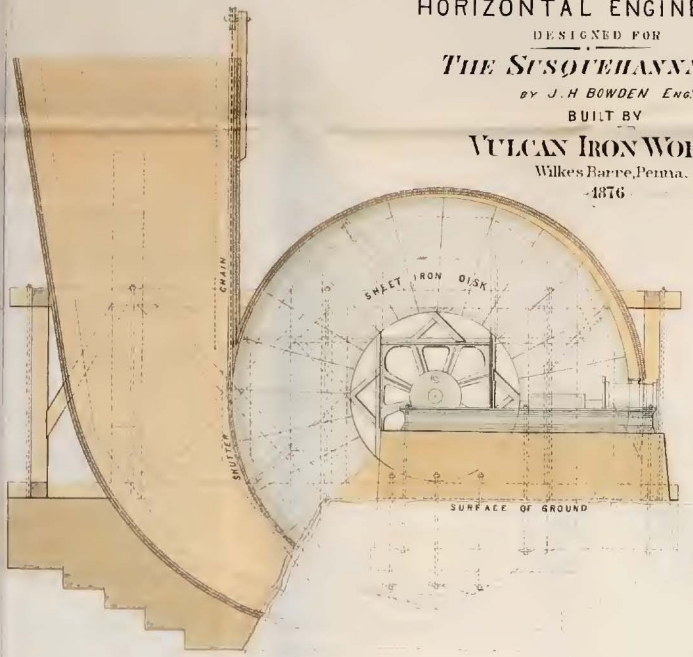
BY J. H BOWDEN ENG'R

BUILT BY

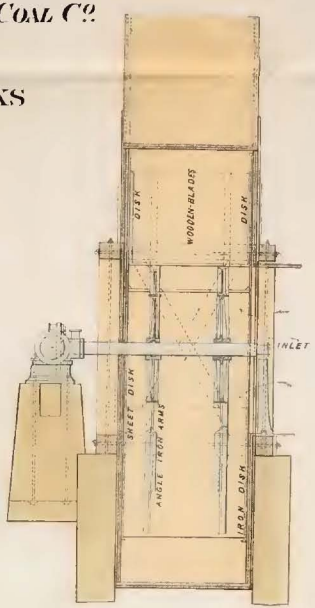
Vulcan Iron Works

Wilkes Barre, Penna.

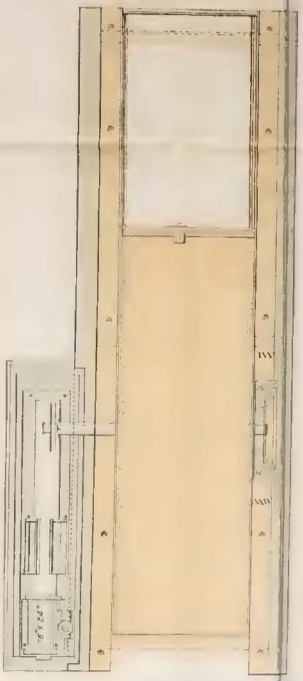
1876



LONGITUDINAL SECTION AND SIDE ELEVATION.



TRANSVERSE SECTION.



PLAN.

SCALE: ¼ INCH TO ONE FOOT.

ence that there may be between an open and a closed periphery fan, must be easiest detected when they are running from very slow to very fast speeds, causing heavy water gauges.

The following experiments were made upon the Avondale fan. Messrs. Wm Prudhoe, master mechanic for the Delaware, Lackawanna and Western railroad company, Plymouth division; E. C. Richter, mining engineer, assisted me in conducting the same.

Fan—diameter, 12 feet; face, 3 feet 4 inches; 2 side inlets, with open periphery, and having a revolving disk.

The following air measurements were taken in the tunnel between the hoisting and the air shafts a short distance from the fan.

1. Speed of fan, 104 revolutions; engine, 50 revs.; area of measuring place=98 S. F.; velocity=496×.97+47=529, and 529×98=51,842 cubic feet of air per minute; water gauge as taken on side of fan, .7 inches.

2. Fan revs., 52; engine, revs. 25; V.=262×.97+47=301, and 301×98 =29,498 cubic feet of air per minute, W. G. .25 inches.

3 Fan revs., 26; engine, revs. 12.5; V.=198×.97+47=180, and 180× 98=17,640 cubic feet of air per minute, W. G. *nil*. Temperature outside, 44°; inside, 51°.

4. Fan revs., 130; engine, 62.5 revs.; V.=610×.97+47=638.7, and 638.7 ×98=62,592 cubic feet of air per minute, W. G. .875 inches.

In the latter measurement the temperature outside was 22°, inside 51°. The above are the mean of four measurements taken at each speed.

The following are the data in regard to the engine and the power spent to produce the above result.

1—*a*. Engine dimensions.—Piston head, 14 inches diameter; area of P. head, 154 S. I.; length of stroke, 30 inches. Diagram taken on front end of engine cylinder at 50 revs; velocity of piston head=250 feet; mean pressure shown in diagram=13.3 pounds per S. I.; deducted for driving the engine and increased friction, 2.3 pounds; effective pressure, 11 pounds per S. I. $\therefore \frac{154\times250}{33,000}\times11=12.83$ H. P.

b. Diagram taken on back end of engine when running 50 revs.; effective pressure=10.2 pounds per S. I. $\therefore \frac{154\times250}{33,000}\times10.2=11.9$ H. P.; mean of both ends=12.36 H. P.

2—*a*. Diagram taken on front end of engine when running 25 revs.; effective pressure=4.0 lbs. per S. I.; velocity of piston=125 feet. $\therefore \frac{154\times125}{33,000}\times$ 4.0 pounds=2.33 H. P.

b. Diagram on back end of the engine when running 25 revs.; effective pressure 4.0 pounds=2.33 H. P.; mean of both ends, 2.33 H. P.

3—*a*. Diagram taken on front end of engine when running, 12.5 revs.; V. of piston=62.5 feet; pressure, 2 pounds per S. I. $\frac{154\times625}{33,000}\times2$ pounds= 5.83 H. P.

b. Diagram on back end of engine, 12.5 revs.; effective pressure, 2.3 pounds per S. I.=6.7 H. P.; mean of both ends=6.26 H. P.

Hence the following:

1. Fan revs., 104; engine R., 50; power expended on ventilation as per diagrams=12.36 H. P.; power utilized as per formula, $\frac{51,842\times.7\times5.2}{33,000}=$ 5.72 H. P.=46.26 per cent of useful effect.

2. Fan revs , 52 ; engine R., 25 ; power expended=2.33 H. P.; power utilized, $\frac{29,498\times.25\times5.2}{33,000}$=1.162 H. P.=49.87 per cent of useful effect.

3. Fan revs., 26 ; engine R , 12.5 ; power expended=.625 H. P.; power utilized, $\frac{17,640\times.083\times5.2}{33,000}$=.23 H. P.=36.8 per cent. of useful effect.

In the above no correction or allowance has been made for the difference between the temperatures inside and outside, there being about the same difference in the case held in comparison, which was 7°.

The highest velocity had was 130 revolutions of the fan, when it exhausted 62,592 cubic feet of air per minute=8.67 H. P., but took no diagram to ascertain the power expended. This measurement was taken at a different time, and there was 29° difference between the temperatures inside and outside.

The object of making the foregoing experiments was to make a comparison of the useful effect obtained from the above (this fan being an open periphery) and the N. C. & I. Co.'s fan, at No. 1 shaft, both being the same dimensions, the latter is an open periphery fan.

The following experiments were conducted by Messrs. E. C. Reichter, M. E., A. Weir, mine boss, and myself, at No. 1 shaft N. C. & I. Co., near Plymouth, January 23, 1872. They were made upon the fan at this place, to be compared with a similar set made with the fan at Avondale mine.

Fan dia. 12 feet; engine cylinder, 10 inches dia. ; length of stroke, 24 inches. Area of cylinder head=78.54 S. I.

Diagrams were taken by attaching one of Richardson's patent indicators to engine cylinder while being driven at different speeds.

The following air measurements were made in the return airway near the fan, to wit:

1. Speed of fan, 104 revs. ; engine, 52 revs. ; area of measuring place=113.5 S. F. Quantity=601.51×113.5=68,271, W. G. .25 inches.

2. Fan revs., 52; engine, 26 revs. ; Q.=301.625×113.5=34,234 C. F. and W. G. .083.

3. Fan revs., 26 ; engine, 13 revs. ; Q.=195.41×113.5=22,179 C. F., W. G. .00 inches.

Temperature outside, 42° ; inside, 48°.

4. Fan revs., 130 ; engine revs , 65 ; Q.=953.85×113.5=108,261 C. F. and W. G. .475 inches.

In the latter measurement temperature outside, 19° ; inside, 44°.

The above are the mean of four measurements taken at each speed.

The following are the data in regard to the engine and the power spent to produce the above result, to wit:

Area of piston head=78.5 S. I. Length of stroke=30 inches.

1—*a*. Diagram taken on front end of engine cylinder at 52 revs. Velocity of piston=208 ft. Mean pressure, as shown per diagram=31 lbs. per S. I. deducted for driving engine, and increased friction 3 lbs.=28 lbs. effective pressure per S. I. ∴ $\frac{78.5\times208}{33,000.}\times28$=13.85 H. P.

b. Diagram taken on back end of engine, running 52 revs. Effective pressure=26 lbs. per S. I. ∴ $\frac{78.5\times208}{33,000}\times26$=12.86 H. P.

Mean of both ends=13.35 H. P.

2—*a*. Diagram taken of front end of engine, running 26 revs.; velocity of piston=104 ft.; effective pressure 13 lbs. per S. I. ∴ $\frac{78.5\times104}{33,000}\times13$=3.21 H. P.

b. Back end of engine, running 26 revs.; effective pressure=13 lbs. ∴ $\frac{78.5\times104}{33{,}000}\times13=3.21$ H. P.; mean of both ends=3.21 H. P.

3—*a.* Diagram taken on front end of engine running 13 revs.; velocity of piston=52 ft.; effective pressure, 3.0 lbs. per S. I.

b. ∴ $\frac{78.5\times52}{33{,}000}=.37$ H. P.; back end the same mean=.37 H. P.

1. Hence the following: Fan revs., 104; engine, 52 revs.; power expended on ventilation as shown per diagram, 13.35 H. P.; power utilized as per formula, $\frac{601.51\times113.5\times.25\times5\ 2}{33{,}000}=2.69$ H. P., equal to 20 per cent. of useful effect.

2. Fan revs., 52; engine revs., 26; power expended=3.21 H. P.; power utilized $\frac{301.625\times113.5\times.083\times5.2}{33{,}000}=.4477$ H. P., equal to 14 per cent. of useful effect nearly.

3. Fan revs., 26; engine revs., 13; power expended=.37 H. P.; power utilized $\frac{195.41\times113.5\times.026\times5.2}{33{,}000}=.0908$ H. P., equal to 24.5 per cent. of useful effect

TABLE of comparison between two Fans.

Date of experiment.....	No. of the experiments..	Letters of the experiments	Hour of the experiments.	Average effective indicated pressure on piston....	Indicated effective horse-power.....	Velocity indicated per anemometer after a correction for friction. Formula V=.97 R+7.....	Quantity of air in return air-way near fan	Water gauge taken on side of the fan house.....	Power in the air in return air-way near the fan	Proportion of power utilized..... effective	Double strokes of engine per minute	Fan revolutions per minute.....	Steam in the boilers.....	Quantity of air per revolution of fan.....	Fan	Indicator used	REMARKS.
a	e	f	g	k	m	n	p	r	s	t	u	v	w	F	G	H	
1872.			P M	*Lbs.*	*H.P.*			*Ins.*	*H.P.*				*Lbs*	*C. Ft.*			
Jan. 20,	1	A	3.	3.	.37	195.41	22,179	.026	.0908	24.5	13	26	70	853.	Closed periphery fan.	Richards'.	Third measurement. Water gauge assumed.
20,	2	"	3.30	13.	3.21	301.625	34,224	.083	.4477	14.	26	52	66	658.16			
20,	3	"	4.	26.	13.35	601.51	68,271	.25	2.69	20.	52	104	61	655.45			
Average										19.3				722.53			
Jan. 19,	1	B	1.	2.15	.65	180.	17,640	.083	.23	36.8	12.5	26	72	678.46	Open periphery fan.	Richards'.	Third measurement. Water gauge assumed.
19,	2	"	1.30	4.	2.33	301.	29,498	.25	1.162	49.87	25	52	74	569.26			
19,	3	"	2.	11.	12.36	529.	51,842	.7	5.7183	46.26	50	104	70	498.48			
Average										44.31				583.			

In all the above experiments no correction or allowance has been made for the difference between the temperatures inside and outside, which was 6°.

The highest velocity had was 130 revolutions of the fan when it exhausted 786.5 cubic feet per revolution, or 108,261 cubic feet of air per minute; water gauge, .475=8.1 H. P., but took no diagram to ascertain the power expended. This measurement was taken at a different time and there was 25° difference between the temperature inside and outside.

The open periphery fan at Avondale exhausted at the speed of 130 revolutions, 62,592 cubic feet of air per minute, or 481 cubic feet per revolution; water gauge, .875, and=8.67 H. P.; temperature outside, 22°; inside, 51°; difference of 29°.

TABLE No. 2.—Shows the number of fans, fan engines and their power respectively; also the quantity of air circulated in each mine, under ordinary circumstances; also a few examples are given exhibiting how much the same may be increased, at short notice, by additional speed of the ventilator, other things remaining the same. The results, as calculated from this table, are only approximately correct, yet they are sufficiently correct to show practically the condition of this—the Wilkesbarre district—at the close of the year ending Dec. 31, 1876.

Name of Colliery.	Fans—number of.....	Coupled or not. (when double).....	Dimensions of Fans. Diameter—feet.....	Face. Feet.....	Inches.....	Side Inlets. Number of.....	Diameter. Feet.....	Inches.....	Elements necessary to Ascertain the Horse Power received in the Air. Working speed of fan per minute. Revolutions.....	Velocity of vane tips—feet.....	Air exhausted per minute. Cubic feet per minute.....	Cubic feet per revolution.....	Water gauge in inches.....	Maxi'm fan sp'd. (with safety.) Revolutions per minute.....	Velocity of vane tips—feet.....	Air exhausted per minute. Cubic feet per minute.....	Cubic feet per revolution.....	Water gauge in inches.....	Elements required to calculate the natural ventilation of a mine. Vertical depth of downcast—ft...	Vertical depth of upcast—feet....	Mean temperat'e upcast, degs. fah	Sectional area of downcast—S. ft...	Sectional area of upcast—S. ft...	Mean temperat'e d'n'ct, degs. fah	Natural ventilation—cubic ft	Water gauge—Inches.....
Mocanaqua	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Paxton	1	...	15	4	0	2	6	0	80	3,770	48,000	600	.....	100	4,712	60,000	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S. C. Co. No. 1, slope No. 1	1	...	15	4	6	2	6	6	71	3,346	40,320	568	1.45	110	5,181	57,549	532	1.50	.....	.....	.....	.....	.....	36	51	.....	.....
Do. Honey Pot, No. 2	1	...	24	5	2	2	12	0	40	3,016	39,060	977	0.75	66	4,976	75,397	1,142	1.125	.....	.....	.....	.....	.....	45	52	.....	.....
Do. No. 2, slope No. 2	1	...	15	3	6	2	6	6	76	3,582	21,186	279	0.75	...	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. No. 1 do.	1	...	20	6	0	1	8	0	59	3,142	86,565	1,671	1.00	80	5,025	135,362	1,692	1.95	.....	.....	.....	.....	.....	46	52	.....	.....
Do. No. 1, shaft do.	1	...	15	4	0	2	6	6	50	2,356	39,200	784	1.00	...	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. No. 3, slope No. 3	1	...	17	4	6	2	9	0	64	3,418	44,720	699	.75	80	4,272	53,976	675	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. No. 3, Tunnel No. 3	1	...	15	4	2	2	6	6	56	2,639	18,480	330	.50	68	3,205	21,780	320	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
E seam Warrior Run	1	...	15	4	0	2	7	6	60	2,838	50,000	833	.....	100	4,712	83,300	833	.....	425	425	98	100	.....	.....	.....	.....	.....
B. do. do.	1	...	15	4	0	2	7	0	45	2,221	37,485	833	.....	100	4,712	83,300	833	.....	2.5	225	80	90	.....	.....	.....	.....	.....
Old Slope Franklin	2	Coupled..	16 / 16	4 6 / 4 6		4	7	6	50	2,513	52,000	1,040	.4	100	5,026	107,000	1,070	.90	507	507	147	75	.....	.....	.....	.....	.....
Brown..do	1	...	15	4	0	2	7	0	63	2,827	21,000	350	.....	120	5,654	42,000	350	.....	391	391	147	65	.....	.....	.....	.....	.....
Hillman	1	...	12	4	0	2	6	0	60	.....	.....	.....	.....	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maltby	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hutchison	1	...	12	.....		1	.....		80	3,016	30,000	375	.....	...	...	...	...	.....	180	180	154	77	.....	.....	.....	.....	.....
East Boston	1	...	15	4	0	2	.....		60	2,827	.....	.....	.....	120	.....	.....	.....	.....	250	180	231	80	.....	.....	.....	.....	.....
Waterman, Beaver & Co., No. 1	1	...	12	3	8	2	5 11 / 5 11		124	4,464	36,000	290	.5	140	5,040	44,100	315	.628	375	375	90	45	40	50	.....	.....
Do. do. No. 2,	1	...	21	6	6	1	10	0	60	3,958	66,000	1,100	.5	80	5,277	80,300	1,010	.75	.....	.....	139	94	48	58	.....	.....
Do. do. do.	1	...	12	3	0	2	5	11	.....	.....	.....	.....	.....	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chauncey	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston	...	...	...	...	...	...	...	...	...	...	68,400	.....	.3	...	...	...	...	.....	165	190	176	100	44	188	.....	.....	.....
Jersey	1	...	12	3	4	2	6 0 / 6 0		101	3,807	.....	.....	.....	146	5,504	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Avondale	1	...	12	3	4	2	6 0 / 6 0		101	3,807	46,920	465	.5	146	5,504	67,150	460	.90	225	270	140	50	47	48	.....	.....	.....
Enterprise	2	Coupled..	15 / 15	4 0 / 4 0		2 / 2	6	0	80	3,770	44,000	550	.4	...	...	...	...	.....	372	380	220	50	.....	.....	.....	.....	.....
Wyoming	1	...	25	8	0	1	12	6	44	3,412	102,000	2,318	.4	66	5,184	132,400	2,006	.90	351	351	160	120	.....	.....	.....	.....	.....
Do	1	...	15	6	0	2	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Forty Fort	1	...	15	6	0	1	7	6	84	3,958	38,640	460	.7	...	...	...	...	.....	96	96	150	50	.....	.....	.....	.....	.....

Poots' Hollenback																									
Henry	1		18	6	0	1	9	0	66	3,732	66,000	1,000							313	313					
Midvale	1		12	3	0	1	5	0	65	2,444	25,300	390													
Mineral Spring	1		18	6	0	1	9	0	60	3,393	52,000	866													
Prospect	1		20	6	0	1	10	0	55	3,455	80,000	1,455							596	596					
Oakwood shaft	1		30	10	0	1	15	0	35	3,298	40,000	1,143							746	746	187	134			
Exeter	1		21	6	0	1	10	0	65	4,288									300	300					
Knight shaft	1		20	6	0	1	10	0	65	4,081															
Ellenwood																									
Mill Creek	2	Coupled	10	2	5		5	0	110	3,456	95,000	860	.92												
			10	2	5																				
Do	1		20	4	0	2	10	0	79	4,963	75,000	937	1.4	85							107	108			
Pine Ridge	1		20	6	0	1	10	0	75	4,712	70,000	933	1.50						416	416					
Laurel Run	1		20	5	0	2	10	0	76	4,775	68,000	894	1.4	80	5,026										
							10	0																	
No. 3 slope, Baltimore	1		16	4	0	2	8	0	72	3,619	44,000	6,161	1.10												
							8	0																	
No. 1 Tunnel....do	1		20	5	0	2	10	0	76	4,775	70,000	921	1.70									81			
							10	0																	
No. 1 D. & H. C. Co., Plymouth	1		12	3	0	2	6	0	104	3,921	68,271	656	.25						295	295	305	10			
No. 2....do.....do	1		12	3	0	2	6	0	99	3,732	72,290	730	.90						400	400	24	11			
							6	0																	
No. 3....do.....do	1		16	4	0	2	8	0											303	303	305	10			
							8	0																	
No. 4....do.....do	1		16	4	0	2	8	0											345	345	24	10			
							8	0																	
No. 5....do.....do	1		12	3	0	2	6	0	125	4,613	40,000	320	1.46						235	235	20	10			
							6	0																	
No. 1, Wanamie	2	Coupled	15	1	4	2	7	6	70	3,298			.60	78	3,675						120	160			
			15	4	4		7	6																	
No. 2....do	1		15	4	4	2	7	6	78	3,576	48,000	615	.70												
Espy	1		15	4	4	2	7	6																	
No. 1, Jersey																									
No. 2....do	1		15	4	4	2	7	0																	
No. 9, Sugar Notch	1		15	4	4	2	7	0																	
Do.....do	1		15	4	4	2	7	0																	
No. 10.....do	1		15	4	4	2	7	0	90	4,241	43,700	574	.90	120	5,654				495	495	150	70			
Hartford	1		15	4	4	2	7	0	90	4,241	22,425	289	1.00												
Do	1		15	4	4	2	7	0	70	3,369	28,480	406	1.20												
No. 5, Empire	1		15	4	4	2	7	0	85	4,005	29,550	381	1.20	120	5,654				749	749					
Empire shaft	1		15	4	4	2	7	0	100	4,712	64,800	762	1.60	120	5,654				441	441					
Do	1		15	4	4	2	7	0	100	4,712	40,000	490													
Hollenback No. 2																									
Do.....No. 3, slope	1		15	4	4	2	7	0											313	313					
Diamond	1		15	4	6	2	7	0	60	2,827	40,250	671	.60	120	5,654				569	569					
Do	1		15	4	6	2	7	0	58	1,885	38,500	664	.60	120	5,654				569	569					
Audenried	2	Coupled	15	4	6	2	7	0	80	3,769	54,600	607	1.20	120	5,651				883	883					
			15	4	6		7	0																	
Dodson	1		15	4	6	2	7	0																	
Lance shaft	1		15	4	6	2	7	0	105	4,948	70,000	666	1.40	120	5,654				236	236					
Gaylord	1		15	4	6	2	7	0	95	4,776	55,000	579	.90	120	5,654				141		100	141			
Nottingham	1		21	6	0	2	13	0	65	4,930	61,000	923	1.7						372						
							13	0																	
Washington	1		15	4	6	2	7	0	65	3,063	18,000	277	.5						176	189	225	50			
Conyngham shaft	1		20	5	0	2	10	0	59	3,707	47,000	796	.6	80	5,026				750	750	400	80			
							10	0																	
	69																								

TABLE No. 2—*Continued.*

NAME OF COLLIERY.	HORSE POWER RECEIVED IN THE AIR BY			ELEMENTS IN PART OF HORSE POWER EXPENDED.						HORSE POWER EXP'DED ON FANS AT		HORSE POWER UTILIZ'D. [Neglecting natural ventilation.]		PERCENTAGES OF USEFUL EFFECT OF FANS.		REMARKS.
	Natural ventilation—horse power	Fan—working speed—horse power	Fan—maximum speed—horse power	No. of engines and their positions respectively.		Dimensions of engines—length of stroke—inches	Dimensions of engines—diameter of cylinder—S. ins.	Steam cut off at—inches	Steam pressure in pounds per S. in.		Working speed—horse power.	Maximum speed—horse power	Working speed—horse power	Maximum speed—horse power	Working speed	Maximum speed	
				Number of	Vertical or Horizontal.				In cylinder—lbs	In steam boilers—lbs						
Mocanaqua	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Idle since 1872.
Paxton	....	.....	.....	1	Vertical	12	36	.....	.....	40	.....	.....	.....	.....	.....	.....	
S. C. Co. No. 1, slope No. 1	....	9.31	13.60	1	....do	9	18	11.25	.....	60	.....	.....	9.31	13.60	.....	.....	[2 tunnels additional.
Do.....Honey Pot, No. 2	....	4.61	13.37	2	....do	14	18	9.	.....	50	.....	.....	4.61	13.37	.....	.....	Honey Pot fan ventilates Nos. 1 and
Do.....No. 2, slope No. 2	....	2.59	.....	1	....do	9	18	11.25	.....	60	.....	.....	2.59	.....	.....	.....	No. 2 slope fan now idle.
Do.....No. 4.....do	....	13.17	41.59	1	Horizontal	16	24	12.00	.....	65	.....	.....	13.17	41.59	.....	.....	No. 4 slope ventilates No. 2 slope.
Do.....No. 1, shaft ..do	....	6.18	.....	1	Vertical	12	18	9.00	.....	60	.....	.....	6.18	.....	.....	.....	
Do.....No. 3, slope No. 3	....	5.29	8.50	1	....do	12	18	9.00	.....	70	.....	.....	5.29	8.50	.....	.....	
Do.....No. 3, Tunnel No. 3	....	1.46	2.57	1	....do	9	18	11.25	.....	50	.....	.....	1.46	2.57	.....	.....	
E seam Warrior Run	....	.....	.....	1	....do	12	18	12.	.....	70	.....	.....	.....	.....	.....	.....	
B....do.....do	....	.....	.....	1	....do	10	18	12.	.....	60	.....	.....	.....	.....	.....	.....	
Old Slope Franklin	....	3.28	15.18	2	....do	14	18	.....	34	59	16.66	42.7	3.28	15.18	9.8	17.77	
						14	18	.....			16.66	42.7					
Brown..do	....	.....	.....	1	....do	12	18	.....	40	55	17.48	47.5	.....	.....	.....	.....	
Hillman	....	.....	.....	1	....do	12	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Maltby	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Idle since 1872.
Hutchison	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
East Boston	....	.....	.....	1	Horizontal	12	30	.....	.....	60	.....	.....	.....	.....	.....	.....	Fan driven by breaker engine.
Waterman, Beaver & Co., No. 1	....	2.83	4.36	1	....do	12	20	18.	57	61	13.	.....	3.83	4.36	21.7	.....	
Do.....do .....No. 2	....	5.2	9.49	1	....do	15	30	22.5	35.5	75	18.27	.....	5.2	9.49	30.5	.....	
Do.....do ....do	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Extra fan for emergencies.
Chauncey	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Ventilated by furnace.
Boston	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	3.2	.....	.....	.....	Ventilated by furnace.
Jersey	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Fan located at and coupled to Avon-
Avondale	....	3.69	9.52	1	Horizontal	14	30	.....	58	75	39.	45.	3.69	9.52	12.3	21.1	dale fan, yet currents are separate.
Enterprise	....	2.77	.....	2	....do	9	18	.....	20	80	23.	.....	2.77	.....	12.	.....	
						9	18	.....									
Wyoming	....	6.43	21.8	1	....do	16	30	.....	25	80	34.	.....	6.43	21.80	19.	.....	
Do	....	.....	.....	1	Vertical	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Extra fan for emergencies.
Forty Fort	....	4.26	.....	1	.....	12	18	.....	25	70	21.25	.....	4.26	.....	20.	.....	Natural ventilation assisted by
Pools' Hollenback	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	steam element.
Henry	....	.....	.....	1	Vertical	16	18	.....	.....	60	.....	.....	.....	.....	.....	.....	
Midvale	....	.....	.....	1	....do	10	18	.....	55	60	.....	.....	.....	.....	.....	.....	
Mineral Spring	....	.....	.....	1	....do	16	18	.....	40	80	.....	.....	.....	.....	.....	.....	
Prospect	....	.....	.....	1	....do	16	18	.....	60	60	.....	.....	.....	.....	.....	.....	The both fans are used to ventilate
Oakwood shaft	....	.....	.....	1	Horizontal	20	22	.....	55	60	.....	.....	.....	.....	.....	.....	Prospect in part.

Exeter			1	Vertical	20	22			60						The both fans are used occasionally to ventilate Exeter workings.
Knight shaft			1	do	16	36			60						New colliery.
Ellenwood															
Mill Creek		13.4	1	Horizontal	14	30			70	30.		1.31		41.	Drift ventilated by a furnace. This fan ventilates parts of Mill Creek and Pine Ridge collieries.
Do		16.54	2	do	18	22			75			16.54			
Pine Ridge		16.4	1	do	14	30				40.		16.4		40.	
Laurel Run		14.2	1	do	18	22			75	40.		11.2		36.	
No. 3 slope, Baltimore		7.6	1	do	18	22			75	20.		7.6		38.	
No. 1 Tunnel do		18.6	2	do	14	24			70	40.		18.6		49.	This colliery has also a double furnace 6'x5' each.
					14	24									
No. 1 D. & H. C. Co., Plymouth		2.69	1	do	10	24		26	64	13.35		2.69		20.	
No. 2 do		10.24	1	do	12	30			65	30.		10.24		31.	
No. 3 do			2	do	18	22									
No. 4 do			1	do	18	22									
No. 5 do		10.34	1	do	14	24			75	31.		10.34		34.	
No. 1, Wanamie			2	Vertical	14	18	13.5	50	80	20.					
					14	18				20.					
No. 2 do		5.29	1	do	12	18	13.5	50	80	15.		5.29		35.	
Espy			1	do	12	18									
No. 1, Jersey															Idle since 1871.
No. 2 do			1	Vertical											
No. 9, Sugar Notch			1	do											
Do do			1	do											
No. 10 do		6.2	1	do	14	18	13.5	45	75	25.		6.2		25.	
Hartford		3.53	1	do	10	18	13.5	55	60	15.		3.53		23.55	This fan ventilates the Ross and Red Ash seams.
Do		5.39	1	Horizontal	10	24	18.	25	80	10.		5.39		53.9	
No. 5, Empire		5.56	2	do	8	14	8.75	35	80	15.		5.56		37.	
					8	14	8.75								
Empire shaft		16.33	1	Vertical	14	18	13.5	70	80	25.		16.33		65.	Fan ventilates Baltimore seam.
Do			1	do	14	18	13.5								Fan ventilates Hillman seam.
Hollenback No. 2															Mine just exhausted—fan removed.
Do No. 3 slope			1	Horizontal	10	24	11.25	60	80	15.					
Diamond		3.80	1	Vertical	14	18	11.25	30	80	20.		3.80		19.	
Do		3.63	1	do	14	18	11.25	30	80	20.		3.63		18.15	
Audenried		11.81	2	do	14	18	11.25	50	60	20.		11.81		29.6	
					14	18	11.25			20.					
Dodson			1	do	12	24	11.25								
Lance shaft		15.41	1	do	12	18	11.25	60	70						
Gaylord		7.8	1	Horizontal	12	24	18.	45	60	20.		7.80		39.	
Nottingham		16.34	2	Vertical	14	18						16.34			This fan ventilates also the Washington slope, the 15 feet fan being used for tunnel.
					14	18									
Washington		1.40	1	Horizontal	12	24									
Conyngham shaft		4.44	1	do	18	22		70		20.		4.44		16.	

The foregoing table shows tolerably correct, in most instances where the calculation has been completed, the amount of work performed but not the useful effect of those fans. This table was designed by the writer, however, to show practically the condition of the district as regards ventilation, and the safety of our men from explosions of gas; and no claim is laid to it for accuracy in their useful effect, and especially so on account of the difficulty of ascertaining the exact power spent, having no indicator and seldom any means of getting the fan and engine separated in order to determine their respective frictions, &c.

It can be seen by this table how much air is circualted in each mine per minute. The number of employees inside can be found on table No. 1, if needed. The maximum quantities in the table is intended to show the amount of air the ventilator is capable to produce by the additional speed of a few revolutions of the same, at almost a moment's notice.

This is what can not be done by furnace ventilation. The difference between the amount of air exhausted by a ventilator when working at ordinary or working speed and the said maximum speed is the surplus or margin reserved to meet emergencies, should occasion require.

The speed of the tips of the vanes are given at each speed, as also the discharge in cubic feet of air per minute and per revolution.

The former shows the actual increase of velocity at the periphery at the higher speed of the fan, and gives a comparison of the speed of the different sizes of ventilators when running at their maximum speeds. It will be observed that very few exceed one mile per minute in speed of the vane tips, large or small.

The matter of discharge per revolution is given to enable us to see how much the quantity per revolution falls off or decreases from the ordinary to the higher speeds.

In most of the cases here given the difference is not very great, caused no doubt by the extreme speeds of the ventilator, when running very low nor very high, not being given. The water-gauge is given to enable any person to calculate the results here given. The sectional area, depth and temperature of the down-casts and up-casts are given only in a few cases in full. It is impossible to learn the exact work of a mechanical ventilator unless such data is had to enable the experimenters to find out the amount of natural ventilation produced by the varying temperatures, &c., of the mine and outside during winter and summer, or at least when testing the same. If we find that natural ventilation is acting in favor and assisting the ventilator, then the said amount should be deducted, and added to, if the reverse is found to be the case.

The engines or power required to drive the fans are given for two purposes. First to afford a means of calculating, approximately, the power expended in causing said air-currents to circulate; in other words, the work of the ventilator; and, again, to enable the different parties in this and other districts to compare the dimensions of engines used for similar work. The positions, whether horizontal or vertical, is also given for a similar purpose.

The primary object of this table, however, relates to the matter of safety of our men working under ground.

Whenever any structure is erected of any material, such as a bridge for instance, or if that a cable of iron or steel is ordered, upon which a certain load is to be suspended, then in either case a factor of safety is used by adding to the strength calculated to do the work five or six times as much. This factor of safety is intended to provide against danger from unforeseen defects in material or workmanship, or to meet any emergency that may arise, and thus if possible prevent accidents.

How is it in our mining operations? In the matter of hoisting men and material in our shafts, the same is found as before mentioned. An iron wire rope one inch thick is calculated to carry fifteen and seven-tenth (15.7) tons; *i. e.* the said amount is the breaking strain, but it is only three and one-tenth (3.1) tons that is called the working load—only one-fifth of its actual strength.

With the exception of the cable for hoisting the factor of safety is little known of below ground. So far as my experience goes little systematic allowance or provision for emergencies is made in our mining operations In the matter of ventilation we have a few fans that are not run to their maximum capacities. I doubt whether many of those having a marginal speed have been erected with the understanding that the mine being new probably requires but a small amount of air at the time of starting the same in comparison to what will be required; and that at the very time that the greatest quantity of air is required per minute, that still there should be a factor of safety to meet emergencies that may arise at the said time. That is to say that a mine requiring a certain quantity of air ought never to have less than fifty per cent. over and above the explosive point in a mine generating carbureted hydrogen gas, and in addition to this a factor of safety to provide for emergencies that may arise. The factor used in other structures, as before stated, is from four to five times. But I imagine to hear some of our mining people say that this is an impossibility in their case. This is true unless the matter is thought of and provided for before erecting the ventilator.

The matter of a proper system of dividing the air-current into a number of splits and securing large or roomy airways in each split, as well as to get the respective splits as near as may be of equal lengths, has much to do with the results of any ventilator; *i. e.* not the useful effect of the same but the amount of air caused to circulate through a mine per minute.

The writer has endeavored to impress the importance of this matter upon the minds of our mine officers from time to time ever since in office, but not always meeting with success when first advocated, yet a similar course, to a great extent, has frequently been forced upon them by attending circumstances.

A glance at the table giving the quantity of air circulated will convince any one that what I claim that we should have as a factor of safety is to be found by but very few, and then only to a very limited degree. I think, and entertain the hope that those figures cannot fail to be of some benefit to many of mine officials.

The great extremes of the temperatures in this country has a very important bearing upon our mine ventilation: changing outside from zero, Fahrenheit degrees, and sometimes below, to 90 above zero, the difference often reaching from 30 to 40 degrees between the temperature inside and outside of a colliery.

A mine in winter during cold weather may have ten or twenty thousand cubic feet of air per minute circulated by natural ventilation. In summer this would probably be produced during very hot weather, but having reversed its direction. If the ventilator be a fan or other machine, being stationary—and the same would apply if a furnace—the difference must be obvious in its work performed, *i. e.* in the amount of air exhausted during the different seasons. One season the forces of nature are its allies and the next its foes.

In addition to the above is the barometric changes, which is also very important. Little or no account is taken of the same in this district at least. It is really necessary therefore that more attention be paid to those matters that cause such sudden fluctuations in our air currents.

In my last annual report I dwelt upon the importance of having governors upon each of our fan engines. I am still, and ever will be, of the same opinion. I notice that M. Gubal, after whose name the Gubal fan is named, has invented an automatic or barometric governor to be attached to mine ventilators so that when the barometer falls the speed of the ventilator is increased accordingly, and said increase in speed is not changed until some person attends to the same, thus giving ample time to have everything safe inside ere the change is made.

Furnaces.—We have but very few furnaces used in this district. Our mines being shallow, and at the same time generating large quantities of carbureted hydrogen gas, as well as consuming such large quantities of blasting powder, they must require large amounts of pure air circulated through, in order to enable persons employed to proceed with their labor.

The relative merits of the furnace and fan as mine ventilators has been treated of so often by the ablest of mining engineers and experts in different countries, the works of whom can be had by any person desirous of such information, that I do not deem it necessary to attempt such a task here, but suffice it to be said once for all that in my opinion the fan is infinitely better adapted to our wants in the anthracite coal fields than the furnace, hence the preponderance of the former over the latter in this district, our people having learned the lesson from actual experience.

TABLE No. 3.—Shows the number of lives lost in each colliery respectively; total coal shipments; as also number of tons shipped per life lost, during the last five years:

NAME OF COLLIERY.	NAME OF OWNER OR LESSEE.	LOCATION OF COLLIERY.	NO. OF LIVES LOST DURING EACH OF THE YEARS.					Total number of lives lost.....	Total tons of coal production.....	Tons of coal produced per life lost.....
			1872.	1873.	1874.	1875.	1876.			
Mocanaqua.....	M. Coal Company.....	Shickshinny.....	...	...	...	...	...	...	.....	.....
Paxton.....	Paxton Coal Company.....	.....do.....	1	...	...	...	...	1	200,500	200,500
No. 1 breaker	Susquehanna Coal Company ...	East Nanticoke ...	...	3	2	1	1	7	697,384	99,612
No. 2 breaker	.....do.....	.....do.....	1	1	1	1	3	7	1,057,532	151,076
No. 3 breaker	.....do.....	West Nanticoke ..	...	3	1	3	2	9	559,895	62,210
Warrior Run.....	A. J. Davis & Co.....	Warrior Run.....	...	2	1	...	1	4	219,150	54,789
Franklin.....	Franklin Coal Company.....	Near Wilkesbarre	...	2	1	...	1	4	349,812	85,203
Hillman	H. B. Hillman & Son.....	Plainsville twp....	...	...	...	...	1	1	187,000	187,000
Maltby.....	S. C. Maltby	Near Wyoming ...	...	...	...	...	...	...	.....	Idle.
Hutchinson.....	C. Hutchinson	Near Kingston....	*	*	...	4	4	8	212,000	26,500
East Boston.....	Wm. G. Payne & Co.....	.....do	...	...	1	...	...	1	362,333	362,333
No. 1	Waterman, Beaver & Co.....	.....do.....	1	...	...	...	1	2	538,933	269,466
No. 2.....	.....do.....	.....do	*	1	1	1	...	3	520,608	173,536
Chauncey.....	Albrighton, Roberts & Co.....	Near Plymouth ...	...	...	4	...	*	4	195,938	48,984
Boston	D., L. and W. Railroad Co.....	.....do.....	...	3	1	1	2	7	580,997	82,999
Jersey.....	.....do.....	.....do.....	...	...	1	1	...	2	180,565	90,283
Avondale.....	.....do.....	.....do.....	...	...	...	1	1	2	653,993	326,993
Enterprise.....	Riverside Coal Company	Plainsville twp....	1	...	2	1	1	5	403,617	89,723
Wyoming	..... do	.....do.....	*	*	1	2	1	4	348,608	87,152
Forty Fort	J. H. Swoyer.....	Near Wyoming ...	*	*	*	1	2	3	147,806	49,268
Hollenback.....	R. S. Poole	Plainsville twp....	...	1	...	1	1	3	172,660	37,553
Henry.....	Lehigh Valley Coal Company..	.....do.....	4	...	2	4	2	12	361,915	30,159
Midvale.....	.....do.....	.....do.....	...	1	1	2	1	5	266,507	53,101
Mineral Spring...	.....do.....	.....do.....	...	...	2	...	2	4	320,000	80,019
Prospect.....	.....do.....	.....do.....	*	1	2	1	...	4	63,000	15,750
Exeter.....	.....do.....	West Pittston....	...	...	...	2	7	9	293,000	32,222
Ellenwood.....	T. Broderick & Co.....	Near Kingston....	...	...	...	...	1	1	50,000	50,000
Mill Creek.....	D. and H. Coal Company	Mill Creek.....	4	2	1	1	...	8	780,465	97,558
Pine Ridge	.....do.....	Nr. Miners' Stat'n	2	3	1	2	3	11	441,309	40,119
Laurel Run.....	.....do.....	.....do.....	...	1	1	...	1	3	507,297	169,099
No. 3 Baltimore..	.....do.....	.....do.....	...	...	1	3	...	4	442,646	110,661
No. 1 Baltimore..	.....do.....	Near Wilkesbarre	3	1	...	...	...	4	479,110	119,772
No. 1.....	.....do.....	Near Plymouth ...	...	1	...	1	...	2	309,069	154,534
No. 2.....	.....do.....	.....do.....	...	...	2	3	...	5	149,054	29,810
No. 4	.....do.....	.....do.....	1	...	...	...	...	1	190,370	190,370
No. 5.....	.....do.....	.....do.....	1	...	...	...	1	2	531,442	265,721
No. 1.....	L. and W. Coal Company.....	Wanamie.....	...	...	1	1	1	3	389,487	129,829
No. 2.....	.....do.....	.....do.....	...	...	...	1	...	1	211,746	211,746
Espy	.....do.....	Hanover township	...	...	...	2	...	2	49,213	24,616
No. 1 Jersey.....	.....do.....	Near Ashley.....	...	...	...	...	...	....	Not working.	
No. 2 Jersey.....	.....do.....	.....do.....	1	2	...	...	...	3	185,979	61,993
No. 9.....	.....do.....	Sugar Notch.	*2	...	1	2	*	5	178,670	35,734
No. 10.....	.....do.....	Sugar Notch.....	*	*	1	1	...	2	164,933	82,466
Hartford.....	.....do.....	Ashley.....	*2	2	3	2	1	10	555,922	69,490
No. 5 breaker	.....do.....	Near Empire.....	*	*	2	...	*	2	95,655	47,827

TABLE No. 3—*Continued.*

NAME OF COLLIERY.	NAME OF OWNER OR LESSEE.	LOCATION OF COLLIERY.	NO. OF LIVES LOST DURING EACH OF THE YEARS. 1872.	1873.	1874.	1875.	1876.	Total number of lives lost.	Total tons of coal produced.	Tons of coal produced per life lost.
Empire shaft	L. and W. Coal Company	Near Empire	*3	*3	2	2	3	13	382,817	54,688
Hollenback, No. 2	do	do	*2	*	...	...	...	2	179,966	179,966
Hollenback, No. 3	do	do	*	*1	1	1	...	3	297,649	148,824
Diamond	do	Near Wilkesbarre	2	5	1	2	...	10	469,489	81,816
Andenried	do	do	*	*	*	1	2	3	83,510	27,836
Dodson	do	Near Plymouth	*	*	1	...	*	1	150,990	150,990
Lance	do	do	*	*	...	...	1	1	248,404	248,404
Gaylord	do	do	*2	*	...	...	1	3	348,222	348,222
Nottingham	do	do	1	...	4	1	2	8	502,627	62,828
Washington	do	do	2	1	1	...	2	6	410,433	68,405
Port Bowekley	H. S. Coal and Iron Company	Plainsville twp	...	2	1	*	*	3	136,000	45,333
In abandoned mines			...	...	2	...	...	2	...	...
In shafts and slopes while sinking			4	4	6	10	2	25	...	...
Totals			40	46	57	63	55	281	...	...

Where there is an asterisk thus * in the table of accidents there is no coal production for that year, hence the numbers killed during said years are not divided into the total coal. The accidents that occurred while shaft sinking is not placed either against the tonnage of the mine subsequently.

Table No. 3 gives the number of persons killed in each colliery for the years 1872-3-4-5 and 6, unless where there was no coal produced. Also the total quantity of coal produced for the same number of years that the list of lives lost are given; as also the average number of tons of coal produced per life lost at each colliery for the same time. Heretofore a general average only was given for the whole district, but in the present report each place has its own record to stand by, let that be what it may. A glance at this table will exhibit a wide range, extending from 15,750 to 362,333 tons of coal mined to a life lost.

TABLE No. 4.—Showing the number of persons killed in the Middle district of Luzerne and Carbon counties from 1872 to 1876, inclusive; also how accident occurred, together with the percentage of each item.

	1872.	1873.	1874.	1875.	1876.	Totals.	Percentages
Explosions of carbureted hydrogen gas	8	6	9	6	7	36	13.79
Falls of Roof and Sides:							
Falls of coal and bone	12	9	14	13	14	62	23.75
Falls of rock and slate	3	2	3	5	9	22	8.43
Sundries	...	...	...	1	...	1	.38
Total falls	15	11	17	19	23	85	32.57
In Shafts:							
Falling into shafts from top	3	3	3	12	...	21	8.04
Things falling from top	...	...	...	...	...	...	...
Falling from part way down	...	...	...	2	1	3	1.15
Things falling from part way down	...	...	...	...	...	...	...
Sundries in shafts	...	...	...	...	...	...	...
Total in shafts	3	3	3	14	1	24	9.19
By Mine Cars:							
By mine cars	7	13	9	5	4	38	14.56
By Explosions of Blasting Powder:							
By explosions of plasting powder	...	...	1	2	3	6	2.3
Miscellaneous Under Ground:							
By blasts in coal and rock	1	4	4	8	10	27	10.34
By locomotive engines	...	...	...	...	1	1	.38
Sundries under ground	3	...	7	1	3	14	5.36
Total miscellaneous under ground	4	4	11	9	14	42	16.09
Total under ground	37	37	50	55	52	231	88.50
On Surface:							
By machinery	...	...	1	2	1	4	1.60
Suffocated in chutes of coal breaker	...	...	1	2	...	3	1.15
Crushed by cars	...	6	1	...	2	11	4.22
Crushed by locomotives	...	...	...	2	...	2	.76
Sundries on surface	3	3	4	...	...	10	3.82
Total on surface	3	9	7	8	3	30	11.49
Gross totals	40	46	57	63	55	261	100.

Table No. 4 shows the total number of lives lost in this district during the last five years, classified under six general heads. Those items have been sub-divided into others, giving a more minute description of the same; also the percentages of each item to the whole number of lives lost is given in the right hand column.

TABLE No. 5.—Exhibits a summary of fatalities; aggregate coal production: also the production in tons per life lost in this district for the last five years.

DATE.	Explosions of C. 112.	Falls of roof & sides.	In shafts.....	By mine cars.....	By blasting powder.	Miscellaneous	Above ground	Totals.....	Totals of coal production.....	Tons of coal mined per life lost.....
1872.....	8	15	3	7	.....	4	3	40	3,250,000	81,560
1873.....	6	11	3	13	....	4	9	46	4,232,000	92,000
1874.....	9	17	3	9	1	11	7	57	4,513,847	80,000
1875.....	6	18	14	5	2	10	8	63	4,261,263	67,629
1876.....	7	23	1	4	3	14	3	55	4,615,386	83,916
Totals.....	36	84	24	38	6	43	30	261	20,932,496	81,033

Table No. 5 shows the number of lives lost during the year 1876, under seven general heads, with the quantity of coal shipped to market; also the number of tons produced per life lost.

TABLE No. 6.—Summaries of fatal accidents, under five heads, for five years, ending 1876.

	1872.	1873.	1874.	1875.	1876.	Totals.
Killed by falls of roof and sides.....	15	11	17	18	23	84
Killed by mine cars.....	7	13	9	5	4	38
Killed by explosions of C 112.....	8	6	9	6	7	36
Killed by blasts in and rock.....	1	4	4	8	10	27
Killed in shafts.....	3	3	3	14	1	24
Totals for each respectively and their sums.....	34	37	42	51	45	209
Total number killed each year, including the above five items.....	40	46	57	63	55	261
Percentages of the above five items to the whole number killed.....	85	80.43	73.68	82.26	80.93	80

The above table of summaries exhibits the items that are most prolific of accidents. In the right hand vertical column can be seen the totals for each item for five years, and the preponderance of one item over another in the list of accidents in the order which they are placed. In the horizontal column of total footings the numbers killed each year respectively under the above five heads are given, and to the right are seen their sums. The second horizontal column shows the total number killed each year, including the above five items and their sums. The third or last horizontal column gives the percentages of the five items before referred to for each year respectively of the whole number killed in each year and their general average.

Table No. 6 shows the number of lives lost under five heads, being the ones considered the heaviest in the list of fatalities. This table also shows what per cent. each item bears to the total for each year, &c.

TABLE No. 7.—Coal production, number of persons employed, &c.

	1872.	1873.	1874.	1875.	1876.	Total.
Coal produced per year in tons	3,250,000	4,232,000	4,513,847	4,261,263	4,615,386	20,932,496
Number of persons employed	9,807	11,325	13,576	15,000	14,317	.....
Ratio of coal produced in tons to each employee	331.4	372.6	332.5	284.0	323.0	Average. 328.4
Number of lives lost each year	40	47	57	63	55	52.2
Ratio of coal produced in tons per life lost	81,560	92,000	80,000	67,620	83,916	81,033
Ratio of persons employed to each life lost	233.26	246.84	238.17	238.22	260.5	253

Table No. 7 shows the coal production of the district for the years 1872–3–4–5–6 and total tons, number of persons employed each year, ratio of production to each employee, number of lives lost each year for the aforementioned space of time, ratio of coal produced per life lost, ratio of persons employed per life lost.

TABLE OF COMPARISON.

This table exhibits a comparision of a few important items, between this and foreign countries.

	England Bituminous Mines.		Nova Scotia Bituminous Mines.		Ohio Bituminous Mines.		Pennsylvania Anthracite Mines	
	1874.	1875.	1874.	1875.	1875.	1876.	1875.	1876.
Coal produced in tons per year	140,713,832	147,730,313	872,720	781,165	4,267,535	.....	22,000,000	....
Number of persons employed	538,829	535,845	4,284	3,777	12,500	.....	69,583	.....
Ratio of production to employees—tons	261.	275.5	203.8	206.82	341.4	.....	316.17	.....
Number of lives lost each year	1,056	1,244	7	2	23	13	238	.....
Ratio of production to lives lost—tons	133,251	118,730	135,063	390,582	142,252	.....	92,437	.....
Ratio of employees per life lost	510	430	611	1,888	416.6	.....	295	.....

Two of the columns in the comparison table I could not fill, although I had intended to have had them complete. For some reason we, the anthracite mines inspectors, failed to affect an interchange of these items in time to be used in the report, notwithstanding that we had arranged to do so. The coal production of Ohio was not in Inspector Roy's report for 1876, the reason for which was therein explained. I subsequently tried, but failed to get the same.

TABLE No. 8.—Shows the number of coal breakers and days operated, classes and total number of employees; also total number of days of labor wrought, total tons of coal produced, and average number of tons produced per employee, per miner; also for each colliery per day in 1876.

Name of Colliery.	Coal Breakers		Under Ground Workmen.					Surface Workmen.				Totals.		Coal produced in 1876.	Averages for each day's work.		
	Number of collieries.	Days worked	Number of miners	Number of laborers	Number of bosses and company men	Number of boys	Total number under ground	Number of mechanics	Number of bosses and company men	Number of boys	Total number on surface	Total number of employes	Total number of days of labor		Tons produced to each employe	Tons produced per miner	Tons produced per day per colliery
Moconaqua colliery	1																Idle.
Paxton colliery	1	175	40	40	4	13	97	2	7	57	66	163	28,525	34,500	211.65	862.50	197.14
S. C. company, No. 1, colliery	1	249¾	80	80	40	42	242	11	133	74	218	460	114,885	178,280	387.56	2,228.50	713.82
S. C. company, No. 2, colliery	1	232½	165	165	134	66	530	9	19	119	177	707	164,373	257,254	363.85	1,559.05	1,106.42
S. C. company, No. 3, colliery	1	243¾	103	70	42	47	262	14	109	98	221	483	117,489	147,836	307.32	1,435.30	607.76
Warrior Run colliery	1	147	47	32	10	15	104	9	15	39	63	167	24,549	56,150	336.28	1,194.68	381.97
Franklin colliery	1	164¼	43	43	24	22	132	18	77	47	142	274	35,004	94,633	345.37	1,200.76	576.18
Hillman colliery	1	172	30	30	5	12	77	2	9	11	22	99	17,028	41,000	414.14	1,366.66	238.37
Maltby colliery	1																Idle.
Hutchison colliery	1	220	76	76	19	19	190	3	25	42	70	260	77,200	90,000	810.81	1,381.61	409.09
East Boston colliery	1	188½	65	60	9	33	167	5	11	42	58	225	42,300	91,002	404.45	1,400.03	481.60
Waterman, Beaver & Co., No. 1, colliery	1	195¼	54	57	22	24	157	8	26	57	91	248	48,222	125,545	506.27	2,324.90	642.99
Waterman, Beaver & Co., No. 2, colliery	1	176	97	111	24	47	279	8	58	96	162	441	77,616	177,897	403.19	1,843.06	1,010.26
Chauncey colliery	1																no ret'ns
Boston colliery	1	174¾	60	60	27	28	175	9	36	47	92	267	46,656	102,700	384.61	1,711.66	587.69
Jersey colliery	1	12½							3		3	3	37	4,763	1,587.66		381.04
Avondale colliery	1	193.8	71	76	23	30	200	9	27	81	117	317	61,425	124,985	394.27	1,760.35	644.91
Enterprise colliery	1	175¼	57	100	71	25	253	8	28	48	84	337	59,059	76,478	227.82	1,254.00	436.43
Wyoming shaft colliery	1	126¼	82	105	36	44	267	8	31	126	165	432	54,540	128,441	297.31	1,563.89	1,015.34
Forty Fort colliery	1	183½	89	91	127	16	314	4	61	132	197	511	93,768	132,652	259.59	1,650.15	722.89
Hollenback colliery	1	178	15	36	6	8	65	5	12	13	30	95	16,910	34,857	366.91	2,323.80	195.82
Henry colliery	1	202½	60	.....	52	49	161	5	35	22	62	223	45,102	112,069	502.55	1,867.81	554.11
Midvale colliery	1	183¼	46	50	9	14	119	2	14	32	48	167	30,602	58,000	347.30	1,260.86	316.50
Mineral Spring colliery	1	160¾	55	55	26	22	158	9	30	46	85	243	39,060	75,076	308.95	1,365.01	467.03
Prospect colliery	1	92¾	54	60	12	16	142	4	15	35	54	196	18,130	24,555	150.79	454.72	265.45
Oakwood colliery			24				24	2	2		4	28					
Exeter colliery	1	201¼	104	104	52	51	311	4	65	69	138	449	90,361	155,000	345.21	1,442.30	770.18
Ellenwold colliery	1	96	39	37	10	9	95	5	13	50	68	163	15,648	50,000	306.74	1,282.05	306.74
Mill Creek colliery	1	167	85	80	25	66	259	9	46	73	128	387	64,428	123,253	320.97	1,450.03	738.04
Pine Ridge colliery	1	197½	76	76	45	46	243	4	35	46	85	328	64,780	120,432	367.17	1,584.63	609.78
Laurel Run colliery	1	143	70	70	37	32	209	4	26	54	84	293	41,899	88,694	302.70	1,267.05	620.23
Baltimore tunnel	1	175	72	72	47	44	235	5	40	48	93	328	41,650	92,051	280.64	1,278.48	526.00
Baltimore, No. 3, slope		14½	50	45	43	23	161	4	36	54	94	255	3,633	8,677	34.00	173.54	608.91
No. 1, D. & H., Plymouth, (*burned down)	.....	102	69	50	17	36	172	3	24	46	73	245	24,990	50,075	204.37	725.72	490.93
No. 2, D. & H., Plymouth	1	62¾	73	50	41	33	197	4	23	50	77	274	17,170	26,830	97.91	367.53	427.56
No. 3, D. & H., Plymouth	1																Idle.
No. 4, D. & H., Plymouth	1																Idle.

No. 5, D. & H., Plymouth	1	189½	65	58	16	43	182	5	27	63	95	277	52,491	117,762	424.91	112.76	621.11
No. 1, Wanamie	1	148	137	110	60	27	334	10	230	139	379	713	105,521	169,625	158.75	860.18	749.70
No. 2, Wanamie	1																Idle.
Espy	1																Idle.
N. J., No. 1, (*taken down)																	Idle.
N. J., No. 2	1																Idle.
Sugar Notch, No. 9	1																Idle.
Sugar Notch, No. 10	1	157¼	80	39	57	15	182	5	54	63	122	304	47,804	82,261	270.59	1,028.26	523.18
Hartford colliery	1	140	105	127	69	31	332	7	61	113	181	513	71,820	118,257	230.52	1,126.25	814.66
Empire breaker, No. 5	1																
Empire shaft, No. 4	1	168¾	133	142	92	94	461	2	64	151	217	678	113,673	205,502	303.10	1,545.12	1,221.40
Hollenback, No. 2	1	175	34	38	40	23	135	.....	41	64	105	240	42,000	69,448	289.36	2,042.58	396.84
Hollenback, No. 3		149	60	60	34	25	179					179	26,671	} 160,016	} 893.91	2,666.93	1,073.93
Diamond	1	149	88	90	48	51	277	14	60	47	121	398	59,302		} 402.05	1,818.36	1,073.93
Auden ried colliery	1	142½	100	100	61	75	336	10	39	73	122	458	64,265	70,510	153.95	705.10	494.80
Dodson colliery	1																
Lance colliery	1	148⅜	65	80	31	32	208	6	32	54	92	300	44,511	91,102	303.87	1,402.49	612.18
Gaylord colliery	1	180.2	95	45	51	33	224	6	37	67	110	334	60,186	132,460	396.55	1,394.31	735.07
Nottingham colliery	1	165.7	125	95	67	47	334	9	84	107	200	534	88,481	162,920	305.09	1,303.36	983.22
Washington colliery	1	150¾	68	27	30	34	159	9	39	67	115	274	46,304	75,053	276.10	1,111.03	501.84
Conyngham colliery			11	16	7	5	39	2	8	1	11	50					
Totals			3,208	2,999	1,702	1,467	9,376	231	1,897	2,763	4,941	14,317	2,310,151	4,273,506			
Averages															298.49	1,332.14	509.29

The eighth table gives the number of employees in their different classes almost as returned from the companies' officers, number of coal breakers, number of days operated, which gives very nearly the days worked by the men; the total number of days of labor performed in the district altogether, from which the general average days per person is found; also the total production of coal for the year 1876, after which the average number of tons is had to each employee; also to each miner for the year and to each colliery per day.

The following additional tables also accompanies the report. Table No. 9, giving the number of surface openings, shafts, slopes and drifts; also under ground slopes; also the dimensions of the shafts, length and vertical depth of slope, elevation of head and bottom of each mine where returns of such were made as per request in blank, above tide, and in a few instances where a mine is below tide, which is also shown in this table.

Also table No. 10 gives the mine machinery. This table shows the number of mine locomotives, hoisting engines and their dimensions and nominal horse-power, number of other engines and horse-power, number of bull or cornish pumping engines, number of steam pumps or direct acting pumping engines; also the number of other pumping engines, giving some details of dimensions, &c., relating to bull and steam pumping engines.

Table No. 11 gives the names and number of persons killed, name of mine, location, &c., and table No. 12 gives the names of persons injured, and description of the same, &c.

Casualties.

The total number of fatal accidents in the district during the year was 55, classified, in table No. 1, as follows: By explosion of carbureted hydrogen gas, 7; by falls of roof and sides, 23; in shaft, 1; by mine cars, 4; by blasting powder, 3; miscellaneous underground, 14; above ground, 3; total, 55. Widows, 31; orphans, 85.

Explosions of Carbureted Hydrogen Gas.

There were seven lives lost during the year under this head=12.72 per cent.

Accident No. 8.—A miner, named James Kates, working in Mineral Spring colliery, was burned so seriously by an explosion of gas, that he died of his injuries some weeks after the accident, the gas having accumulated in his working place while he and his laborer, who was also burned on face and hands, were working there.

Accident No. 10.—This accident occurred in Exeter shaft and was the most fatal case that we had in the district during the year, causing the loss of four lives. Thomas Harris, a fire boss, was in charge of the party at work, there being but a few persons in the colliery at the time, who were making repairs and improvements. The person whom it is supposed that ignited the gas was a driver boss named Alex. Jones, and was considered a very responsible and trustworthy man, as he had been in charge of the whole working party but a few days previous to this sad accident, while the other officers, including the fire boss (Harris), were attending court. The driver boss (Jones) was the only one burned in the whole party, the other three were killed by the concussion of the blast, which also injured several others slightly.

The mine being idle advantage was taken of the opportunity to make some improvements in the ventilation, and in part to carry out the requests of the inspector, by causing the air current to be separated into another or additional split. To do this the main current had to be broken, causing the accumulation of gas in the face of the workings.

The party was divided into two or three squads, but were all working on the main roads or airways, and each received orders not to leave the main road for any purpose unless so ordered. The squad in which Harris, Jones, Smalley and Allen were working was preparing to erect a new air crossing or bridge, and no person appeared to know for what purpose did Jones leave the others of his gang and wander off for several hundred feet into the workings from off the main road, where his corpse was found after the explosion. The county coroner, P. J. Pendergast, had the following named persons empanelled as a jury, who rendered a verdict exonerating the company officials from any blame or censure in the matter, signed by the coroner, P. J. Pendergast, H. L. Startwood, James A. Howell, William Helf, Matthew Dougher, John Beavan, A. Armstrong.

Accident No. 45.—Thomas R. Davis, a miner, working in the Nottingham colliery, was seriously burned by entering the face of an old working place contrary to orders, which occasionally had a small quantity of gas in it. His injuries from burning probably would not have proved fatal, had it not been for an attack of erysipelas, as well as improper treatment.

Accident No. 48.—Thomas R. Evans, a fire boss, employed in the Henry colliery, while in charge of a party of four or five men, forcing out a small quantity of gas from the face of a cross cut, near face of chamber, was seriously burned on his face and hands, as also were two of his comrades. The explosion was caused, it would appear, through the disobedience of a laborer, named Simeon Kelly, who had been properly cautioned and instructed against entering the return airway, where he subsequently ignited the gas. Kelly escaped uninjured. Evans' case was not considered dangerous, but erysipelas set in in the head, the effects of which, together with his burns, soon proved fatal.

Falls of Roof and Sides.

There were 23 lives lost by falls of roof and sides, which is equal to 41.82 per cent. of the whole list. The same item averaged for the last five years 32.18 per cent. There were 15 miners and 8 miners' laborers killed. The miners are generally held responsible for the safe timbering of their respective places, and are supposed to have acquired considerable knowledge, by their experience in other branches of mining, of a preparatory nature, to entitle them to such a charge. Unfortunately, however, for all concerned, there are large numbers acting in the capacity of miners who are illy prepared to assume such responsibilities, their inexperience resulting in many cases in their own death, or of those whom they employ.

Another feature which is still worse, is the fact that each person having charge of a working place generally hires an assistant or partner, whom is termed a laborer, who is required to do the most part of the unskilled labor required in their working place.

It is not supposed or required that a miners' laborer should know anything about the art of mining, but he depends for his safety and care upon the miner who employs him. In this way the person in charge of a working place is directly responsible for the lives of his laborers, as well as that of his own How important is it then that a miner should be qualified ere he is permitted to act in such a capacity.

Should we follow up this matter and were able to show what an important bearing this has upon the whole item of colliery accidents, in the various ramifications of the subject, the result would astonish many of our mine managers and owners.

It has already been stated that fifteen of those killed under this head were miners, and that eight were miners' laborers, the latter being about

thirty-four per cent. of the whole number killed in this class. This goes far to prove that those laborers need some further protection under the law.

The miner, in this case, is his own protector, and in cases where his is not so and any personal injury befalls him through the carelessness of his employers the law provides that a suit for damages may be brought against them. On the other hand if a laborer, hired by a miner, should be injured or killed while under his employ and immediate care no suit could be brought against the company, as they did not employ him and had no immediate control over him in the case. Again there is no provision in the law to bring a civil suit against a fellow workman, and if there was in most cases it would not avail them anything.

Of the accidents under this head there are two that invite our particular attention.

Accident No. 35. Michael Hagerty, a laborer, was instantly killed by a fall of roof, on the 6th of September last, while working loading coal in a chamber for a miner named Timothy Finerty in the Exeter shaft, West Pittston. After a careful examination into the cause of the death of Hagerty I had the miner Finerty arrested and was bound over to appear at court. This course I pursued because it appeared to me that the miner was to blame in the case. I came to this conclusion after examining the place in a day or so after the occurrence in company with the mine boss, fire boss, Finerty, the miner, and some others, also after questioning Finerty as well as the mine boss, while together, as also the miner working in the adjoining place. The facts are as follows :

Finerty was working a chamber about 20 feet wide. The seam of coal is about 8 or 9 feet thick and having a natural parting or lamination in the direction of the deposition near the centre of the seam. The upper part is about 4 feet in thickness and the lower part about 4 or 5 feet The top bench, or that portion above the parting, is blasted out as a mining, after which the lower bench is blown up, *i. e.* whenever that the top part is far enough in advance to give a blast in the lower bench the most favorable opportunity to do effective work. In this case Finerty had his mining bench worked considerable in advance of the lower bench, and had just driven a cross-cut through the pillar to his left hand neighbor. The day preceding the death of Hagerty the miner, Finerty, had discovered a large slip or break in the roof extending nearly across the chamber and running from within a few feet of the face backwards along the side of pillar. The material of the roof was bone and slate for about 20 inches thick below the rock top. Finerty left his work and went to search for the mining boss the day above mentioned to learn what to do with the bad and dangerous roof; after waiting a length of time at the shaft head, A. G. Mason, who has control outside and inside at said colliery, asked him (Finerty) why it was he wanted the mine boss so particular. Finerty stated that he had a piece of roof in his chamber that appeared dangerous and wished to know what to do with it. Mr. Mason told him that he should take it down or secure it without waiting to see the mine boss, as each miner had always had their instructions under similar circumstances to do so. Finerty did not see the mine boss this day. The next morning, about 7 A. M., Finerty by going to his work had to call at the fire boss' station to inquire if everything was all right, when he was informed by the fire boss that there was no gas found this morning in his place, but that his roof was very dangerous.

About eleven o'clock, A. M., the mine boss and a party of mining engineers were passing through Finerty's place, when the boss observed the dangerous appearance of a part of the roof. Finerty was then in the act of drilling a hole in the lower bench of coal, immediately under the bad

roof, and within about three feet of one of the props supporting the same. The break in the roof was, as before stated, in advance of the face of this lower bench, hence it had to be mined and taken away before timber support could be placed under the broken roof. The mine boss told Finerty to put an extra quantity of blasting powder in the hole when complete, to endeavor to strike out the prop, and thereby let down this dangerous roof; and if the blast did not accomplish the desired end to either take it down or make the same secure before doing any more work under the same. Finerty completed the hole and exploded the blast, but the prop was not disturbed. The blast, according to Finerty's statement, loosened about twenty tons of coal. He and the laborer held a consultation, and concluded it would be safe to load the loosened coal, &c. In less than an hour from the time that the mine boss gave the aforementioned directions the roof had fallen and killed the laborer, Hagerty. Finerty, while upon the stand, stated that the place was full of coal, and that he could not timber the bad roof until the coal was loaded up to make room for the same; and, in answer to a question, stated that he could not have taken it down safely by placing a blast into it by standing in the cross-cut near the rib. The mine boss testified that he agreed with Finerty about the timbering, that it could not have been done until the coal had been removed, but that in his judgment there was ample opportunity to blast it down with comparitive safety by standing in the mouth of the cross-cut, the side where the roof was most solid, where it rested upon the solid coal pillar, the slip or break being on the other side of the chamber.

Finerty himself, after directing the laborer to load the loosened coal, began to work in a cross-cut, a place perfectly safe from the dangerous roof under which the laborer was placed.

These facts were all set forth in the trial on the 26th day of December, before His Honor, Judge Harding.

The court in charging the jury took the grounds that there was as much blame upon the mine boss in this case as there was on the miner Finerty, inasmuch as he assented to the exploding of the blast for which Finerty was drilling a hole when the boss entered the chamber, as the said blast filled the place with loose coal, and thereby making it impossible for the miner to timber the place; and further, that instead of allowing the said blast to be exploded the drilling of the hole should have been suspended, and the dangerous roof timbered. The jury, as might have been expected, brought in a verdict of not guilty, and Finerty was acquitted.

It was, no doubt, fortunate for Finerty that this case was disposed of in this manner, yet in a general way it is unfortunate that such a decision should have been rendered.

In my humble opinion there were two very important points overlooked in this case by the court and jury, to wit: First, that the large quantity—20 tons—of material loosened, if it ever was, did not prevent Finerty from blasting down the dangerous roof by standing in the mouth of the cross-cut or upon the loosened coal near the solid rib, and that with a hundred times less danger than to load up the loosened coal. The danger in that case, however, would have been rather more to the miner than to the laborer. Secondly, *if the hole had not been completed, and consequently not exploded*, the necessary timbering could not have been done, as the bottom bench of coal in which the hole was placed must have been taken out to make room for more timber since the roof outside of the said bottom bench had been previously pretty well timbered, and the dangerous roof extended inwards five or six feet over the bottom coal; hence it was impossible *to timber*, as the court suggested, until the bottom bench was removed, *i. e.*

and to work the chamber forward, but it was practicable to have put a blast in the bad roof either before exploding the blast above referred to or afterwards, when the prop was not struck out by the blast as contemplated.

The secret of the whole trouble in this case, as it has been found in many others, was this: That the roof was not passable coal, and its falling upon a quantity of good coal gives extra labor of cleaning, and a probable loss of a portion of the same, and losing their turn of cars; in this way incurring the risk and danger of losing a life and limb sooner than lose a car or two of coal.

It was to endeavor to do something towards correcting this evil that this case was pressed; not so much to inflict a punishment upon Mr. Finerty for the death of a fellow-workman, nor yet to avenge the death of Hagerty, as it was to cause our miners in general, including Fi. rty, to consider their responsibilities in such cases and to exercise more care in this particular. In this way I intended the case to be in the interest of saving the lives and limbs of poor creatures in the future as well as to try and reduce the list of our fatal accidents under this head. In this anticipation I was at least partly foiled, yet I hope that many may take the lesson it was intended to convey.

Accident No. 39. James O'Connell, a miner, was instantly killed by a fall of rock while working on shares with his brother in a gangway in No. 5 colliery, D. and H. C. Co.'s mines, Plymouth.

It appeared that James was not in the face of the gangway at the time that the first part of the fall came down, which caught his brother Charles, but hearing the same he immediately jumped to his brother's rescue, and no sooner had he done so than a large mass of rock additional fell, crushing him to death instantly. His brother Charles' life, however, was spared, although very dangerously injured, his life being despaired of by his friends for many weeks.

This is one of the many cases on record in mining where one miner sacrifices his own life in the attempt to save that of his fellow workman. There is quite a contrast between this case and the one last mentioned, and it is hardly fair to suppose the difference is all to be attributed to the relationship exhisting; in the latter case it is more in accord with the characteristics of a brave and daring miner.

In Shafts.

There was but one life lost during the year, against fourteen lives lost last year. Last year this item was 22.22 per cent. of the whole number killed, and this year (1876) it was 1.82 per cent.

Accident No. 51.—Anthony Earley lost his life while working in the Oakwood shaft, Prospect colliery, about 8 o'clock P. M., Sunday, 31st day of December. He was attending to the water buckets to see that they would fill properly when lowered into the shaft bottom. He gave a signal to be hoisted, which was complied with by the engineer; but it appears that by some means unknown he fell out or off the hoisting bucket when a part way up, and dropped back probably four or five hundred feet. The shaft is altogether over seven hundred feet. There was nothing being done in the shaft at the time except hoisting water, hence there was no other person in the shaft, and it will always remain a mystery what caused the unfortunate man to fall, as he was well accustomed to riding in a shaft, having worked in the said shaft in various capacities for some time. The distance from which he fell was judged from the manner in which his clothing was found along the shaft at different parts.

By Mine Cars.

There were four lives lost by mine cars in various ways, against an average of eight for each of the preceding five years; one-half below the average of those years. The percentage of this number is 7.27 per cent. of the whole number killed during the year.

Of the four persons who lost their lives three of them were adults and one a youth of fourteen years.

It is not to be wondered at that the accidents from cars, in killed and injured, are so numerous when we consider the enormous amount of handling there is upon each and every car where the inclination of the seam is not enough for the coal to slide upon the floor from the face of the chamber to the gangway. The cars in such a case have got to be hauled from the main gangway up grades from one to ten, and in extreme cases as high as fourteen degrees to reach the faces of the chambers. After being loaded those cars are run down by a driver boy or car runner to the main gangway, requiring in most cases, if sprags are used, from one to four in each one; other places use friction brakes.

In many cases small boys are employed as drivers and as assistants, who handle most of those cars. The small door boys are employed to attend to the doors, but it is a difficult task to keep them to their post, as they will ramble around more or less, and when the cars come they rush to attend to their door, but very often are caught by the cars, in the attempt, before reaching the same. Thus happens many accidents of this class.

By Blasting Powder

There were three persons lost their lives by being burnt by explosion of blasting powder, against three lives lost during the four preceding years, an increase equal to twelve in four years, instead of three, as before mentioned. The percentage of this number equals 5.45 per cent. of the whole number killed. A similar increase is noticable in the list of injured as well.

To any person who travels around amongst the men who are using blasting powder, and witnesses the very careless, yes, even reckless, manner in which they handle the same, it is more a wonder that many more of them are not destroyed, than it is of the number of lives sacrifice at present—annually.

At least nine-tenths of the risks run by our men in using blasting powder are unnecessary.

There is one feature in connection with the powder question that deserves more than a passing notice. Some time ago some of our powder manufacturers thought well of introducing powder already prepared in paper cartridges, in quantities equivalent to the usual keg—about twenty-five pounds. The new system was introduced by agents traveling through the various collieries. The powder contained in those cartridges was claimed to be a more powerful explosive than the powder heretofore furnished them in kegs, which the agent would endeavor to demonstrate to the satisfaction of the miner. Besides this, that, having those cartridges already made, it saved the miner to purchase paper and soap, and saved him the time and trouble to make them; as the same amount of a superior quality of powder, and those cartridges would be given the miner for the same price as he formerly had to pay for the keg of powder.

But one of the strongest arguments used was this, that the new system would necessarily lessen the miners' risks from burning by handling the same, the powder in paper bags instead of wooden kegs. The powder thus placed is packed into paper bags called cartridges, about the same diameter as the ones usually used by our miners. These bags or cartridges are

about four or five feet long, and two or three of those doubled or folded in the centre are made equal in weight to the ordinary keg—twenty-five pounds—and packed into a rectangular or square box, sometimes fifty pounds are placed in each of those boxes.

When those boxes and cartridges were first introduced, the party furnishing the same gave a certain number of sheet iron cases or canisters free gratis to whosoever would use the new powder and cartridges. These canisters were calculated to hold three of those cartridges, doubled—equal to twenty-five pounds or the usual keg, and were intended to be strapped over the shoulders and carried upon the back. It has been customary for the men and boys to bring out the powder keg, sometimes for their own domestic use or to sell to some of the mine officers, or some person whom they had given this little perquisite to.

Those persons having this duty to attend to generally pay to the party bringing to them such kegs, a certain sum per keg, not always in cash, however, but in soap, cotton or miners' wick, oil or blasting paper, &c. Those kegs, afterwards, accumulating to a goodly number, would be sold back to the agent of the party furnishing the powder, in the first place, or some one else, making from ten to twenty cents of profit upon each keg, exclusive of what they can make upon the articles given as pay for the said keg to the miners.

When the wooden boxes were introduced this field of operations became still more profitable, as in many places they denied the miners those boxes altogether. The cartridges in such cases are tied up in a piece of blasting paper, and in this manner it has to be carried into the mine. At other places the miners themselves, to save the trouble of carrying a box into the mine and out again, would turn and sell the same to the parties purchasing, right at the powder house or magizine. In some instances not less than the equivalent of two kegs of powder, the contents of one of those boxes, when so arranged, will be given out by those, thus compelling a miner who needs but one keg of blasting powder to take out two. The miner, then, to save himself from loss, from dampness of the powder, has to secure another person to take one-half of the contents of the said box, leaving each the equivalent of one keg of powder. This division, of course, is made right at the powder house, after which the box is sold to the purchasing party.

These boxes bring to those parties, when selling again, from 30 to 40 cents each, depending whether they pay anything for them and how much, if any. Up to the present the powder has not been subjected to any material danger of explosion, but I make the above explanation to show where the abuses that I am about to point out have had their origin, &c.

The men and boys congregate at the head of the slope or shaft, as the case may be, at each colliery in the morning before descending in various sized groups, in some instances probably one hundred or more in one group. This gathering takes place between six and seven o'clock A. M., as they must wait to be lowered into the mine, with not over ten persons upon any car or carriage at one time.

A colliery producing about 500 tons of coal per day would require from 15 to 20 kegs of blasting powder per day, and one producing double the amount, double the quantity of powder would be required. This would indicate that it would require on an average from one and one-half to one and three-quarters of a pound of powder to each person descending each colliery per day, or over one-half a keg to each carriage load of ten persons, if taken down the same time as the men. This shows that there is an enormous amount of powder used and handled by the men in our mines,

and large quantities often accumulate at the head of the slopes and shafts, just as do the men in the mornings. Let us suppose a case: It is no doubt with miners and persons working in and about the mines, as with persons of other callings, that they are in the habit of using tobacco, and should one of those tied up, in paper, kegs of powder be penetrated by one of the miners' picks or drills, letting out the contents, in whole or in part, while situated near several others at the head of the mine, where there would be, in all probability, a large number of persons waiting an opportunity to descend, having their lamps and tobacco pipes—those that smoke—all lighted up and standing in a place where the air current is strong, driving sparks from their lamps in all directions; is it not likely that the said loose powder would be ignited, and should it do so would it not be very apt to explode each of the other paper bags with their contents, thereby injuring and perhaps killing a number of persons in proportion to the amount of powder exploded, together with the number of persons in close proximity to the same? Again a similar supposition might be made of a party descending a shaft, when such could occur as before described.

What a fearful result either of the cases above pictured might be, and unless more care is taken such may take place any time. The above is not only possible, but it is probable where these paper or even canvas bags are used to carry such large quantities of powder into our mines. In fact the above is not all drawn from imagination, I am sorry to say. It happened that some time during the last summer one of those bags did actually open, and its contents spilled upon the floor of the hoisting carriage, where there were a few persons, while descending the Pine Ridge shaft. Fortunately, however, the powder was not exploded.

On the 25th day of July accident No. 28 occurred in this same colliery, whereby John T. Moore, Jr., a son of the mine boss, aged thirteen years, lost his life by the explosion of one of those paper powder bags. Another boy, of about the same age, who was with young Moore at the time, was also very seriously burned, and his life was despaired of for a long time.

Mr. Moore, the mine boss, had made it a rule some time previous to this accident not to allow any person to ride in the same car with powder, even with wooden kegs, much less with these paper bags. But this day a miner's laborer, taking a keg of powder, in those paper bags, for his miner, pitched it into a car near the foot of the shaft, and afterwards went and got a T iron rail and placed it upon the last car in the trip of empty cars. In due time the trip was moved forward by the driver, and at some point on the road the two small boys before mentioned jumped into the car where this powder was in, and soon afterwards an explosion followed, resulting as above mentioned. This is the only fatal accident in this district that can be placed directly to those paper bags, and this was independent of any danger in their using, being simply in their transportation from the magazine at the head of the mine into the working place of the miner.

I see by the papers that similar accidents have occurred from those contrivances in other districts where they are being used. Nor is the danger ended here judging from observations made on my inspection of the different mines, where I see those temporary boxes when taken in lying wide open, the top having been broken by taking it off, the cartridges scattered promiscuously around, some in the box, others upon top. In my opinion the risk run by using those cartridges, as at present, does not lessen our dangers, but has a tendency to increase the same materially.

I call attention to this matter early before we may be required to record some one of those fearful catastrophies, which I have pointed out, that are possible to occur at any time under our present system of handling powder.

I have protested against the use of those paper or canvas bags, and endorse nothing as their substitute, unless it be wooden kegs or boxes, sheet iron or tin cans or canisters. The said protest I sent to the officers of the companies in whose works I found those nuisances being used. Messrs. A. H. Vandling and Christ. Scharar, officers of the D. and H. Coal Company, have cheerfully complied and are carrying out my request, having issued orders to that effect to their subordinate officers.

I have seen as high as two and three of those paper powder bags, equal to fifty or seventy-five pounds of blasting powder, lying together on the bottom of a slope, thrown across each other as if they were bags of potatoes, and that where there were a number of small boys, door attendants, and others half grown.

What a contrast this manner of using and handling of powder in this country is to that of England, where it is against the mining law to allow any person to take any more than some five or six pounds at any one time, or to be in his working place. It is true that our requirements being so much more we must handle larger quantities; yet it shows that in England, where a much less quantity is required to be used and handled, they saw the need of stringent laws upon handling of the same.

Accident No. 33. Thomas Coleman, a miner working in the Hillman colliery, was so seriously burned by explosion of a keg of blasting powder that he died of his injuries in a few days at the City hospital. The powder was ignited from a spark dropping from his lamp into the open end of the keg.

Accident No. 34. David O. Owens, a miner working in the Nottingham colliery, lost his life by explosion of blasting powder while handling of it in a careless manner, a spark from his lamp igniting and exploding nearly a keg of the same.

In those two cases the powder was ignited and exploded while being handled—preparing it into cartridges, &c. Nevertheless it is true that with proper care it should not and never would have exploded in the manner aforesaid, unless by the most reckless mode of handling and exposing of the same.

The miners generally have a rectangular box for each party, made of inch hemlock or pine boards, varying in length from two and a half to three and a half feet, and about eighteen inches wide by eighteen or twenty inches in depth. In these boxes the miners keep their supplies, such as oil, wick, blasting paper, soap and powder, &c.

The box is usually located pretty convenient to the face of the working place, as they must often visit it. Yet it must be protected from the flying coals from their blasts, hence they are generally placed in the inside cross-cut—*i. e.* the place where the air-current passes nearest to the faces through the pillar, between the two working places. If in a gangway, the box is also either placed in a cross-cut or in some recess in the side or rib, in either case it is very often placed where there is a strong current of air passing, depending somewhat upon the sectional area of the place, as well as the quantity of air passing.

The miners in our anthracite coal mines use oil lamps for light, which are hooked upon a piece of leather fastened on the front part of their hats. And, strange to say, it is a very common thing to see a miner—a man of mature years, perhaps having spent the most of his years in under-ground work—having his lamp lighted and fastened upon his head, and with cartridge in one hand, with end open, and pouring powder into his cartridge from a keg, from the bung-hole of the keg. In other cases, and perhaps the majority of them, the one end of the keg is broken in and thrown away, thus letting the whole face of the keg open, which is temporarily covered

by a sheet or two of blasting paper. The miner who opens his keg thus, takes the paper off and uses a small tin can or cup, or his hand to fill his cartridge with powder. Thus the powder in the cartridge and in the broken keg must necessarily be exposed during this length of time, this is the critical time and point which most of our men suffer from If the miner has his lamp upon his head, and the usual cinders upon the wick, which are continually being blown around by the air-current and exploding like small torpedoes, or if he places his lamp upon the side, in close proximity to the box, to enable him to see his work of making and filling the cartridge, and especially if placed in the direction from which the wind blows towards the powder; then, I ask, is it any wonder that we have so many killed and injured thereby. Besides this the powder is spilled in and around the box, and for a short time is liable to be ignited by a spark from anywhere and explode the whole of the powder in the box. The miner and his laborer must needs open their box very often during each day's work, and frequently they use it as a seat or place of rest; during either of those visits they are liable to be blown up by this loose powder igniting and exploding the balance in kegs or otherwise.

In fact many accidents have occurred from powder exploding from sparks from lamps of parties while sitting upon and around those boxes.

Miscellaneous Under Ground.

During the year there were fourteen lives lost under this head, equal to 25.44 per cent. of the whole number of lives lost during the year.

In the sub-division of this head, the one item of by blasts in coal and rock, produced ten out of the fourteen, equal to 71.43 per cent. of those under the head of the miscellaneous, and equal to 18.18 per cent. of the total number of lives lost during the year. Besides this, fourteen person were seriously injured by the same cause.

As can be seen from the tables accompanying this report, one life was lost by blast in 1872, four in 1873, four in 1874, eight in 1875, and ten in 1876, equal to 10.34 per cent. of the total number of lives lost during the five years.

Thus it will be obvious to any one that our accidents have increased, under this head, to nearly double the average of the last five years.

Why this steady increase takes place I know not, nor can I think of but two ways how to account for it. First, our mines are getting deeper, and the working places are evolving greater quantities of explosive gas, consequently these feeders or jets may be the cause of some of this increase. Secondly, there are various kinds of contrivances introduced to explode the blasts, called "safety squibs." Their names would indicate that their patentees lay claim to their being an improvement on our old mode of exploding—by straw or paper squibs—in regard to safety. In my opinion the case is rather to the reverse of this, as I think they have a tendency to increase rather than decrease our accidents by their use.

My reason for pointing out these items is this: that we may endeavor to find out the cause of so great an increase in our fatalities, and if within our power to prevent the same.

The increase of gas, I am confident, has a tendency to increase the danger from explosions of blasts materially; yet this cannot be the only cause of the great increase of the said item.

The question of those patent squibs is not quite so clear to my mind, although a number of accidents have occurred where they were being used. I am inclined, however, to attribute a part of this increase, from explosions of blasts, to their use. In conversing with the miners who are, or who have been,

using them, I meet very many who discountenance their use altogether, others again speak doubtful of their safety. The mine bosses in most instances are aversed to their use, as they do not consider them as safe as the ordinary straws or squibs of the miners' own preparing.

The majority of those casualties occur when the miner is just on his return to, or has reached the spot where the hole is located, for the purpose of re-touching—supposing the first match to have quenched or straw to have missed fire. A few, however, occur while retreating, after igniting the match, attempting to reach a place of safety, caused sometimes by too short a match, or probably inclined too much, and other times by their falling on the road, the blast exploding ere they reach their contemplated place of refuge.

Again, it may happen that a small gas jet or feeder issues from the hole through the straw, or it may be that some careless or thoughtless person has cut the both ends of the straw, thereby exposing the powder to the flame immediately. A few, also, have been killed by the very foolhardy operation of ramming into a hole, not large enough or not quite circular, a cartridge of powder with the butt or tamping end of the drill, sometimes two men have undertook to force the cartridge in, in this manner.

I have hesitated a good while, rather than speak hastily against those patent squibs, knowing them to be a convenient article for the miner, and further, that they were introduced and manufactured by individual enterprise at great cost and risk. I have came to the conclusion, however, that it is my duty to call attention to what appears to me, at least, an additional source of danger. In this opinion I am sustained by some of our most experienced miners and ablest mining bosses. It may be well that I should point out some of the objections raised by miners against those squibs.

First, they are somewhat longer than the usual straw used by miners—that, could be remedied by making it shorter, by the miner or any one else.

Next, the match is attached to one or two kinds of them, made from the same paper as the squib, *i. e.*, they are one and the same piece of paper.

The match is greased, or is prepared according to the kind of match desired. The one kind is intended to burn up into a flame, while the other is much like the miners' touch paper, that does not cause a flame, it merely burns in what the miners call a dead fire.

Those matches in being made are twisted from the powder outwards, or the reverse, for about two inches or more. It is stated the powder extends sometimes out into the twisted match, thus deceiving the person igniting the same, in the actual length of time required, before it explodes the blast after being ignited.

In this case the miner is liable to be caught before he reaches his place of safety.

The same is said of the match made to be used in gas, when the same burns without showing any flame, they burn more rapid in some cases than in others, thus disappointing the men in their time. Also that they burn so dimly that it is impossible to see, whether they are quenched or not, unless very close to them.

The most of those squids are being used in blasting barrels in this district, and it is generally the case that the barrel becomes bent by using into every shape. It is afterwards straightened, yet the short bends or kinks are hard to get out, and sometimes it is bent by tamping to some extent, so that if a straw or squib of much length is sent in it becomes fast or ties between those short bends.

It is questionable also with me whether or not that those patent squibs are more apt to hang fire, *i. e.* should the powder in them explode, than

the paper or straw squibs, and thus ignite some grain of powder that had been left unexploded from dampness or other cause, and thereby explode the blast. One thing is certain, and that is this: that with a proper means to explode those blasts the lives of many valuable men might have been saved; and unless some improvement is had in this direction this needless loss of life will continue. Had we a proper system of exploding the blasts in coal and rock, and not to attempt to pick out the tamping from holes that have missed fire, especially in rock, then at least nine-tenths of these accidents would not occur. It appears to me that some arrangement could be used similar to the voltaic battery, as used at many of our rock tunnel driving and shaft sinking. In this way each miner before exploding his blast would necessarily have reached a place of safety before getting to the exploding apparatus, and no danger could exist from the blast hanging fire and exploding when being approached by the miner as in our present system.

In some of our fiery mines the blasting has been done by using safety fuse, and is being used at present where the gas is very strong, the expense of which is borne by the company. In a few rare cases the battery has been applied. To the use of the fuse the matter of additional expense is quite an argument, when the very important part of its being liable, like a paper or patent squib, to hang fire and explode almost at any length of time after the proper time, is also against their adoption. This uncertainty of the fuse exploding the blast, or length of time required to do so, is caused, as our miners well know, from defects in the construction of the same, or it may have occurred from the place where they are kept, caused probably from unequal exposure. Other times difficulty is found from unequal pressure from tamping or stemming.

The matter of additional expense to explode blasts is still a more formidable argument to the use of the battery; as its first cost is great, as well as the continual expense of exploders and wire, or conductors that would require renewing frequently. Yet it is the question of almost perfect safety of life and limb against the matter of dollars and cents, in relation to the present system of exploding blasts in coal and rock, and one recommended costing more dollars and cents but less lives and limbs.

The objection on account of the expense is liable to be greatly modified, if not altogether removed, by having improved arrangements, specially adapted to such work. The great number required would also enable them to be manufactured much cheaper than at present when their sales are so limited. Should this matter be treated in a point of view relating to expense, how can we tell or make any estimate of what our present system does cost to explode blasts.

We have our own home-made paper squibs, straws and matches, which cost so much which is seldom if ever calculated, although the actual cost of this item may be easily had. Next comes the time required to explode the number of blasts required by a party of two—miner and his laborer—for a certain length of time, say a month, of twenty-five working days, or three hundred days per year.

First, we must estimate the number of blasts required by such a party working in a wide place or chamber, in a seam of coal about 7 feet thick. In such a case it would require about six charges per day, equal to $25 \times 6 = 150$ charges per month, or $= 1,800$ per year.

If it should require five minutes to explode each blast this would equal for one party $5 \times 6 = 30$ minutes $=$ one-half hour per day for two persons, and for one month equal to 25 half hours for each, or 25 hours for one person, equal to two and one-half days labor for one person, of ten hours per day—but really nearer three days, working time.

In a year the time would be equal to $2.5 \times 12 = 30$ days labor in this one item.

In the above we have calculated but the one item of time required to explode the blasts, when every thing is favorable, and no allowance is made for blasts missing fire, which they often do to the extent of a dozen times if the hole be a dry one, if not the charge is lost by getting wet, perhaps immediately after the first or second effort to explode it. This is the point in which the greatest amount of time is lost and danger incurred. The blast does not explode, the miner's laborer has a car partially loaded, and the miner has not sufficient coal loose to enable the laborer to complete the load. The miner by this time begins to be alarmed about the charge of powder that is likely to be lost, and the time that will be required to pick out the tamping, make another cartridge, reload and explode. Besides this he is liable to lose his trip of cars, as the driver or runner may come any moment to run out and exchange his car if loaded. These and kindred thoughts hurry the, by this time, impatient miner to rush into his place, sometimes no doubt unwisely, not giving really the usual time for the blast, and especially so after a blast has missed fire several times. Again, it is impossible to say how long a time it will require for any of those paper or wick matches to burn a certain length, as it depends upon the manner of their oiling, the quantity and quality used, their length and the inclination of the same Another thing that effects the time of their burning as much if not more than anything else is the condition of the air, and if a current should strike or move the flame, then it is important to know whether it increases or decreases its time of burning. Many a time the strong air-current fans the flame rapidly to the straw or squib. The discharge of carbureted hydrogen gas also effects the present system of exploding blasts. It issues to such a great extent from some holes in our mines that hours have been required to explode a single blast, the force of the gas being too much to allow the straw or squib to penetrate the charge through the needle hole or blasting barrel. In some instances the powder, when in small grains, has been forced out of the cartridges, and frequently out of the squib. Other times the straw being fastened, the gas ignites from the match near the mouth of the hole, and keeps burning away, the blaze of which can be plainly seen a long distance.

The miner finally gets impatient and he ventures on towards the blast, with something in his hand to try and extinguish the flame or feeder and at the same time he knows not what instant the same may explode and in all probability be the cause of his instant death ; yet he must do something or the gas may burn for any length of time, and it must be put out for fear of other consequences.

The reason that the gas does not burn the straw or squib is this : the gas is forced out of the hole through the small straw and has considerable pressure, hence it is forced a short distance beyond the end of the straw or squib with a constant force or pressure, nearly. The gas as it leaves the hole is not explosive, but becomes so by a certain mixture of atmospheric air, which it receives ere it is consumed outside the straw.

The flame, in the manner above described, in many cases is not in contact with the straw at all, while in many other cases the straw or squib is ignited by the gas-feeder or flame therefrom ; the reason of which that in that case the quantity and pressure is less and the mixture required to cause it to be explosive is reached quicker ; hence the pure gas—which is not explosive—is not forced so far outside the straw, therefore the flame ignites the straw or paper and from that the powder explodes.

These gas-feeders have, in many cases, been extinguished, and the straw appearing unscorched and perfectly cool when taken out and examined.

In addition to the above long list of items then comes the loss of time caused by accidents occurring under this head. Whenever there is a serious accident, or a fatal case, the colliery is stopped for the day, and very often until the day after the funeral, causing the loss of from one to three days per accident to the miner and his laborer. This ought also to be added to the expense of our present system of exploding blasts.

In the above we have only reckoned the matter of dollars and cents to the miner and his laborer, which is impossible to get exactly, on account of the time required to pick out the tamping and re-touch after re-loading of the charge; also the expense of the powder lost and the value of the time lost in these various operations.

Next comes the loss of *human lives* and loss of limbs. Many of those injured must be cripples for life, and therefore are objects of public charity generally. But the matter of loss of lives is not to be calculated by dollars and cents. In order to do what we can to save the lives and limbs of these poor and unfortunate beings any system should be adopted that promises an improvement over the present. I dwell more upon this item than on any other in the whole list of accidents, the reason for which is this: I see that it is one of the heaviest items on the list, falls of roof and sides being the highest and blasts the second highest. In the second place I think that an improvement could and should be made in this department resulting in the saving of many lives that would otherwise be lost.

In the total number of lives lost in England for 1874, amounting to 1,056, thirty were attributed to blasts in various ways, equal to 2.84 per cent. of the whole number, while ours in this district for 1876 equals 18.18 per cent., nearly six times the percentage of the former. This is due no doubt from the excess of powder used in this district over what they require to use in mining the bituminous coals.

The other four deaths classed under this head occurred as follows: One by falling under a locomotive engine in the mines; one by being drowned in bottom of new shaft by falling under platform which was covered by several feet of water; one by being crushed by hoisting carriage in carriage pit at foot of shaft; a boy 12 years of age looking for employment, and one died from wounds received by being kicked by a mule.

On Surface.

There were three lives lost under the above head. One by car on culm bank, one by railroad cars under coal breaker, one by falling into pony rollers in breaker, by carelessnes, on his own part; his age being but about ten years, he probably did not comprehend the great danger incurred when disobeying the advice of men and boys around him.

Improvements.

There has been but a very limited amount of work done in this district under the above head during the year just ended. Indeed, much less than in any year since 1870.

Shaft Sinking.

The Ellenwood coal company has completing one of their shafts to the coal, but a connection to the second shaft, which is intended as their second opening, is not yet effected.

The Maltby circular shaft, begun in 1872, has not yet been completed. The time of my last visit, during the summer, the cast iron tubing had

been lowered to a depth of about one hundred and forty feet, and the superintendent stated that they had about fourteen feet more to go before striking the solid rock. Subsequently I have been informed that the whole operation has been suspended for some time.

Second Opening.—The following shafts at present have no lawful second opening: Nos. 1 and 2, Susquehanna coal company, at East Nanticoke; Conyngham shaft, Delaware and Hudson coal company, near Wilkesbarre; Ellenwood shaft, Ellenwood coal company, near Kingston. The respective parties are driving for the second opening in each case, except the latter; operations in the same having been suspended since 1875.

Mines on Fire.

The Empire mine fire is not extinguished altogether yet. Although it causes but very little inconvenience or expense as at present. Whatever amount of fire that there is in the said old mines is located very near the crop of the seam. The same being above water level is hard to overcome in any manner, as the periphery of so large an area is almost impossible to be made perfectly air tight; hence a certain amount of fresh fuel is added to the fire, no doubt continually. The inclosed space having been opened at the lower level several times, the carbonic acid gas has been drained from the higher point, and to get another fresh supply sufficient to fill the whole space, the same being manufactured by the slow process of the consumption of oxygen by the present fire is almost out of the question.

The Baltimore Old Mine Fire.—This old mine is still burning. It is confined to the boundaries, as described in my last report, and requires but a few persons to attend to the same.

Prospect Shaft Fire.—The Prospect shaft colliery was again visited by the ravages of a fire during the year of a very severe character.

On the — day of January, at about 8 P. M., a blast was fired in the face of the north-west gangway, from which the gas ignited around the face. The men began to combat the fire, but by some mishap one of the water connections would not work, hence they could not employ their hose and force of water upon which they depended. Before they got the same changed and in order to work, requiring perhaps three-quarters of an hour, the fire had gained such headway that they were unable to cope with it. The fire had crept back opposite them through the airway or return, they being in the intake. In the combat the boss, Samuels and two of his men were more or less burned on their faces and hands, but not seriously, but before twelve o'clock midnight they were all compelled to abandon their efforts and retreat to the surface, after which the water from the reservoir was turned in to flood the mine. They had a two and a-half inch gas pipe from the shaft's foot to the face of the gangway, connected immediately with the reservoir on the surface, thus having a head of six hundred (600) feet. This appliance had been kept in readiness and often successfully employed since the great fire of 1874. The operation of flooding the mine by letting in the water from the large reservoir near the shaft's head, and pumping from the river and canal, sufficient to prevent the admittance of atmospheric air, took several days. After that the water had reached a height of about one hundred (100) feet, or sixty (60) feet above the highest point excavated in the workings—pumping water into the shaft was discontinued. Having given ample time for cooling the strata, the hoisting of water from the mine was now commenced Some of the chambers on the pitch had been worked up quite a ways, having reached perhaps, in some cases, as high as forty feet vertical above the shaft gangway.

On the seventh of March they had reached or got the water out to within about forty (40) feet of the shaft's bottom.

At this time they noticed that the gas was escaping very fast, judging from its noise in the shaft, and in consequence orders were immediately given by the boss in charge, Mr. Wm. Patten, not to let any naked lamp or fire be brought near the shaft head. About nine o'clock P. M. Jacob Glotz was on duty as headman, with nothing to do but to see that no person violated the orders above mentioned, and that nothing might go wrong unnoticed with the water tanks, as they were provided with a trip so that they emptied their contents automatically. The night watchman, Charles Nolan, came along with his lantern upon his arm, and Glotz, the headman, stated that he hailed the watchman, and told him to stand away with his lantern. Just at the time a tank or bucket of water was being landed, and at once the gas was ignited from the watchman's lantern. An explosion followed, from which both the men were severely burned on their faces and hands, and were violently thrown in different directions.

This was the first scene in this surface panorama, and was considered by eye-witnesses as one of the most terrible yet grandest spectacles ever witnessed at the head of coal pit or shaft, at least in this country. The explosions followed each other at intervals of about fifteen minutes, decreasing in force to some extent each time. Thus it continued until between twelve and one o'clock that night. The gas that was escaping in such fearful volumes from its pent-up reservoir in the mine, no doubt, ascended the shaft in a solid stream in the upward current formed by the water tank's fast motion, which must have been moving at the rate of about fifteen feet per second. The water having been high enough in the shaft to prevent a circulation of air through the mine since a few days after the fire took place, and increasing in its pressure or head continually until it reached the highest point, the escape of gas during this time must have been very limited. When the water had filled twenty-five feet at the shaft-foot all circulation must have been suspended. The highest point reached in the interior of the mine would be about forty (40) feet vertical. This would indicate that the difference between the highest point in the excavated mine and the level of the water when the admittance of atmospheric air was cut off, consisting of fifteen feet vertical, covering an extensive area, must have been a cavity full of gas and air. This cavity would act in this case much like an air chamber attached to a pump, an elastic or spring; besides this, it would be a receptacle for the gas that could penetrate it. The pressure in the aforementioned space must have been increasing from two causes: First, the continued increase of pressure in the strata, which must have been considerable, as the one side of the mine, where the explosion occurred, generated about two thousand (2,000) cubic feet of pure carbureted hydrogen gas under the ordinary atmospheric pressure. The other parts of the mine altogether must have given about the same quantity. What amount of this discharge would be retarded from the increase in pressure from the head of water is hard to tell. Secondly, the pressure upon and consequently the density of the contents of the same must have been affected materially from the increase in the head of water in the shaft. In fact the density of the contents of said aeriform cavity or dry part of the mine must have been sufficient to withstand the pressure from the head of water above it in the shaft at the time.

It was stated by the officers of the mine that so strong was the force of the pent up gas that when there was sixty feet of water in the shaft the timber, that had fell into the shaft from the head frame and otherwise, of large dimensions were kept up from the surface of the water two or three feet by the force of the gas. The head frame, generally called head house, was of wood, but had not a board or plank upon it, yet it was ignited from

the flame of the first great gas explosion, the sparks from which either fell and touched off a fresh supply of gas down near the surface of the water, or else the gas was escaping so fast from below that it ascended to the head and ignited from the burning timber, causing the balance of the intermittent explosions. Those volcanic eruptions, as it were, could be seen for many miles of the surrounding country, and the concussions were felt by several parties in Pittston, a distance of some seven miles easterly; to the west they were not so far heard or felt.

After many months of anxious and hazardous working the mine was again got into working order.

The new Gubal fan, 30 feet diameter, was started, and has been kept running since work was resumed.

I would state that the fan above mentioned was ready the time of the fire, all except about one or two days' work to make the necessary connections, which was to have been completed during the week the mine took fire.

It will be remembered that there was a fan of the same pattern, 20 feet diameter, there since the opening of the mine, and the new fan is erected at the Oakwood shaft or second opening to the Prospect shaft.

Since work was resumed they have put in a second water pipe, to the face of the north-west gangway, of the same dimensions as the other one aforementioned, with connections to either of the two shafts; and even with all the above facilities to fight the fire they have had several hard struggles since.

The officers have made some very important improvements in the ventilation by cutting a new return, with its accompanying intake, which enables them to employ additional splits of the main current. In fact this and many others of our mines cannot be worked unless they have the main current divided into many separate currents or splits, at the same time each must have a strong force, as well as large quantity, to prevent them from being too weak to penetrate the corners and places in advance, and not be overcharged with explosive gas. On my visit to this mine in December last, in company with the visiting inspectors from four of the other districts of the anthracite coal fields of this State, I found it in what I called first class condition, considering what difficulties they had to contend against. The officers are Frederick Mercur, superintendent; Wm. Patton, outside foreman, and Wm. Samuel, mine boss.

I would here state that we also visited the Wyoming colliery the same day, and must also state that we found this colliery in most excellent condition in every particular. This mine generates explosive gas at about the same rate as Prospect colliery, in some of its parts, requiring from 20,000 to 25,000 to enable them to drive a gangway and its accompanying airway, and then not be able to carry a naked lamp near the face, when brattice, in advance of the cross-cut, would be within 8 or 10 feet of the solid face. There is over 100,000 cubic feet of air circulated in this mine per minute, being divided into four separate splits. The officers are J. H. Swoyer, general manager; Charles H. Leonard, general superintendent; William M'Culloch, general mining superintendent; Philip Wintersteen, outside foreman, and Jenkin B. Jones, mining boss.

Steam-boiler Inspection.

Although fortunately we did not lose any lives by explosions of steam-boilers during the year, yet the remarks made in my last report is just as applicable in the present, still they need not be repeated, but wish to call attention to the subject, as I am fully convinced that something should be done in the premises similar to what was recommended in the report of 1875.

INSPECTORS' REPORT.

During the last several years successively the annual reports of the Pennsylvania Inspectors of Mines have been made the subject of unfavorable criticisms, and a great deal of ridicule, from some of our scientific journals and other sources. Those criticisms have been more particularly upon the document as an official State report purporting to contain original contributions upon scientific subjects, also extracts quoted from various works in the shape of compilation. The said conglomeration is generally placed in the front part of the said reports and is accredited to the clerk of the mining district of Pottsville. The reports, or work of the inspectors themselves, have not been quite so mercilessly treated. I do not here intend to defend our mutilated and much abused reports so much as to explain some few points relating thereto. In my opinion our reports would receive as hard blows from able critics for not having in them what they ought to contain as they possibly can receive for what little there is in them, if not more so.

In relation to the matter of clerkship it is generally supposed by the public that the officer called "Clerk of the mining district," &c., is really an assistant to the inspectors to attend to their writings, &c. I would like to correct this wrong impression. The said clerks are not required by the law creating the said office to do any such a thing, as will be seen by reading the same, which I insert to prove my statement. It is true that the clerk of the Schuylkill district has been doing considerable work for some of the first inspectors appointed in the said district by a mutual understanding amongst themselves. The first clerk in this, the Luzerne and Carbon counties, or Wilkesbarre district, during his term of five years lived strictly up to the letter of the law. The present clerk is walking in the track of his predecessor in this regard. He has been in office since 1875. Mr. Chase resides in the city of Scranton and runs the paper called "Daily Times." He keeps a clerk to attend to the work of the "mining clerk"—keeping an office open, &c., in this city. The law requires the clerk to keep an office open, but really nothing else. This is equivalent to doing nothing, and so far as our clerks are concerned they have done so admirably for the last six and a-half years, with prospects of several more years of the same fatiguing task.

Many persons suppose that those "mining clerks," or as generally called the "inspectors' clerks," are officiating under the ventilation law of 1870, or a supplement thereto. It was passed and signed just one month and two days later than the ventilation law, as can be seen by the date attached thereto. This, together with its title, is sufficient proof that it is neither a part of nor supplement to the mining law aforementioned. The law creating the said clerkship was enacted for the express purpose of creating an office for a person that was about being legislated out of office by the mining law of 1870, which superceded the law of 1869.

In the inspectors' reports for 1875 I observed that a copy purporting to be the mining law of 1870 had been inserted, but on examination, to my great surprise, I found some of the most glaring errors included in said document. The said document is inserted immediately preceding the reports of the inspectors and following the name of the clerk of the district of Schuylkill, hence it is to be inferred that it was a part of his report.

The first item of importance that I wish to call attention to, is the insertion of the following words in section ten (10), page seventy-six (76): "shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not less than ten dollars nor more than one hundred, and no owner or agent shall employ any boy knowing that he has not attained

to twelve years of age." In section twelve the following clause is sandwiched in in a similar manner, "or his deputy." But the climax is reached in the insertion of the "Live Stock Amendment," between sections nineteen and twenty.

The aforementioned live stock amendment, during the passage of the law in 1870, was offered by Senator Brodhead, from Carbon county, but never passed, hence it should not have been quoted as part of said law. The placing of said words between the sections before mentioned appears as if it was designedly done to deceive the unwary.

The above quotations are only a few of the most extraordinary changes or errors appearing, as the whole of it is mutilated more or less. There are any number of omissions of one, two or three words, and nearly as many substitutions. The three parts quoted from in sections ten, twelve and nineteen and twenty are left out, but the other corrections can be seen by noticing those parts in italics.

I fail to see what object there could have been in view in inserting the law in this mutilated condition, it was very wrong to say the least, as it is calculated to mislead persons seeking reliable information relating to the same, and thus add to our reports more cause of sarcasm and unfavorable criticisms. Persons having those reports will naturally say and think, that they have the mining law of 1870 correct, as it has been published by the inspectors in their annual reports, and are subject to be deceived in this ridiculous manner.

I insert a copy of the law creating the *useless* office of "mining clerks," also the mining law of 1870, as published in the pamphlet laws. I say useless office of mining clerks, &c., because the Commonwealth has not had or received one penny's worth of value or service for all the money paid towards the maintainance of the said office since its creation in 1870. The insertion of these laws here will enable any person to examine those matters for themselves.

VENTILATION LAW OF 1870.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same,* That the owner or agent of every anthracite coal mine or colliery shall make, or cause to be made, an accurate map or plan of the workings of such coal mine or colliery on a scale of one hundred feet to the inch, and when there is more than one seam of coal worked in said coal mine or colliery the map or plan shall exhibit the workings in each seam of coal, and shall state the general inclination of the strata with any material deflection therein in said workings, and the boundary lines of the lands of said coal mines or colliery, a true copy of which map or plan the said owner or agent shall deposit with the inspector of coal mines and collieries for the district in which the coal mine or colliery is situated, within four months from the passage of this act, and one copy shall be kept at the office at each colliery; and the said owner or agent shall furnish to the inspector aforesaid, on the first day of January and July in every year hereafter, a statement or map or plan of the progress of the workings of such coal mine or colliery during the year past up to date, to enable the inspector to mark the same upon the map or plan of the coal mine or colliery furnished him and deposited with said inspector as hereinbefore provided for; and when any coal mine or colliery is worked out preparatory to being abandoned, when any level or *lift* thereof is being finished with a view and

for the purpose of being abandoned, or when any of the pillars therein are to be removed, the owner or agent of such coal mine or colliery shall have the map or plan thereof furnished as hereinbefore provided, or such portions thereof as the case may require, carefully verified; and notice shall be given to the inspector of the coal mines and collieries for the district, in writing, of the purpose to abandon or remove the pillars, as the case may be.

SECTION 2. That whenever the owner or agent of any coal mine or colliery shall neglect or refuse or from any cause fail for the period of two months to furnish to the inspector the map or plan of or the addition thereto provided for in the first section of this act, or if the inspector finds or has reason to believe that any plan or map of any coal mine or colliery furnished him under the provisions of this act is materially inaccurate or imperfect, he is hereby authorized to cause an accurate map or plan of the actual workings of such coal mine or colliery to be made at the expense of the owner thereof, the cost of which shall be recoverable by law as other debts are from said owner.

SECTION 3. That four months from and after the passage of this act it shall not be lawful for the owner or agent of any anthracite coal mine or colliery worked by or through a shaft or slope to employ any person in working within such coal mine or colliery, or to permit any person to be in such coal mine or colliery for the purpose of working therein, unless they are in communication with every seam or stratum of coal worked in such coal mine or colliery, for the time being at work at least two shafts or slopes or outlets separated by natural strata of not less than one hundred and fifty feet in breadth, by which shafts, slopes or outlets distinct means of ingress and egress are always available for the person employed in the coal mine or colliery; but it shall not be necessary for the two shafts, slopes or outlets to belong to the same coal mine or colliery if the persons therein employed have ready and available means of ingress and egress by not less than two shafts, slopes or outlets, one or more of which may belong to another coal mine or colliery: *Provided*, That a second opening can be had through coal, but that if any tunnel or shaft will be required *for the additional opening* work upon the same to commence immediately after the passage of this act, and continue until its final completion, with not less than three shifts in each twenty-four hours, and as many hands to be employed as can be put to work to advantage, the inspector to be the judge as to the least number of hands engaged per shift. This section shall not apply to opening a new coal mine or colliery, nor to any working for the purpose of making a communication between two or more shafts, slopes or outlets, so long as not more than twenty persons are employed at any one time in said new mine or working; and the term "owner," used in this act, shall mean the immediate proprietor, lessee or occupier, of a coal mine or colliery, or of any part thereof, and the term "agent" shall mean any person having, on behalf of the owner, the care or direction of a coal mine or colliery, or of any part thereof.

SECTION 4. The owner or agent of any coal mine or colliery to which there is only one shaft, slope or outlet may petition the court of common pleas in and for the county in which such coal mine or colliery is situated, which said court is hereby empowered to act in the premises, setting forth that in consequence of intervening lands between the working of his coal mine or colliery and the most practicable point or the only practicable point, as the case may be, at which to make or bring to the surface from the working of his mine he is unable to make an additional shaft, slope or outlet in accordance with the requirements of this act, whereupon the court may make an order of reference, and appoint three disinterested persons, residents of

the county, viewers, one or more of whom shall be a practical mining engineer, all of whom, after being sworn to a faithful discharge of their duties, shall view and examine the premises and determine as to whether the owner ought or ought not, under the circumstances, to have the privilege of making an additional outlet through or upon any intervening lands, as the case may require, and report, in writing, to the next term of the court, which report shall be entered and filed of record. If the finding of the viewers, or any two of them, is in favor of the owner of such coal mine or colliery, he may make an additional shaft, slope or outlet under, through or upon intervening lands, as may be determined upon and provided for by the award If the finding of the viewers is against the owner, or if no award be made by reason of any default or neglect on the part of the owner, he shall be bound to comply with the provisions of this act in the same manner as if this section had not be enacted. In case the said owner or agent desires to and claims that he ought to make an additional opening under, through or upon any adjoining or intervening lands to meet the requirements of this act, for the ingress or egress of the men employed in his or their coal mine or colliery, he or they shall make a statement of the facts in the petition, with a survey setting forth the point of commencement and the point of termination of the proposed outlet which he or they, their engineers, agents and artists may enter upon said intervening lands and survey and mark as he or they shall find it proper to adopt for such additional outlet, doing no damage to the property explored; and the viewers shall state in their report what damage will be sustained by the owner or owners of the intervening lands by the opening, constructing and using of the outlet, and if the report is not appealed from it shall be liable to be confirmed or rejected by said court as to right and justice shall appertain; and any further and all proceedings in relation thereto shall be in conformity with like proceedings as in the case of a lateral railroad across or under intervening lands, under the act in relation to lateral railroads, approved the fifth day of May, 1832, and the supplements thereto, so far as the provisions of the same are applicable hereto; and the notices to the owner of intervening lands of the intention to apply for the privilege of making an outlet and meeting of the viewers shall be given, and the costs of the case shall be paid as provided in the said act of fifth day of May, 1832, and the supplement thereto.

Section 5. Any of the courts of law or equity of this Commonwealth having jurisdiction where the coal mine or colliery proceeded against is situated, upon application of the inspector of coal mines and collieries of the proper district, acting in behalf of the Commonwealth, shall prohibit, by injunction or otherwise, the working of any mine in which any person is employed in working or is permitted to be for the purpose of working in contravention of the provisions of this act, and may award such costs in the matter of the injunction or other proceedings as the court may think just, but this section shall be without prejudice to any other remedy permitted by law for enforcing the provisions of this act.

Section 6. The owner, lessee, operator or agent of every coal mine or colliery shall erect or provide, at or near the mouth or entrance to such mine, and maintain the same at all times where men are employed in such mine, a suitable building or buildings, supplied with soft water, and properly lighted and warmed for the use of the men employed in such mine to wash and change their clothes when entering the mine and when returning therefrom.

Section 7. The owners or agents of every coal mine or colliery shall provide and establish for every such coal mine or colliery an adequate amount

of ventilation, and not less than fifty-five cubic feet per second of pure air, or thirty-three hundred cubic feet per minute for every fifty men at work in such mine, and as much more as circumstances may require, which shall be circulated through to the face of each and every working place throughout the entire mine to dilute and render harmless and expel therefrom the noxious, poisonous gases to such an extent that the entire mine shall be in a fit state for men to work therein, and be free from danger to the health and lives of the men by reason of said noxious and poisonous gases, and all workings shall be kept clear of standing gas. The ventilation may be produced by using blowing engines, air pumps, forcing or suction fans of sufficient capacity and power, or other suitable appliances as to produce and insure constantly an abundant supply of fresh air throughout the entire mine, but in no case shall a furnace be used in the mine where the coal breaker and chute buildings are built directly over and covering the top of the shaft for the purpose of producing a hot up-cast of air ; and there shall be an in-take airway of not less than twenty square feet area, and the return airway shall not be less than twenty-five square feet.

Section 8. The better to secure the ventilation of every coal mine and colliery, and provide for the health and safety of the men employed therein, otherwise and in every respect the owner or agent, as the case may be, in charge of every coal mine or colliery shall employ a competent and practical inside overseer, to be called mining boss, who shall keep a careful watch over the *ventilating* apparatus, over the airways, the travelingways, the pumps and sumps, the timbering ; to see, as the miners advance in their excavations, that all loose coal, slate or rock overhead is carefully secured against falling, over the arrangements for signaling from the bottom to the top and from the top to the bottom of the shaft or slope, over the metal tubes from the top to the bottom of the shaft or slope for the purpose of talking through, and all things connected with and appertaining to the safety of the men at work in the mine. He or his assistants shall examine carefully the workings of all mines generating explosive gases every morning before the miners enter the coal mine or colliery, and shall ascertain that the mine is free from danger, and the workmen shall not enter the mine until such examination has been made and reported, and the cause of danger, if any exist, be removed ; and he or his assistant shall also, every evening when the workmen leave the mine or colliery, go over the mine and see that the doors of the passageways are all properly closed, and that all the airways are free and unobstructed to the passage of air through them ; and it shall be the duty of the mine boss to measure the ventilation at least once per week at the inlet and outlet, also at or near the face of all gangways, and all measurements to be reported to the inspector once per month.

Section 9. All and every of the safety-lamps used in coal mines or collieries shall be the property of the owner thereof, and shall be under the charge of a suitable person, under the direction of the mining boss, who shall keep them clean and in good order ; and the mining boss shall provide that all doors used in assisting or *in any way* effecting the ventilation of the mine shall be so hung and adjusted as that they will close of their own accord and cannot stand open, and the main *air*-doors on the traveling roads shall be double, and an extra door shall be fixed to be closed only in the event of an accident to one of the others ; and the sides and top of such doors shall be well built with stone and mortar in mines in which the inspector shall deem it necessary and shall so order, and all main doors shall be provided with an attendant, whose constant duty it shall be to guard them and prevent them being left open ; and every mine having explosive gas in *each and* every part of such a mine or mines shall be divided into

two, four or more panels or districts, each ventilated by a separate *split* or current of air, and fifty persons shall be the greatest number that shall work in any one panel or district at the same time, and bore holes shall be kept twenty feet in advance of the face of each and every place, and if necessary on both sides, when the same is driven towards or approaching an abandoned mine or part of a mine suspected to contain inflammable *gases*, or which is inundated with water.

SECTION 10. The owner or agent of every coal mine or colliery opened and operated by shaft or slope shall provide and maintain a metal tube from top to bottom of such slope or shaft suitably calculated and adapted to the free passage of sound therein, through which conversation may be held by and between persons at the bottom and at the top of the shaft or slope; and also the ordinary means of signaling from and to the top of the shaft from the bottom; and also provide an improved safety catch and a sufficient cover overhead on every carriage used for lowering or hoisting persons; and they shall provide and arrange the flanges or horns of sufficient dimensions are attached to the sides of the drum of every machine that is used for lowering or hoisting persons in or out of any mine; an adequate break shall be attached to every drum or machine, worked by steam or water power, that is or will be used for lowering or raising into or out of any of said mines, and the main link attached to the swivel of the wire or any other rope shall be made of the best quality of iron, and tested, by weights or otherwise, satisfactory to the inspector, and bridle chains shall be attached to the main link from the cross pieces of the carriage, and no single link chain shall be used for lowering or raising persons into or out of any of said mines; and no boy under twelve years of age shall work or enter any mine, and proof must be given of his age, by certificate or otherwise, before he shall be employed, and *no* father, or any other person shall conceal or misrepresent the age of any boy. The neglect or refusal of any person or parties to perform the duties provided for and required to be performed by sections six, seven, eight, nine and ten of this act, by the parties therein required to perform them, shall be taken and be deemed a misdemeanor by them or either of them, and upon conviction thereof they or any of them shall be punished by imprisonment and fine or either, at the discretion of the court trying the same.

SECTION 11. No owner or agent of, or at any coal mine or colliery operated by shaft or slope, shall place in charge of any engine whereby the men are lowered into or *hoisted* out of the mine, any but experienced, competent, sober engineers; and every engineer so placed in charge of an engine shall constantly attend to the engine of which he has charge, and shall not allow any person, except such as may be deputed by the operator or agent, to touch or meddle with it, or any part of its machinery. He shall work his engine slowly and with great care when any person is ascending or descending the shaft or slope, and when any person is about to descend or ascend the shaft or slope the men at the bottom or top, as the case may be, must inform the engineer by the metal tube, the signal, or otherwise, thereof; and no one shall interfere with or in any way intimidate the engineer in the discharge of his duties, nor ride upon a loaded wagon or cage in any shaft or slope, and in no case shall more than ten men ride on any wagon or cage at one time in any of said mines; and upon any person violating the provisions of this section he shall be held and deemed guilty of a misdemeanor, and upon conviction thereof he shall be punished by fine and imprisonment, at the discretion of the court trying the same.

SECTION 12. Whenever loss of life or serious personal injuries to any person shall occur, by reason of any explosion or other accident whatever, in

or about any coal mine or colliery, it shall be the duty of any *party* having charge of such coal mine or colliery to give notice thereof forthwith, by mail or otherwise, to the inspector of coal mines and colleries for the district, and to the coroner of the county if any person is killed thereby, and due notice shall be given by the coroner of any inquest to be held as the result of any such explosion or accident; and it shall be the duty of the said inspector to immediately repair to the scene of the accident and make such suggestions as may appear necessary to secure the safety of the men; and if the result of the explosion does not require an investigation by the coroner he shall investigate into and ascertain the cause of the explosion or accident, and make a record thereof, which he shall preserve with the records of his office; and to enable him to make the investigation he shall have the power upon such occasion to compel the attendance of persons to testify, and to administer oaths or affirmations thereto, the cost of which investigation shall be paid by the county in which the accident occurred in the same manner as costs of inquests held by the coroner or justice of the peace are now paid; and the failure of the person in charge of the coal mine or colliery to give notice to the inspector and coroner, as provided for in this section, shall subject him to a fine of not less than twenty-five dollars nor more than one hundred dollars, to be recovered as other fines are to the county treasury.

Section 13. All boilers *used* for generating steam in and about coal mines and collieries shall be kept in good order, and the owner or agent thereof shall have them examined and inspected by a competent boilermaker, or other well qualified person, as often as once in six months, and oftener if needed, and the result of such examination, under oath, shall be certified in writing to the inspector for the district; and all machinery in and about the mines, and especially in the coal breakers, where boys work, shall be properly fenced off, and the top of such shaft shall be securely fenced off by vertical of flat gates covering the area of said shaft, and the entrance of every abandoned slope and air or other shafts shall be securely fenced off.

Section 14. Upon the passage of this act the Governor of the Commonwealth of Pennsylvania shall, upon the recommendation of a board of examiners, selected for that purpose, composed of three reputable miners in practice and two reputable mining engineers, to be appointed by the judges of the courts of common pleas of Luzerne county, all of whom shall be sworn to a faithful discharge of their duties, appoint three properly qualified persons to fill the office of inspector of coal mines and collieries in Luzerne and Carbon counties, whose commissions shall be for the term of five years or during good behavior, but they shall be at all times subject to removal from office for neglect of duty or malfeasance in the discharge of duty as hereinafter provided for; and the person so appointed shall have attained the age of thirty years, be a citizen of Pennsylvania, and have a knowledge of the different systems of working coal mines, and have been intimately connected with the *anthracite* coal mines of Pennsylvania for a period of five years, and have had experience in the working and ventilation of coal mines where fire-damp and noxious gases are evolved. Before entering upon their duties they shall take an oath or affirmation, before an officer qualified to administer the same, that they will perform the duties of the office with impartiality and fidelity, which oath or affirmation shall be filed in the office of the prothonotary of the county; and they shall provide themselves with the most approved modern instruments and chemical tests for carrying out the intentions of this act. The examiners provided for in this act shall be appointed by the judges of the courts of common pleas for the county at the first term of the court in each year, to hold

their places during the year, and vacancies shall be filled by the court as they occur; and the said examiners shall meet whenever candidates for the office of inspector of mines are to be appointed, of which meeting public notice shall be given in at least two papers published in the county at least two weeks before the meeting. The examiners shall agree in their recommendation of candidates to the Governor, and they shall recommend only such as they find qualified for the office; the said examiners shall receive three dollars per day for every day they are actually engaged in the discharge of their duties of examiners under this act, to be paid to them by the county; one inspector shall be appointed for the district in the Wyoming coal field, Luzerne county, lying east of and including Jenkins township, and one district shall be composed of that part of Wyoming coal field lying west of Jenkins township and west of the Susquehanna river, and one other district shall be composed of that part of Luzerne county lying south of the Wyoming coal field, together with Carbon county.

Section 15. The term of office of inspector of coal mines, appointed under an act for the better regulation and ventilation of mines and for the protection of the lives of the miners in the county of Schuylkill, approved April the twelfth, one thousand eight hundred and sixty-nine, shall expire on the first day of June, Anno Domini one thousand eight hundred and seventy, and in his room three inspectors of mines, for the counties of Schuylkill, Dauphin, Northumberland and Columbia, shall be appointed by examiners, to be appointed by the court of common pleas of Schuylkill county in like manner and form provided by the fourteenth section of this act; and the said examiners and inspectors, when so appointed, shall be subject to like regulations and duties, and entitled to like privileges, franchises and salaries as are in the said section provided for the examiners and inspectors for the counties of Luzerne and Carbon; and the inspectors for the said counties of Schuylkill, Northumberland, Dauphin and Columbia shall be assigned to duty in separate districts in said counties, which said districts shall be laid out and fixed by the examiners as aforesaid, to be appointed by the court of common pleas of the county of Schuylkill.

Section 16. It shall be the duty of the court of common pleas of the proper county whenever a petition, signed by not less than fifteen reputable coal operators or coal miners, or both, setting forth that any inspector of coal mines or collieries grossly neglects the duties, or that he is incompetent, or that he is guilty of malfeasance in office, to issue a citation, in the name of the Commonwealth, to the said inspector to appear, at not less than fifteen days' notice, on a day fixed, before said judges, when the said court shall proceed to inquire into and investigate the allegations of the petitioners: and if the court find that the said inspector is grossly neglectful of his duties, or that he is by reason of causes that extend before the appointment, or that have arisen since his appointment, incompetent to perform the duties of said office, or that he is guilty of malfeasance in office, the court certify the same to the Governor of the Commonwealth, who shall declare the office of inspector of the district vacant, and proceed, in compliance with the provisions of this act, to appoint a properly qualified person to fill the office; and the costs of the said investigation before the courts shall be borne by the removed inspector; but if the allegations of the petitioners are not sustained by the final judgment of the court the costs shall be borne by the said petitioners.

Section 17. The salaries of the said inspectors appointed for Luzerne and Carbon counties shall be three thousand dollars each; the maps and plans of mines and the records thereof, together with all papers relating thereto, shall be kept by the inspector properly arranged and preserved in a convenient place in the district for which each inspector shall have been appointed.

SECTION 18. Each of the inspectors of coal mines and collieries shall give his whole time and attention to the duties of the office; and it shall be his duty to examine all the coal mines and collieries in his district as often as his duties will permit him to do so, to see that every necessary precaution is taken to insure the safety of the workmen, to see that the provisions of this act are observed and obeyed; and it shall also be each inspectors duty to attend at every inquest held by the coroner, or coroners, in his district upon bodies killed in or about the coal mines or collieries.

SECTION 19. That any miner, workman or any other person who shall knowingly injure any safety-lamp, water gauge, barometer, air-course, brattice, or obstruct or throw open air-ways, or carry lighted pipes or matches into places that are worked by safety-lamps, or handle or disturb any part of the machinery of the hoisting engine, or open a door and not have the same closed, whereby danger is caused in the mine, or enter any place of the mine against caution, or disobey any order given in carrying out the provisions of this act, or shall ride upon a loaded car or carriage in any shaft or slope, or on any plane in or around any of said mines, or do any other act whereby the lives or the health of persons, or the security of the mines or the machinery is endangered, or any miner having charge of a working place in any coal mine or colliery who shall neglect or refuse to keep the roof thereof properly propped and timbered, to prevent the falling of coal, slate or rock, *every such person* shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by imprisonment and fine at the discretion of the court.

SECTION 20. It shall be lawful for any inspector to enter, inspect and examine any coal mine or colliery of his district, and the works and machinery belonging thereto, at all reasonable times, by night or by day, but so as not to impede or obstruct the working of the coal mine or colliery, and to make inquiry into and touching the state and condition of such coal mine or colliery, works and machinery, and the ventilation of such coal mine or colliery, and the mode of lighting and using lights in the same, and into all matters and things connected with or relating to the safety of the persons employed in or about the same, and especially to make inquiry whether the provisions of this act are complied with in relation to such coal mine or colliery; and the owner or agent of such coal mine or colliery is hereby required to furnish the means necessary for such entry, inspection, examination and inquiry, of which the said inspector shall make entry in the record of his office, noting the time and material circumstances of the inspection.

SECTION 21. No person who shall act or practice as a land agent, or as a manager, viewer or agent of any coal mine or colliery, or as a mining engineer, or be interested in operating any coal mine or colliery, shall act as inspector of coal mines or collieries under this act.

SECTION 22. It shall be the duty of each inspector to make an annual report of his proceedings to the Governor of the Commonwealth at the close of every year, in which he shall fully enumerate all the accidents in and about the coal mines and collieries of his district, marking, in tabular form, those accidents producing death or serious injury to persons, and the state of the workings of said mines with regard to the safety of the workmen therein and to the ventilation thereof, and the result of his labors generally shall be fully set forth.

SECTION 23. The salaries of *each of* the inspectors of coal mines and collieries, and the expenses of carrying into execution the provisions of this act, shall be paid by the State Treasurer, out of the Treasury of the Commonwealth, upon the warrant of the president judge of the court of common pleas

of Luzerne county for the salaries of the inspectors for Luzerne and Carbon counties, and upon the warrant of the president judge of the court of common pleas of Schuylkill county for the inspectors for the counties of Schuylkill, Columbia, Northumberland and Dauphin ; and all inspectors under this act shall reside in the districts for which they are appointed.

SECTION 24. That for any injury to persons or property occasioned by any violation of this act, or any willful failure to comply with its provisions, by any owner, lessee or operator of any coal mine or opening, a right of action shall accrue to the party injured for any direct damage he may have sustained thereby; and in any case of loss of life by reason of such willful neglect or failure aforesaid, a right of action shall accrue to the widow and lineal heirs of the person whose life *shall be* lost for like recovery of damages for the injury they shall have sustained.

SECTION 25. All laws of this Commonwealth that are inconsistent with the provisions of this act are hereby repealed.

BUTLER B. STRANG,
Speaker of the House of Representatives.

CHARLES H. STINSON,
Speaker of the Senate.

APPROVED—The 3d day of March, 1870.

AN ACT

For the preservation of the records of the inspection of mines in the mining districts of Schuylkill and Luzerne, embracing the anthracite coal region of Pennsylvania.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same,* That the judges of the courts of common pleas of Schuylkill and Luzerne counties are hereby directed to appoint, for their respective mining districts, one competent person each, who shall be designated "clerk of the mining district of Schuylkill," which district shall embrace the counties of Schuylkill, Columbia, Northumberland and Dauphin respectively, and "clerk of the district of Luzerne," which district shall embrace the counties of Luzerne and Carbon, and who shall hold their said office for the term of five years.

SECTION 2. It shall be the duty of the several and each inspector, appointed under the provisions of an act for the preservation of the health and safety of miners employed in coal mines, approved the —— day of March, Anno Domini one thousand eight hundred and seventy, to make true returns to the said clerks, on or before the first Monday in each and every month, of all data, statistics, matter and thing of which they severally are required to take notice and record under the provisions of said act, and all information deemed by the said courts useful and necessary to the health and safety of miners and workmen, and the proper, skillful and safe working of the miners, in the several districts respectively, and of deaths and accidents, resulting from injuries or neglect, or otherwise, and the circumstances of the person so injured.

SECTION 3. The said clerks so appointed as aforesaid shall receive and keep a record, under directions of said judges, of all data, statistics, matter, thing or information, either in tabulated form or otherwise, of all such information so returned, and shall allow, at all business hours, full and free access, to all parties interested, to the records of such information in his office, where maps of coal mines shall be filed and kept for safety and preservation.

SECTION 4. The office of the said clerks shall be located in the boroughs of Pottsville and Wilkesbarre respectively, and they shall receive for their services the sum of fifteen hundred dollars per annum each, payable in like manner as the salaries of the said inspectors under the said act for the preservation of the health and safety of miners, approved as aforesaid.

SECTION 5. Should the said clerks, or either of them, neglect or refuse to discharge the duties of his said office, it shall be lawful for the judges of the said courts aforesaid, or either of them, upon the petition of fifteen reputable citizens, interested in the mining of coal, to examine into the cause and reason of such neglect or refusal, and if said charges are sustained, it shall be the duty of the judges of the said courts having jurisdiction, to discharge said clerks, or either of them, forthwith, and appoint a successor.

SECTION 6. The said clerks shall be citizens of the United States of America, and shall be residents of the district for which they are appointed, and attain the age of thirty-five years, and shall be conversant with the coal mines of their districts for which they are appointed, and shall take an oath or affirmation before an officer properly qualified to administer the same, that he will faithfully discharge the duties of his office, to the satisfaction and under the direction of the judges of the courts aforesaid, and as the interest of people and law require; and shall, if so discharged or removed, deliver over to the said judge of the district, and to his successor, all papers, records, maps and things in his office, as the property of the State and district, and shall not be interested in any other business or calling other than the duties of the office for which he is appointed aforesaid.

BUTLER B. STRANG,
Speaker of the House of Representatives.

CHARLES H. STINSON,
Speaker of the Senate.

APPROVED—The 5th day of April, A. D. 1870.

JOHN W. GEARY.

SUMMARY.

Coal Production for 1876.

	Tons.
Coal shipped to market	4,273,506
Home consumption—8 per cent. of shipments	341,880
Total tons	4,615,386

	Miners.	Inside.	Outside.	Totals.
Number of miners	3,208			
Men employed		9,376	1,897	11,273
Boys employed		1,467	2,763	4,230
Totals	3,208	10,843	4,860	15,703

Number of persons killed	55
Number of persons injured	87
Total number killed and injured	142

Tons of coal produced per life lost	83,916.10
Blasting powder consumed in district in pounds	3,096,500
Blasting powder consumed in district in kegs	123,860
Blasting powder consumed in district in tons of 2,000 pounds	1,548¼
Blasting powder consumed per ton of coal mined	.73 lbs.
Coal mined per pound of blasting powder	1.38 tons.
Number of breakers in district, 56; less one burnt down and one taken down	54
Total number of days worked by the whole number of employees during the year	2,340,151
Average number of days worked per person	163.51
Number of tons produced to each employee	298.49
Number of tons produced to each miner	1,332.14
Number of tons produced to each mine	99,383
Number of tons produced per day per colliery	599.29
Average thickness of 86 seams, counting the seams as worked separately	9.82 ft.
Total number of horses and mules in district	1,278
Total number of locomotives in district	25
Total number of double hoisting engines	71
Total number of single hoisting engines	26

Mine Machinery.

Total number of Bull or Cornish pumping engines	5
Total number of horizontal pumping engines, with rods	32
Total number of hoisting engines	97
Total number of steam pumps	75
Total number of breaker engines	58
Total number of fan engines	66
Total number of engines	258
Steam boilers	
Total number of ventilating fans	69
Total number of ventilating furnaces	4

TABLE No. 9.—Shows the number of shafts, depth, area and height of head above tide water; also the number of under ground slopes and their length, vertical depth, height of head above tide; also surface slopes, number, length, vertical depth and height of head above tide; besides total depth of each mines, showing also elevation of bottom above or below tide, number of surface openings and coal breakers in Wilkesbarre district for 1876.

NAME OF COLLIERY.	LOCATION OF COLLIERY.	SHAFTS.					UNDER GROUND SLOPES				SURFACE SLOPES.				Total depth of mine—feet	ELEVATION OF BOTTOM.		TOTAL SURFACE OPENINGS			Coal breaker—No. of..
		Number of.....	Length—feet.....	Width—feet.....	Depth—feet.....	Height of head above tide—feet	Number of.....	Length—feet.....	Vertical depth—feet.....	Height of head above tide water—feet.....	Number of.....	Length—feet.....	Vertical depth—feet.....	Height of head above tide water—feet.....		Above tide—feet.	Below tide—feet.	Shafts.....	Slopes.....	Tunnels & drifts	
Mocanaqua	Shickshinny	....	....	.....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	...	.....	3	1
Paxton	....do	....	....	.....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	...	.....	2	1
No. 1 breaker	East Nanticoke	....	.....	.....	.....	.....	....	.....	.....	.....	1	800	245	515	215	340	.....	...	1	—	1
No. 2 breaker	....do	1 1	43 25	13 12.5	540 600	575 530	....	.....	.....	.....	1 1	390 1,340	240 320	593 535	240 325 540 600	353 215 35	.....	...	2 2	.....	.....
No. 3 breaker	West Nanticoke	....	.....	.....	.....	.....	1 1	1,875 600	380 100	610 725	....	.....	.....	.....	380 100	230 615	70	...	.....	3 1	1 1
Warrior Run	Warrior Run	....	.....	.....	.....	.....	....	.....	.....	.....	1 1	850 550	425 225	860 860	850 550	.....	.....	...	1 1	.....	1
Franklin	Near Wilkesbarre	....	.....	.....	.....	.....	....	.....	.....	.....	2	1,913 1,750	507 391	671 721	507 391	161 333	.....	...	2	.....	1
Hillman	Plains township	....	.....	.....	.....	.....	....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	...	2	.....	1
Maltby	Near Wyoming	1 1	Circular	20.0	135	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	...	2	1	1
Hutchison	Near Kingston	1	22	11	180	.....	1 1	210	60	.....	....	.....	.....	.....	210	.....	.....	...	1	.....	1
East Boston	....do	1	20	10	180	.....	1	590	.....	.....	....	.....	.....	.....	180	.....	.....	...	1	.....	1
W. B. & Co., No. 1	....do	1	21	10	347	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	...	1	.....	1
Do.....No. 2	....do	1	30	10	285	720	....	.....	.....	.....	1	1,200	222.5	.....	285 222.5	435	.....	1	1	.....	1
Chauncey	Near Plymouth	....	.....	.....	.....	.....	1	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	...	.....	1	1
Boston	Near Kingston	1	21	10	165	684	....	.....	.....	.....	....	.....	.....	.....	165	519	.....	1	.....	.....	1
Jersey	Near Plymouth	....	.....	.....	.....	.....	....	.....	.....	.....	1	950	308	858	308	550	.....	...	1	.....	1
Avondale	....do	1	20	10	235	584	....	.....	.....	.....	....	.....	.....	.....	235	349	.....	1	.....	.....	1
Enterprise	Plains township	1	20	10	372	616	1	550	95½	244	....	.....	.....	.....	467½	148½	.....	1	.....	.....	1
Wyoming	....do	1	20	10	251	556	2	600 1,200	100 116	.....	....	.....	.....	.....	351 367	189 205	.....	1	1	.....	1
Forty-Fort	Near Wyoming	1	20	10	96	630	1	275	15	534	....	.....	.....	.....	111	519	.....	1	.....	.....	1
Hollenback	Plains township	....	.....	.....	.....	.....	1	150	28	.....	1	175	45	.....	73	.....	.....	...	1	.....	1
Henry	....do	1	20	10	343	538	1	1,950	181	.....	....	.....	.....	.....	524	14	.....	1	.....	.....	1
Midvale	....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	600	200	650	200	400	.....	...	1	.....	1
Mineral Spring	....do	....	.....	.....	.....	.....	1	.....	181	.....	1	1,950	343	538	524	14	.....	...	1	.....	1
Oakwood shaft	....do	1	30.5	12	748	663	....	.....	.....	.....	....	.....	.....	.....	716	.....	86	2	.....	.....	1
Prospect shaft	....do	1	42	12	598	660	....	.....	.....	.....	....	.....	.....	.....	598	62	.....	2	.....	.....	1
Exeter	West Pittston	1	45	12.5	300	.....	....	.....	.....	.....	....	.....	.....	.....	300	.....	.....	1	.....	.....	1
Ellenwold	Near Kingston	2	24	12	175	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	2	.....	4	1
Mill Creek	Near Miners' Station	....	.....	.....	.....	.....	....	.....	.....	.....	1	2,000	.....	.....	.....	.....	.....	...	1	1	1
Pine Ridge	....do	1	29	10	446	611	1	370	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	1

TABLE NO. 9—*Continued.*

NAME OF COLLIERY.	LOCATION OF COLLIERY.	SHAFTS.					UNDER GROUND SLOPES				SURFACE SLOPES.				Total depth of mine—feet	ELEVATION OF BOTTOM.		TOTAL SURFACE OPENINGS.			Coal breaker—No. of ..
		Number of.....	Length—feet	Width—feet	Depth—feet.....	Height of head above tide—feet	Number of.....	Length—feet	Vertical depth—feet.....	Height of head above tide water—feet.....	Number of.....	Length—feet	Vertical depth—feet.....	Height of head above tide water—feet.....		Above tide—feet.	Below tide—feet.	Shafts.....	Slopes.....	Tunnels & drifts	
Laurel Run	Near Miners' Station	....	.....	.....	.....	.....	....	.....	.....	.....	1	1,400	.....	655	.....	.....	.....	.....	1	.....	1
No. 3 Baltimore	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	1,715	.....	.....	.....	.....	.....	.....	1	.....	1
No. 1 Baltimore	Near Wilkesbarre	....	.....	.....	.....	.....	{1 / 1	1,300 / 299	.....	.....	}	.....	.....	.....	.....	.....	.....	.....	.....	1	1
No. 1, D. and H.	Plymouth	1	30.6	10	313	.....	....	.....	.....	.....	....	.....	.....	.....	313	.....	.....	1	.....	.....	*
No. 2.....do	.....do	1	24	11	400	.....	....	.....	.....	.....	....	.....	.....	.....	400	.....	.....	1	.....	.....	1
No. 3.....do	.....do	1	30.6	10	303	.....	....	.....	.....	.....	....	.....	.....	.....	303	.....	.....	1	.....	.....	1
No. 4.....do	.....do	1	20	12	345	.....	....	.....	.....	.....	....	.....	.....	.....	345	.....	.....	1	.....	.....	1
No. 5.....do	.....do	1	22	10	235	.....	1	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
No. 1, L. and W. B	Wanamie	....	.....	.....	.....	.....	....	.....	.....	.....	1	2,200	.....	739	.....	.....	.....	.....	1	3	1
No. 2 .... do	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	1,200	.....	672	.....	.....	.....	.....	1	.....	1
Espy	Hanover township	....	.....	.....	.....	.....	....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	1	1
No. 1 Jersey	Near Ashley	....	.....	.....	.....	.....	....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	1	†
No. 2 Jersey	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
No. 9 shaft	Sugar Notch	1	18	11	318	.....	1	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	1	1
No. 10 slope	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	.....	495	698	498	203	.....	.....	1	.....	1
Hartford	Ashley	....	.....	.....	.....	.....	2	{254 / 181	.....	715 / 449	1	.....	266	715	254 / 447	461 / 268	.....	{.... /	1	1	1
No. 5 L. & W. B. breaker	Near Empire	....	.....	.....	.....	.....	1	1,100	362.69	337.48	1	600	386.28	721.6	748.97	.....	27.37	.....	1	.....	1
Empire shaft	.....do	1	18	12	297	620.21	1	200	144.5	330	1	.....	.....	.....	441.54	178	.....	1	1	.....	1
Hollenback, No. 2	.....do	....	.....	.....	.....	.....	1	1,500	197	557.47	1	600	220.7	774	418.21	325.79	.....	.....	1	.....	1
Hollenback, No. 3	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	1,200	313.38	689.36	313.38	375	.....	.....	1	.....	.....
Diamond	Near Wilkesbarre	1	.....	.....	383	601.09	1	900	186	231.78	....	.....	.....	.....	569	32	.....	1	.....	.....	1
Audenried	.....do	1	.....	.....	883.5	653.12	....	.....	.....	.....	....	.....	.....	.....	883.5	.....	230.38	1	.....	.....	1
Dodson	Near Plymouth	1	.....	.....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Lance	.....do	1	28	12	236	570	1	300	54.71	336.54	....	.....	.....	.....	290.71	279.29	.....	1	.....	.....	1
Gaylord	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	300	141.13	589.62	141.13	448.49	.....	.....	1	.....	1
Nottingham	.....do	1	20	10	365	540.9	1	520	176.73	.....	....	.....	.....	.....	541.73	.....	.83	1	.....	.....	1
Washington	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	890	109.17	705.52	109.17	596.35	.....	.....	1	1	1
Conyngham	Near Wilkesbarre	1	40	12	750	573	....	.....	.....	.....	....	.....	.....	.....	750	.....	187	1	.....	.....	.....
Young's slope	.....do	....	.....	.....	.....	.....	....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Hollenback shaft	.....do	1	46.5	12	510	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Hollenb'k sh't, 2d open'g	.....do	1	30	12	100	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
South Wilkesbarre shaft	.....do	1	22	12	500	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Gaylord shaft	Near Plymouth	1	46.5	12	100	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
		37	.....	.....	.....	.....	24	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	37	30	28	54

* Burned down. † Taken down.

TABLE No. 10.—Shows the number of mules and horses employed, number of steam boilers, number of locomotives, hoisting and fan engines; also the number and various kinds of pumping engines, with some details relative thereto, including their indicated horse power respectively, as employed in the Wilkesbarre district at the close of the year 1876.

NAME OF COLLIERY.	Number of horses and mules employed	Number of steam boilers	LOCOMOTIVE ENGINES. Number of	Weight—tons	Horse power	HOISTING ENGINES. Number of	Direct acting or geared	Number of cylinders	Diameter of cylinders—inches	Length of stroke—inches	Indicated horse power	BREAKER ENGIN'S. Number of	Indicated horse power	FAN ENGINES. Number of	Indicated horse power	PUMPING ENGIN'S. Number of	Indicated horse power	CORNISH OR BULL PUMPING ENGINES Number of	Steam cylinders, diameter of—inches	Indicated horse power	Working barrels, diameter of—inches	Number of working barrels	Length of each lift—feet	Discharge per stroke—gallons
Mocanaqua	Idle		2		80							2	60											
Paxton	19	4										1	40	1	12									
S. C. Co. No. 1	67	16	2	5 5		1 1	1 to 3 1 to 5	1 1	10 9	24 30	115 80	1	30	1	15	1	35							
Do. No. 2	67	56	5	9 7.5 7 7.5 7.5		1 1 1 1 1 1	1 to 3 1 to 4 1 to 4 1 to 4 D. A. "	1 1 1 1 1 1	16 16 14 16 30 30	30 30 30 30 72 72	77 77 120 150 650 650	1	80	1 1 1 1	15 80 60 12	1	55	1	65	210	24	2	260 320	230
Do. No. 3	43	22				1 1	1 to 4	1	15 18	48 36	140 230	1	100			1 1	7 35							
Do. No. 4, (Breaker)						1		1	12	24	37													
Warrior Run	14	16				1 1	1 to 5	1	15 18	60 30	119	1	40	2	60									
Franklin	22	21	1		15	1 2	D. A. 1 to 5	1 4	30 12	72 24	360 25	1	30	1 2	60 30	2	75 50							
Hillman	8					1					30	1	30	1	20									
Maltby		3				1						1												
Hutchinson	18	6				1			12	30		1												
East Boston	26					1			12	24		1		1										
W. B. & Co. No. 1	25	10				1		2	16	36	120	1	30	1	15	2	97 85							
Do. No. 2	31	19	1 1 1		20 25 25	1	1 to 5 1 to 6	2 2	16 15 12 12	36 30 24 24	50 180	1	50	1	40									
Chauncey		4																						
Boston	38	12	1		40	1	1 to 5.5	2	14	30	100	1	40											
Jersey		6				1	1 to 4		12	30	80	1	40											
Avondale	30	10				1	1 to 4		12	30	80	1	40	1	50	1	90							
Enterprise	34	11				2		1 1	18 16	36 30	144	1	30	1	23	1	10½							

TABLE No. 10—*Continued.*

NAME OF COLLIERY.	Number of horses and mules employed.....	Number of steam boilers.....	LOCOMOTIVE ENGINES. Number of.....	Weight—tons.....	Horse power.....	HOISTING ENGINES. Number of.....	Direct acting or geared...	Number of cylinders.....	Diameter of cylinders—inches.....	Length of stroke—inches.	Indicated horse power....	BREAKER ENGIN'S. Number of.....	Indicated horse power....	FAN ENGINES. Number of.....	Indicated horse power....	PUMPING ENGIN'S. Number of.....	Indicated horse power....	CORNISH OR BULL PUMPING ENGINES. Number of.....	Steam cylinders, diameter of—inches.....	Indicated horse power....	Working barrels, diameter of—inches.....	Number of working barrels.....	Length of each lift—feet,	Discharge per stroke—gallons.....
Wyoming	34	12				1	D. A.	2	20	48	276	1	51	1	25									
						2		3	16	39				1	34									
									14	36														
									14	24														
Forty Fort	34	9				1	D. A.	2	18	30	100	1	50	1	21	1	12							
						1			9	18														
Hollenback	10	5				2			8	18	55	1	25											
Henry	30					1	D. A.	2	20	48		1		1										
Midvale	14					1	1 to 5	2	12	24		1		1										
									12	24														
Mineral Spring	25	6				1	1 to 4	2	16	30	55	1	30	1	40	1	90							
						1	1 to 7		8.5	14	40													
Oakwood shaft		12				1	D. A.	2	26	60														
									26	60														
Prospect	20	10				1	D. A.	2	24	60		1		1										
									24	60														
						1		1	16	48														
Exeter	46	16				1		2	14			1		1		1		1	55	24	1	300		
									14	36				1										
						1	D. A.	2	24	60														
									21	60														
Ellenwold	6		1	7		1					180													
						1	D. A		22	48	100	1	100											
						1					35													
Mill Creek	41	20				1	1 to 4	2	12	30	72	1	36	1	30									
						1	1 to 3	2	16	36	123			2	80									
Pine Ridge	30	12				1	1 to 3	2	16	36	123	1	40	1	30									
Laurel Run	28	9				1	1 to 3	2	12	24	30													
									14	36	110	1	58	1	70									
No. 3, Baltimore	18	14				1	1 to 3	2	18	36	150	1	60	2	40									
															40									
No. 1.....do	33	12	1		20	1	1 to 4	2	14	30	95	1	30	2	60									
						1	1 to 5		14	30	40													
No. 1, D. & H., Plymouth	28	12				1	1 to 3	2	14	30	70	1	40	1	40	1	77							
No. 2....do.....do	29	12				1		1	14	30	40	1	40	1	40	1	77							
						1	1 to 2.5	2	16	36	120													
No. 3....do.....do		12				1		2	16	36	120	1	40	1	40			1	50	120	22	1	303	
														1	70									

No. 4....do. .....do.....	.....	.....	.....	.....	.....	1	1 to 2.5	2	16	36	129	1	40	1	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
						1	1 to 4	2	14	30	70																				
No. 5....do.....do.....	47	9	.....	.....	.....	1	1 to 4	2	14	30	90	1	70	1	30	1	77	.....	.....	.....	.....	.....	.....	...	.....
No. 1, Wanamie	37	24	.....	.....	.....	1	1 to 3	2	16	30	300	2	80	3	85	4	350	.....	.....	.....	.....	.....	.....	.....	.....
						1		2																							
No. 2.....do	Idle	6	....	.....	.....	1	.....	2	14	30	.....	1	50	1	25	1	50	.....	.....	.....	.....	.....	.....	.....	.....
Espy	"	.....	1	.....	.....	1	D. A.	2	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
No. 1, Jersey.....	"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
No. 2....do	"	.....	.....	.....	.....	1	.....	2	.....	.....	.....	1	.....	1	... ..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
No. 9, Sugar Notch	"	.....	.....	.....	.....	2	.....	2	.....	.....	.....	1	... ..	1	.....	2	.....	.....	.....	.....	... ..	.....	.....	.....	.....
								2																	
No. 10.....do	17	12	.....	.....	.....	1	1 to 3	2	18	36	160	2	100	1	40	. ...	.....	.....	.....	.....	.....	.....	.....	.....	.....
									18	36															
Hartford	42	20	2	.....	25	1	1 to 3	1	12	24	170	2	80	2	10	1	80	.....	.....	.....	.....	.....	.....	.....	.....
					25	1	1 to 4	2	15	48															
						1	1 to 4	2	12	24															
Empire No. 5.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire shaft.....	.....	9	4	.....	120	1	1 to 3	1	18	36	80	1	.....	1	40	1	8	.....	.....	.....	.....	. ....	.....	.....	.....
						1	D. A.	2																	
Hollenback No. 2..... .	29	4	1	.....	30	1	1 to 3	1	16	36	60	1	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		8					1 to 3	1	16	36	60														
Do .....No. 3.....	20	12	.....	.....	.....	1	D. A.	2	24	48	280	.....	.....	1	20	1	196	.....	.....	.....	.....	.....	.....	.....	.....
									24	48						1	6								
Diamond.....	31	21	.....	.....	.....	1	1 to 4	2	14	24	80	1	60	1	40	1	80	.....	.....	.....	.....	.....	.....	.....	.....
									14	24															
						1	1 to 3	2	18	36	160	1	80	1	40										
									18	36															
Audenried	23	24	1	.....	50	1	1 to 3	2	14	30	80	1	60	2	80	1	8	1	70	700	20	1	433	.....	
									14	30											22	1	450		
						1	D. A.	2	30	72	450														
									30	72															
Dodson	.....	.....	.....	.....	.....	1	.....	2	16	36	100	1	60	1	40	.....	.....	1	50	120	22	1	280	.....	
									16	36															
Lances	30	9	.....	.....	.....	1	.....	1	12	24	30	1	40	1	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
						1	D. A.	2	15	30	50														
Gaylord	41	11	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
						1	.....	2	16	30	140	1	25	1	25	2	90	.....	.....	.....	.....	.....	.....	.....	.....
									16	30															
Nottingham.	52	12	.. ..	.....	.....	1	....	2	8	16	10	1	50	2	10	1	50	.....	.....	.....	... ..	.....	.....	.....	.....
									8	16					40										
						1	D. A.	2	32	48	130														
									32	48															
Washington	34	8	.....	.....	.....	1	.....	2	12	24	50	1	70	1	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
									12																
Conyngham	6	9	.....	.....	.....	1	1 to 2.5	1	16	36	90	.....	.....	1	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
						1	.....	2	18	36	123														
									18	36															
Young's slope	Idle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hollenback shaft.....	"	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do..... ....(second opening)...	"	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gaylord shaft.....	"	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Wilkesbarre shaft	"	3	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
			25			97						58		66		32		5							

TABLE No. 10—*Continued.*

NAME OF COLLIERY.	DIRECT ACTING PUMPING ENGINES OR STEAM PUMPS.									Total number of engines.	Total indicated horse power of engines.....	Total indicated horse power of engines, locomotives and steam pumps.....
	Number of.....	Name of maker.	No. of pump.....	Diameter of cylinders—steam—ins...	Diameter of cylinders—water—ins...	Length of stroke....	Discharge per stroke gallons.....	Discharge per minute—gallons.....	Indicated horse power applied.....			
Mocanaqua										2	60	140
Paxton	1	Knowles	2		6					1	52	
Susquehanna Coal Company No. 1	1	Blake		14	7	12	8	240	20	4	275	295
	1	Cameron		24	12	30	29	440	90	14	1,300	1,300
Do.....do.....No. 2	1	....do		24	12	30	29	440			1,078	1,173
	1	Knowles	No. 5...	7	8.5	10	1.33	40	5			
Do.....do.....No. 3	1	....do		16	10	14	9.25	185	15	6	512	527
	2			30	12	72	35	500				
Do.....do.....No. 4 (Breaker)	1	Alison		14	8	36	7.5	300		5	256	
Warrior Run	1	Cameron		18	7	24	4	150				
		Blake		12	7	12	2	150				
Franklin										9	655	670
Hillman	3									3	80	
Maltby										2		
	2	Blake		20	10	30						
				16	9	24						
Hutchison	1	Knowles	6	9	5	5				3		
	1	Deluge		24	65	12						
	1	Blake		12	7	12						
East Boston	1	Thatcher		21	14	24				3	150	
W. B. & Co. No. 1	2	....do	No. 1..	36	12.5	39	17.3	328		5	367	
			No. 2..	21	10		7					
Do.....No. 2										4	390	280
Chauncey										2	140	180
Boston	1	Thatcher		21	12	24	10.1	125		2	120	120
Jersey										4	260	260
Avondale										5	207½	242
Enterprise	1	Blake		24	12	36	17½	493	34½	6	387	394
	2	....do		7⅛	4⅜	12	7	56	7			
Wyoming				12	5	12				5	183	192
Forty Fort	1	Knowles		16	10	16	5⅝	225	9	3	80	80
Hollenback	2	Cameron		10	5		⅞	175		3	270	
Henry	4									1	125	
Midvale	1									5	255	
Mineral Spring	2	Knowles								5	700	
Oakwood shaft										8	600	
Prospect										4		
Exeter	1	Blake		34	14	24				6	311	
Ellenwold	1	Thatcher		34	12	18		1,050		4	225	
Mill Creek	2	....do		24	12	18		1,050				
Pine Ridge	1	Seldon										

Laurel Run	2	Culver		12	5.5	15		100		3	238	
	1	Woodward		10	4.5	15		75				
				6	3.5	6		50				
No. 3, Baltimore	3	Gild & Gamson		21	12	18		900		4	290	
No. 1.....do	1	Culver	3	31	16	18	46	501		5	225	225
No. 1, D. & H., Plymouth										4	227	227
No. 2.....do.....do	1	Thatcher		39	12	72	24	490		5	317	317
No. 3.....do.....do										5	390	390
No. 4.....do.....do										4	300	300
No. 5.....do.....do										4	267	267
	2	Knowles	No. 8...	12	8	10						
No. 1, Wanamie	1	Bannan & Allison		28	14	72	47.81	489		11	815	
	1	Roberts		36	16	72	62.6	626				
No. 2.....do										4	125	125
Espy										3	370	370
No. 1, Jersey												
No. 2....do										3	80	80
No. 9, Sugar Notch										6	315	315
No. 10.....do	1	Knowles' double acting plunger	No. 6.	7.5	5	10	.85	170	8	4	300	432
	1			24	10	24	8.16	163	124			
	1	Knowles	No. 10..	16	8	12	1.99	79				
Hartford	1	....do	No. 8...	12	7	12	2.61	104	311	8	370	731
	1	Roberts	....	28	12	72	35.2	492				
	1	....do		15	6	30	3.5	73				
Empire No. 5										2		
Empire shaft	1	Knowles	No. 6...	7.6	5	10	.85	170		3	590	
Hollenback No. 2										2	195	195
Do ..... No. 3	1	Roberts	....	28	12	33	17.6	352		4	512	
	1	Knowles		5.5	3.75	7	.34	204				
Diamond	2	....do	No. 6...	7.5	5	10	.85	170	8	7	540	556
				7.5	5	10	.85	170	8			
Audenried	1	....do	"	7.5	5	10	.85	170	8	7	1,388	1,444
Dodson										4	360	360
Lances	2	Knowles	No. 8...	14	7					4	140	
	1	Thatcher		20	12							
Gaylord	1	Roberts		16	6	30				6	280	
	1	Knowles		14	7	12						
Nottingham	2	Roberts		16	8	30				6	320	
		Knowles		14	7	12						
Washington	1	....do		14	2	12				3	270	
Conyngham	3	....do		12	7	12	4	200		3	283	
				12	7	12	4	200				
				12	7	12	4	200				
Young's slope												
Hollenback shaft										1		
Do.....(second opening)										1		
Gaylord shaft										1		
South Wilkesbarre shaft										1		
	75									258		

TABLE No. 11.—List of fatal colliery accidents, and loss of life arising therefrom, in the Middle district of Luzerne and Carbon counties, during the year 1876.

DATE.	Number of accident.....	NAME OF COLLIERY.	NAME OF PERSON KILLED.	Age.....	Widows.....	Orphans.....	CAUSE OF DEATH, AND REMARKS.	NO. OF PERSONS KILLED.							
								Explo'n of C. H. gas	Falls of roof & sides.	In shafts.....	By mine cars.....	By blasting powder.	Miscellaneous.....	On surface.....	Total.....
Jan. 4,	1	Exeter, West Pittston	Isaac Lovel.....	46	1	6	Instantly killed by a fall of rock in gangway face	....	1	....	....	....	....	....	....
5,	2	Wyoming, Plainsville.....	James James.....	34	1	1	Instantly killed by a blast; had returned to re-touch it.....	....	....	....	....	....	1	....	....
5,	3	Forty Fort, near Wyoming..	Joseph Marsden...	19	....	....	Killed almost instantly by a blast.....	....	....	....	....	....	1	....	....
7,	4	Midvale, Plainsville.....	John Crawford....	37	1	5	Injured by a fall of rock, and died of his wounds in a few days	....	1	....	....	....	....	....	....
8,	5	Forty Fort, near Wyoming..	Thomas Kane.....	30	....	....	Instantly killed by a fall of rock in chamber	....	1	....	....	....	....	....	....
4,	6	Enterprise, Plainsville.....	John Waldren	16	....	....	Instantly killed; run over by car on culm bank	....	....	....	....	....	....	1	....
26,	7	Boston, near Kingston	John Jennings	32	1	....	Killed by fall of coal in chamber.....	....	1	....	....	....	....	....	....
28,	8	Min. Spring, nr. Parson's S.	James Kates	42	1	4	Died from wounds received by explosion of carbureted hydrogen gas.	1	....	....	....	....	....	....	....
28,	9	Hartford, near Ashley	John Fox.....	12	....	....	Instantly killed by a blast, while working with his father.....	....	....	....	....	....	1	....	....
								1	4	....	....	....	3	1	9
Feb. 12,	10	Exeter, West Pittston	Thomas Harris....	35	1	3	Harris was a fire boss, Allen a laborer, Smalley a stable boss and Jones was a driver boss, and were all killed instantly from the effects of an explosion of C. H. gas. The latter only was burned, he having set fire to the gas, the former three were killed by the concussion of the explosion	1	....	....	....	....	....	....	....
12,	10	....do .....do	Ed. Allen.....	21	....	....		1	....	....	....	....	....	....	....
12,	10	....do .....do	Darius Smalley ...	21	....	....		1	....	....	....	....	....	....	....
12,	10	....do .....do	Alexander Jones..	21	....	....		1	....	....	....	....	....	....	....
								4	....	....	....	....	....	....	4
Mar. 22,	11	Pine Ridge, near Parson's S.	James Cavanach..	26	1	2	Killed by a fall of coal in chamber.....	....	1	....	....	....	....	....	....
29,	12	Mineral Spring	Noah Davis	59	1	8	Killed by a fall of coal in chamber.	....	1	....	....	....	....	....	....
								....	2	....	....	....	....	....	2
April 29,	13	Exeter, West Pittston	Wm. E. Williams	33	....	....	Killed by a fall of coal from roof; called rider coal.....	....	1	....	....	....	....	....	....
								....	1	....	....	....	....	....	1
May 3,	14	Audenried, nr. Wilkes-Barre	Nicholas Hohn...	14	....	....	Killed by mine cars; attending door and lost his light.....	....	....	....	1	....	....	....	....
8,	15	Pine Ridge	A. M. Phillips	25	....	....	Killed on inclined plane by a trip of empty cars.....	....	....	....	1	....	....	....	....
10,	16	No. 1 shaft, East Nanticoke.	Thomas Williams.	33	1	1	Injured by explosion of a blast, and died the next day.....	....	....	....	....	....	1	....	....
12,	17	No. 3 slope, Wanamie.....	Daniel Sweeney...	24	....	....	Killed by a fall of coal in chamber.....	....	1	....	....	....	....	....	....
19,	18	Boston.....	Wm. Jones.....	26	....	....	Killed by a fall of coal	....	1	....	....	....	....	....	....
								....	2	....	2	....	1	....	5
June 8,	19	Ellenwold, near Kingston....	H. G. Victor.....	32	1	3	Drowned in bottom of new shaft, slipped under platform	....	....	....	....	....	1	....	....
12,	20	No. 3 tunnel, W. Nanticoke.	John B. Walton ..	53	1	3	Killed by trip of mine cars in mouth of tunnel.....	....	....	....	1	....	....	....	....
15,	21	Gaylord, Plymouth.....	Samuel Bennett...	23	....	....	Killed by fall of coal	....	1	....	....	....	....	....	....

17,	22	Empire shaft, nr. Wilkes-B.	Jno. Heycock, Jr.	19			Killed by locomotive engine under ground						1		
21,	23	No. 1 shaft, East Nanticoke.	Thos. B. Jones	36	1	2	Killed by fall of roof—fire-clay		1						
29,	24	Hutchison	Ed. Williams		1	4	Killed by fall of slate from roof		1						
30,	25	Laurel Run, nr. Parson's S.	Abe. Zimmerman	10½			Killed by being drawn into pony rollers in breaker							1	
									3		1		2	1	7
July 11,	26	No. 3 slope, West Nanticoke.	Jno. Rorreck	32	1		Killed by blast while drilling out tamping						1		
17,	27	No. 1 breaker, E. Nanticoke.	John Cook	26	1	2	Killed by railroad cars under the breaker							1	
25,	28	Pine Ridge	John T. Moor, Jr.	13			Killed by explosion of blasting powder in car					1			
29,	29	Hutchison	Joseph Sillivan				Killed by fall of rock		1						
									1			1	1	1	4
Aug. 1,	30	Henry, Plainsville	John O'Brien				Killed by fall of roof slate in chamber		1						
11,	31	No. 2 tunnel, E. Nanticoke.	Wm. T. Williams.	18			Killed by flying coals from blast						1		
15,	32	Lance	Lewis Sanders	12			Killed by hoisting carriage						1		
21,	33	Hillman, Plainsville	Thomas Coleman.				Died in a day or two after igniting a keg of powder					1			
31,	34	Nottingham	Robt. O. Owens.	29			Died in a day or two after being burned with blasting powder					1			
									1			2	2		5
Sept. 6,	35	Exeter, West Pittston	Michael Hagerty		1		Killed by fall of roof coal and slate		1						
13,	36	Avondale, near Plymouth	John Miller	32			Died in a few days after injuries received from fall of coal		1						
23,	37	Empire shaft	Theo. Evans	33	1		Killed by a blast						1		
									2				1		3
Oct. 6,	38	Warrior Run	David Owens	24	1	1	Killed between car and side at foot of slope				1				
10,	39	No. 5 shaft, D. & H. C.C., Pl	Jas. O'Connell	42	1	7	Killed by fall of rock in trying to rescue his brother		1						
11,	40	Hutchison, near Kingston	Patrick Martin	30	1		Martin and Noy were both killed by flying coals from blast in pil-						1		
11,	40	do. do.	William Noy	26	1	2	lar between their's and the next place						1		
13,	41	Empire shaft	Patrick Higgins	28			Killed by a fall of coal		1						
20,	42	No. 1 colliery, W., B. & Co.	Thos. Campbell				Killed by fall of roof or rider coal		1						
									3		1		2		6
Nov. 6,	43	Ellenwold	Joseph Bennett	30	1	2	Killed by fall of rock		1						
10,	44	Washington	John Conyngham.	18			Died in a few days from effects of kick from mule						1		
20,	45	Nottingham, near Plymouth	Thos. R. Davis	45	1	4	Died in ten days after being burned by gas explosion	1							
28,	46	Hollenback, Plainsville	John Purcell				Killed by fall of roof or bone coal and slate		1						
								1	2				1		4
Dec. 2,	47	Washington, near Plymouth.	Michael Kelley	26			Died in three days from injuries received by fall of coal		1						
2,	48	Henry	Thos. R. Evans		1	3	Died in ten days from injuries received by explosion of C. H2. gas	1							
13,	49	Franklin	Patrick M'Coy	51	1	6	Killed by fall of coal		1						
15,	50	Audenried	Ed. Welsh		1		Killed by a blast						1		
31,	51	Oakwood shaft, Prospect col.	Anthony Earley	25			Killed by falling down shaft			1					
								1	2	1			1		5
		Totals			26	69		7	23	1	4	3	14	3	55

TABLE No. 12.—List of colliery accidents not proving fatal during 1876, in the Wilkes-Barre District.

DATE.	No. of accident.	NAME AND LOCATION OF COLLIERY.	NAME OF INJURED.	CAUSE OF ACCIDENT.
Jan. 5..	1	No. 3 slope, W. Nanticoke,	Wm. Hawkins....	Severely injured by kick from a mule.
14..	2	Nottingham colliery.....	Patrick Driscol...	Injured severely by a fall of coal.
15..	3	Grand Tunnel colliery.....	John Tigue.....	Injured severely by prop falling upon him.
20..	4	Prospect shaft colliery, near Wilkesbarre.	Hugh Morris ..... Ed. Jenkins.....	Both severely burned by explosion of carbureted hydrogen gas while trying to subdue or extinguish a large fire.
25..	5	Jersey colliery	Charles Wiley	Badly injured by car on culm bank.
28..	6	Mineral Spring colliery, nr. Parson station.	Peter Smith.....	Smith was burned by carbureted hydrogen gas on face and hands the same time and place as Jas. Kates, who died of his injuries.
31..	7	Avondale colliery.....	Frank Smith.....	Had several of his teeth struck out and his face badly disfigured by a kick from a mule.
Feb. 7..	8	Grand Tunnel colliery.....	Thomas Ward	Bruised and cut from a premature explosion of a blast.
8..	9	No. 2 breaker, E. Nanticoke	John Cowitch.....	Injured while loading cars under breaker.
11..	10	Conyngham shaft, near Wilkesbarre.	John Rowett..... Nicholas Jobe..... Larey Owens.....	The three men were burned more or less by explosion of carbureted hydrogen gas caused by placing a naked lamp in the return airway and brushing the gas into it.
12..	11	Exeter coll'y, W. Pittston,	Joseph York..... Thos. Graham	York and Graham were injured by the concussion of an explosion of carbureted hydrogen gas, which caused the death of four persons and others slightly injured.
Mar. 3..	12	Exeter coll'y, W. Pittston,	Thos. Mangan	Injured by explosion of a blast.
7..	13	Prospect shaft coll'y, near Wilkesbarre.	Jacob Glatz ..... Charles Nolan.....	Glatz and Nolan were both burned severely by explosion of carbureted hydrogen gas, igniting at head of shaft from a lantern of the night watchman, Glatz, while water was being hoisted by large tanks, and one of which was being emptied at the time.
29..	14	Exeter colliery.....	Simon Carrol.....	Burned severely on face and hands by explosion of blasting powder, caused by careless handling.
30..	15	Nottingham colliery.....	Wm. Danaugh....	Bruised and cut badly by a fall of coal.
Apr. 11..	16	Exeter colliery.....	Solomon Jermyn..	Injured severely by a premature explosion of a blast.
11..	17	Hartford colliery	Wm. Stevens	Face and hands burned by explosion of carbureted hydrogen gas.
14..	18	Diamond colliery, near Wilkesbarre.	H. Bergenstock...	Had hand injured so badly by being crushed between cars that it had to be amputated.
18..	19	Audenreid colliery, near Wilkesbarre.	Thos. Thomas..... Peter M'Manifan,	Both were burned on faces and hands quite severely by explosion of carbureted hydrogen gas.
May 4..	20	Lance shaft colliery, near Plymouth.	Wm. Evans.....	Lost an eye from explosion of a blast while returning to re-touch.
17..	21	No. 1 tunnel, E. Nanticoke,	Samuel Wylan	Injured severely by a fall of slate from roof.
22..	22	Midvale colliery.....	W. G. Callson	Had four fingers cut off by a piece of coal striking them while having hold of a prop.
31..	23	Enterprise colliery	Jas. Alexandre ...	Had leg broken by being caught between mine cars.
June 1..	24	Enterprise colliery	Robert Hyslop .... Henry Kirk..... Mannus O'Donald	Messrs. Hyslop, a mine boss, Kirk, a fire boss, and O'Donald, a track-layer, were burned by carbureted hydrogen gas severely.
29..	25	Mill Creek colliery.....	Hamilton Semore,	Leg severely injured between car and side.
July 13..	26	Midvale coll'y, Plainsville,	Thomas F. Jones,	Had both hips dislocated and otherwise injured by fall of slate from roof.
25..	27	Pine Ridge colliery, near Parson's station.	Charles Brazile ...	Seriously burned by explosion of blasting powder in paper cartridges in car the same time and place that John T. Moore, Jr., lost his life.
26..	28	Exeter coll'y, W. Pittston,	Sam'l Montangue,	Had an arm broken—caught between bumpers of railroad cars.
28..	29	Forty Fort colliery	Patrick Malon	Arm injured by falling under car.
28..	30	Exeter colliery.....	Thos. C. Collins..	Head and breast crushed severely by carriage at shaft-foot.
29..	31	East Boston colliery.....	Wm. H. Johns....	Injured severely by premature explosion of a blast while tamping it.
31..	32	Midvale colliery.....	Daniel Sullivan ...	Had hip dislocated and was otherwise injured by being caught between mine car and door.
Aug. 1..	33	Hollenback No. 3 slope	Wm. Jones.....	Seriously burned by explosion of a keg of powder, ignited from his lamp.
23..	34	Exeter colliery.....	Wm. Dampman ..	Severely injured by car running over his foot while fast between rails.
23..	35	Forty Fort colliery	Joseph Soby.....	Injured severely—crushed between mine car and side at shaft-foot.
29..	36	Conyngham shaft.:	Robert Vivian.....	Injured severely by a premature explosion of a blast.
Sept. 7..	37	Exeter colliery.....	John Hamill	Injured severely on head by coals from a blast he had just fired.
11..	38	Gaylord colliery.....	M. M'Caffery	Had both hips dislocated by fall of rock in a tunnel.
12..	39	Forty Fort colliery	Henry Maynard...	Face and hands burned by explosion of blasting powder. Had loose powder in open keg and ignited it by spark falling from his lamp.
13..	40	No. 2 coll'y, W., B. & Co.,	Wm. Morgan	Had skull fractured by a kick from a mule.

TABLE No. 12—*Continued.*

DATE.	No. of Accident.	NAME AND LOCATION OF COLLIERY.	NAME OF INJURED.	CAUSE OF ACCIDENT.
Sept. 14..	41	Pine Ridge colliery.....	John Sheppard....	Severely injured by explosion of a blast, caused by gas feeder burning the straw off.
14..	42	Nottingham colliery.....	Chas. Meighan....	Lost one eye and otherwise severely injured by explosion of a blast in rock while he was returning to re-touch it.
18..	43	No. 1 tun., Baltimo. mines,	Michael Hoben ...	Severely injured by explosion of a blast before he got away from the hole.
18..	44	No. 1 tun., Baltimo. mines,	Ed. Batson.....	Injured on leg and hand by being crushed between cars.
19..	45	No. 1 tun., Baltimo. mines,	John Deitz	Injured on head and leg by mine cars.
25..	46	Enterprise colliery.....	Charles Atkins....	Severely injured by fall of rock.
25..	47	Empire colliery	Reese Hughes.....	Both severely burned on faces and hands by
			Daniel Mulligan ..	explosion of carbureted hydrogen gas. The fire boss has since been charged with violating the mining law in not having examined the place.
27..	48	East Boston colliery	Archie Wallace...	Very seriously injured by a fall of rock.
28..	49	Boston colliery.....	Wm. L. Pritchard	Head very severely injured by a piece of slate falling upon him.
28..	50	Boston colliery.....	John James	Severely injured by a mine car running over him, which had run down the chamber, blocks having been struck out by a blast.
Oct. 2..	51	Exeter colliery.....	Michael Martin ...	Injured severely by coals from a blast in opposite pillar; did not leave when warned to do so.
2..	52	No. 10 slope, Sugar Notch..	Jenkin Jones.....	Both burned on faces and hands severely by
			Wm. Cronin	an explosion of carbureted hydrogen gas, caused by their own carelessness mostly.
3..	53	Mill Creek colliery.....	Thos. Williams...	Burned on face and hands by explosion of blasting powder.
7..	54	Prospect colliery.....	Patrick Reily	Severely injured by kick from a mule.
10..	55	No. 5 colliery, D. & H. C. Co., Plymouth.	Chas. O'Donald...	Seriously injured by a fall of rock. His brother lost his life by going to his rescue.
10..	56	No. 3 slope, Wanamie.....	John Hankey.....	Both brothers were severely injured by a fall
			Daniel Hankey....	of rock.
10..	57	Pine Ridge colliery.....	Thos. Considine ..	Seriously injured; crushed between loaded car and brattice.
11..	58	Hutchison colliery.....	Wm. Sahl	Had arm broken in two places and otherwise seriously injured by coals from a blast in pillar between his and the next place. Two of his partners were killed by the said blast. Some misunderstanding about signals caused the sad affair.
12..	59	No. 10 slope, Sugar Notch..	Jacob Mangold....	Had leg broken in two places by coal and prop falling upon him.
17..	60	Hartford col., near Ashley,	Joseph Walker....	Arm broken and side injured by fall of bone coal from roof.
20..	61	Mill Creek colliery.....	Joseph Hersh	Leg broken and head injured by trip of cars on slope.
23..	62	No. 1 shaft colliery, Waterman, Beaver & Co.	William Hazle	Had leg broken through carelessness of a miner in letting a mine car run away down his chamber.
Nov. 8..	63	Exeter colliery.....	Daniel Demsey ...	Had one rib broken by flying coals from a blast; failed to get away in time.
8..	64	Hartford colliery	John Slack	Injured dangerously from fall of coal.
14..	65	Exeter colliery...	D. Gillespie.....	Had head and left leg injured severely by explosion of a blast while returning to re-touch the same.
23..	66	Prospect colliery.....	Peter Peterson....	Injured from explosion of a blast while returning to re-touch.
24..	67	Enterprise colliery	John Conway	Injured severely by a kick from a mule.
28..	68	Hollenback col., Plainsville	John Lynch.....	Had leg broken and head injured by a fall of rider coal from roof, whereby his partner was killed.
29..	69	Boston colliery.....	Thomas Miles.....	Severely injured by a kick from a mule.
Dec. 2..	70	Henry colliery	John Johns.....	Both were seriously burned on face and hands
			Luke Conners.....	by explosion of carbureted hydrogen gas, from the effects of which one of the party lost his life. The gas was ignited in the return by Simon Kelley.
8..	71	Audenreid colliery.....	Wm. Harper.....	Leg broken and finger crushed by fall of coal.
19..	72	Diamond colliery	P. Gilslighter.....	Had leg broken in two places by falling under mine cars.
22..	73	Prospect colliery.....	Evan Edwards....	Arm broken by cars near foot of shaft.
27..	74	Audenreid colliery.....	John M'Dermot ..	Shoulder-blade dislocated by fall of coal.
28..	75	Hartford colliery	Richard Roe.....	Slightly burned on face and hands by explosion of carbureted hydrogen gas.

REPORT

OF THE INSPECTOR OF COAL MINES IN THE EASTERN DISTRICT OF THE WYOMING COAL FIELD LYING EAST OF AND INCLUDING JENKINS TOWNSHIP, IN THE COUNTY OF LUZERNE AND STATE OF PENNSYLVANIA, FOR THE YEAR ENDING DECEMBER 31, A. D. 1876.

To His Excellency, JOHN F. HARTRANFT,

Governor of the Commonwealth of Pennsylvania:

SIR:—I had the honor of receiving my commission as mine inspector for the above named district from your Excellency on the 4th day of October, 1876. I entered upon the duties of the office on the 6th day of the same month; hence my term of service covers only a little less than three months of the year, and my report, for that reason, will not be as exhaustive and elaborate as I could wish. In compliance with the requirements of section twenty-two of an act, entitled "An Act providing for the health and safety of persons employed in and around coal mines," approved the third day of March, A. D. 1870, however, I herewith most respectfully submit the following report of my labor for so much of the year as I have had the honor to serve.

All the information that I have gathered relative to fatal and non-fatal accidents is submitted in tabulated form, from which it will be found that the number of persons killed during the year is 44, and the number of persons injured is 120; the number of widows is 21, and the number of orphans 79; the number of deaths as compared with the number in 1875 is 18 less, while the non-fatal accidents show an increase of 18; the ratio of coal produced for each life lost in 1876, as shown by table No. 4, is 110,511 tons, while the ratio for 1875 is 128,340 tons per life lost, and 92,143 tons per life lost in 1874; the total production of coal in this district in 1876 is 4,862,512 tons; for 1875 it was 7,956,452 tons, and for 1874 it was 6,357,879 tons.

Table No. 1 contains a statement, in detail, of all the fatal accidents; table No. 2 gives the same statement relative to non-fatal accidents; table No. 3 gives a condensed statement of fatal and non-fatal accidents for four years; table No. 4 gives the total coal production for four years, number of persons employed, ratio of coal production per person employed, ratio of production per life lost, ratio of production per person killed and injured, and ratio of persons employed per life lost, for four years; table No. 5 gives the number of tons of coal shipped to market, sold for home consumption, and used for motive power, furnaces, &c., at the mines of all the collieries in operation during the year 1876, together with the number of kegs of powder used, the number of days worked, the number of persons employed, and the ratio of coal mined per person employed, per person killed and injured, and per person killed, at every colliery in the district; and it also gives the ratio of coal mined per person killed and injured and per person killed at each colliery named for the last three years. Each colliery is thus charged with the fatal and non-fatal accidents occurring in them, and the collieries which are free from accidents get due credit for their careful and safe management. Table No. 6 gives the number and nominal horse-power of the stationary engines used for hoisting the coal

out of the mines, for breaking the coal, for pumping the water out of the mines, and for driving fans to produce ventilation, and number and dimension of boilers, &c.

In conclusion, I have deemed it proper to notice the most prolific causes of accidents, upon which I have given some suggestions, and it will be well for the several parties interested to give them due consideration. I have also noticed the condition of the ventilation in the different collieries throughout the district, giving due credit to all parties deserving credit, and moderately criticising where I thought it necessary. I have given my attention also to several other matters of more or less importance, all having a direct bearing on the "health and safety of persons employed in coal mines," my views upon which will be found in the body of the following report, and all of which is most respectfully submitted by

Your humble and obedient servant,

WILLIAM S. JONES,
Inspector of Mines.

SCRANTON, PA., *March* 10, 1877.

CAUSES OF ACCIDENTS.

What are the most prolific causes of accidents in our collieries? This is, in my opinion, a very important inquiry, for if we succeed in finding the causes we can then seek for and apply the proper remedies so as to avert them in the future. I do not presume to assert that accidents can be wholly averted by any means, but I do assert that with the proper and timely use of precautionary measures, which are simple and within easy reach of all, our mine accidents can and ought to be reduced very much. By referring to the long lists of accidents, which are detailed in tables Nos. 1 and 2, it will be seen at a glance that a very heavy percentage consists of "killed by a fall of roof," and "killed by a fall of coal;" and "injured by a fall of roof" and "by a fall of coal." Now I am perfectly convinced that, with the proper use of their common sense on the part of the workingmen themselves, nine-tenths of those accidents from the above named causes can be avoided. No man should work under either roof or coal which he suspects to be unsafe. A few minutes' work in such cases would make the place absolutely free from danger. Where a slab of rock, or a piece of coal, or bone, hangs over a man's head, and cannot be taken down, temporary props should be stood under it so as to make it impossible for it to drop without a moment's warning, as it so often does, with such serious and fatal results. In my examination of collieries throughout the district, so far as I have been able to visit them, I must say that as a rule I find too little timber used everywhere. The workmen, however, are not alone to blame for this. The mining bosses are almost invariably as reckless in this respect as are the workmen. When their attention is called to this fearful insufficiency of timber to support the roof of the workings, they will argue that "no timber is needed"—that "the roof rock is as sound as an anvil," or "as sound as a bell," &c., and the men under their charge are thus not only allowed but are encouraged in their criminal negligence to make their working places safe. It is a well known fact that almost in every case of accidents from falls of roof they occur in those apparently safe places, where the rock is said to be "as sound as a bell," and that an accident very rarely occurs in bad, rotten and shelly roof. Accidents occur where danger is not suspected—in comparatively safe places—and not where danger is imminent. The fact is, however, that there is

danger to life and limb, lurking in secret and hidden slants and fissures in rock and coal, frequently in apparently the safest places; and it is the experience of every competent, observing and considerate miner that good strong props are excellent companions even where danger is not suspected. It appears passing strange that the workmen will not guard in every way against accidents. They are the sufferers. It matters not what safe-guards may be thrown around them by legislation, nor what efforts may be made on the part of others to protect their lives and health, they must continue to meet with serious and fatal accidents unless they learn to protect themselves.

I have said that mining bosses are almost invariably as reckless in this respect as are the workmen; but there are honorable exceptions, however. I have found several mining bosses who complain bitterly that they cannot induce their workmen to stand props; and in some instances men have been killed instantly by not obeying the orders of their mining bosses, while many more have had their limbs broken through the same disobedience. One of the first cases of fatal accidents that occurred after my entering upon the duties of my office, in October last, was a case of this kind. The mining boss, in this case, had threatened to discharge the man for refusing to stand props in his chamber; but the threat was unheeded because it had repeatedly been made before but never executed. This unfortunate man paid the penalty of his disobedience with his life. His laborer was with him, and it appears that he was so overcome with fear that he became actually ill, and had announced his purpose of going home, leaving the car which he was loading unfinished. But the miner asked him to remain and to go and drill a hole which he had commenced, and said he would finish loading the car himself. No sooner than the two men had thus exchanged work than the roof of the chamber fell, killing the miner instantly.

There are several cases of this kind that I might mention, but the above is sufficient for my present purpose. Now, would it not be an act of mercy towards such men, in such cases, for the mining boss to discharge them rather than to allow them thus to commit willful self-murder, or to be the cause of the untimely death of the men who work with them? The mining bosses are too reluctant to use severe measures to enforce obedience to their orders; they know that the poor miner has a very hard struggle to keep starvation from his door, even when working every day, and, out of compassion for the offender's family of little ones, he will not discharge a man though he may have threatened to do so a dozen times. This feeling is undoubtedly a credit to his heart, but it is, in my opinion, an unwise and mistaken policy. A man's judgment should govern him in all such cases.

All parties are absolutely without an excuse in this matter, for the operators always provide all the timber for propping that is needed, and I have not found one instance where they complain that the amount of timber used is too great.

"Crushed by Mine Cars."

Another cause of numerous accidents is classified under the term "crushed by mine cars." Drivers and runners are the principal sufferers from this cause. These accidents are generally the result of reckless daring on the part of the boys, and of narrow main roads which are frequently obstructed on the sides by rubbish. How often the inspector is notified that a driver has been killed or seriously injured by being "crushed between cars and pillar, "between cars and props," or "by falling under the cars," on account of the rubbish on the road-side. The remedy for this class of accidents is very simple. Give adequate space between the cars and pillars

and between the cars and props, and keep the road-side free from rubbish, and these accidents will cease almost entirely. There may be places, occasionally, where this might be impracticable, but as a rule these simple remedies are easily applied. The coal seams in this district are such that nothing but incompetency in the management can be advanced as an excuse for crowding the main roads so close to the pillars that there is no place to pass.

Then, again, the drivers very often attempt to couple the cars while they are in motion; this they should never do, and the driver bosses ought to prohibit the practice at once. If these boys were outside, in broad daylight, the practice might be excusable, for then they would be enabled to see any obstruction that might be lying in their way and avoid them; but under ground they are comparatively in midnight darkness, and cannot see but a few yards in advance, at the best, and they are hence liable to be thrown under or between the cars by the first obstruction they meet. There were nine killed and nineteen injured by mine cars in divers ways during last year; and every effort should be made by our colliery managers to save these boys' lives.

Explosions of Carbureted Hydrogen Gas.

There were six fatal and twenty-one non-fatal accidents from explosions of carbureted hydrogen gas during the year. Many of the non-fatal ones, however, resulted in only slight burnings of hands and faces. The collieries generating this gas are nearly all supplied with strong currents of pure air to dilute and carry it off as fast as it is generated. But I am sorry to say there are exceptions, and I have given them my particular attention with the view of securing adequate ventilation in them all. There are several causes for complaint in regard to this matter. One of them is that the gas is allowed to accumulate in large volumes in those collieries which have not the adequate amount of ventilation for its dilution. These accumulations are designated, in the Mine Ventilation act of the third of March, 1870, as "standing gas," and are beyond all peradventure under the legislative inhibition. I have been compelled to order a suspension of work in a part of one colliery, on account of "standing gas," until such time as the owner shall provide a sufficient quantity of pure air to dilute and carry it off. Mr. Tompkins, the owner and operator of the colliery referred to, feels that my course respecting his colliery is severe and arbitrary, and has suspended work altogether. But I cannot see how I could have taken any other course. I had a duty to perform, and had no choice in the matter.

I found, also, when I commenced my official examinations, that it was nearly the universal custom to decrease the speed of the fans during the night. The natural and unavoidable consequence of this was, that large accumulations of gas were found by the fire bosses, when making their morning rounds, in many of the chambers where the men work. Then it becomes necessary to resort to the old custom of "brushing out the gas" to break up these accumulations and hasten their exit, with the renewed full current of air, to the upcast. The law evidently provides but one means to dilute the gases so as to render them harmless, and that is by providing such an amount of pure air "as circumstances may require, which shall be circulated through to the face of each and every working place throughout the entire mine." The necessity of "brushing out the gas" should never exist.

Another custom which I found in very general practice was, that workmen were obliged to do this "brushing out" business themselves. The fire

boss would make his tour of inspection in the morning, and on his return to the bottom of the shaft or slope, would inform the men in whose chambers he had found gas of that fact, and then the men would go in themselves to "brush out the gas," notwithstanding that the law explicitly provides that, "the workmen shall not enter the mine until such examination has been made and reported, and the cause of danger, if any exists, be removed." This provision of the law is eminently wise and proper, for the ordinary miner, especially in this country where a man assumes to be a miner when he can drill a hole and charge it—in some shape—do not understand but very little about the nature of gas, nor the proper way to deal with it. However incredible it may seem, it is nevertheless a fact, that two men in one of the collieries of this district entered one morning to their work, and one of them entered into the face of his working place without a light, and taking off his coat, he commenced to "brush out the gas." The other man walked in with his naked light, apparently to hold a light for No. 1, and the result was an explosion, as a matter of course, which gave both men a foretaste of Hades.

Two men in another colliery went to work "brushing out the gas" from their chambers, leaving their lighted lamps down on the heading road, directly in the course the gas must take to escape, and both men were severely burned by an explosion that under the circumstances was inevitable. And still another couple of miners in another colliery were fatally burned by an explosion of gas, ignited in the same manner. All of these unfortunate men were violating the plain letter of the law, by entering the mines before "all cause of danger was removed," and the foremen of such mines were violating the law by allowing them to enter. These irregularities, however, are being corrected, and I am happy to bear testimony to the cheerful alacrity, with which almost all mine superintendents second my efforts to inaugurate a radical reform in this direction.

Other "Noxious and Poisonous Gases."

When on my official visits of inspection to those collieries in the district which do not generate carbureted hydrogen gas, and when I have found, as I have in many cases, that the ventilation of the mines has been entirely neglected; the invariable excuse given for the neglect is, "O, we have no gas here!" "There is no danger here in any part of the mine!" And when I inform them that they are sadly mistaken, that they *have* gas in their mines, and that it destroys the health and shortens the lives of their workmen—slowly it may be, but as surely as they are compelled to inhale it—these would-be wise and efficient mining bosses open their eyes in incredulous surprise, and appear as if they seriously doubted my sanity. There is a fearful ignorance in relation to these "noxious and poisonous gases" on the part of very many of the mining bosses throughout this whole district. Ninety per cent. of the number to whom I propounded the question, "Are there other noxious and poisonous gases generated in your colliery?" answered "No." And several of these men were in charge of collieries where there was not a sufficient current of air traversing in any part thereof to move an anemometer, and some of them are actually suffering untold misery from the effects of those gases, the existence of which they deny.

The workmen, however, know, to their sorrow, that there are "noxious and poisonous gases" in those colleries. It is very probable that they cannot designate one gas from another, and even the names of the gases may be as Greek to them; still, they are well aware of their existence and of their presence in the atmosphere which surrounds them, and they feel their

poisonous and life-destroying effects on their constitutions every day of their lives. I met one of these men sitting by the roadside one day, and I asked him why he was sitting there, and he answered, "I am sick." And upon my questioning him relative to the condition of the ventilation of the colliery in which he had worked, he complained most bitterly, and said that, "the men are kill't entirely for the want of air;" and in regard to himself he said, "I could think there was a blacksmith's shop in my head this very minute." This poor sufferer did not know who I was, and I knew he did not exaggerate. I had been in the colliery in which he worked that very day, and had found it fully as bad as he represented. There were parts of this colliery where an eternal cloud of powder smoke filled all the workings and not a breath of pure air to dispel it. The atmosphere of the mines was heavily charged with carbonic oxide, and yet the mining boss had succeeded, apparenty, to persuade himself—and he tried to persuade me also—that there was no gas whatever in that colliery. There are other collieries in which carbonic acid gas, carbonic oxide and sulphureted hydrogen gas are met with in large quantities, and yet the mining bosses assert that there is no gas there. I withhold the names of those collieries at present, because there are important improvements inaugurated which will effectually remove these glaring evils within the coming year, and I am very positive that I shall be able to give a good report from them in my next annual report.

Ventilation in General.

In collieries where carbureted hydrogen gas is evolved, with but few exceptions, the ventilation is passably good; and in many instances it is excellent—the amount of air ranging from forty thousand up to one hundred and twenty thousand cubic feet per minute. Then again, in collieries which do not generate this explosive gas, with few exceptions, the ventilation is very far from being up to the requirements of the law. The superintendents and mining bosses of several of this latter class of collieries had apparently succeeded in making themselves believe that the proper ventilation of their collieries was nearly, if not absolutely, an utter impossibility. They evidently thought they had succeeded in deluding everybody else with the same sophistry, but they are being convinced to the contrary. Preparations are now under way to sink air-shafts with the purpose of putting in fans of the most approved pattern to produce the amount of ventilation required; and when these contemplated improvements are perfected no further trouble in this respect will be had, and I will venture the prediction that no party will be better pleased with the result than those very superintendents and mining bosses above referred to. There are many collieries where no air-ways are worked parallel with the gangways, and some with no gangways even; and I readily admit that it is no easy matter to provide good ventilation in such workings. If there be no system in working the colliery it will always be difficult to provide good air-courses to conduct an adequate amount of pure air to the face of the workings as the law requires. It is always much better, and even much cheaper, to conduct the colliery on scientific principles than to root out the coal in every which way—without any regard to system or science—as is so often done; and those who work up to the highest standard will readily admit this fact.

In justice to the superintendents and mining bosses of the Delaware, Lackawanna and Western railroad company I must give them the credit of having by far the best ventilated collieries in my district. They have no poorly ventilated collieries. Every care is taken to utilize all the pure

air that enters their collieries by conducting it systematically through excellent air-ways to the face of each and every working place in the mines. Their air-ways are large and shapely; their stoppings in cross-cuts, or entrances, are all walled with stone and mortar; their ventilators consist almost entirely of fans, which for the present give excellent results; and their furnaces, what they have of them, are first-class and give entire satisfaction. No labor or expense is spared to keep the collieries in good condition in every respect; and the company deserves great credit for their honest efforts to comply cheerfully with all the provisions and requirements of the mine ventilation act.

Of the large corporations, the Pennsylvania coal company must be classed second on the list for efficient ventilation. The general mine superintendents are men of long experience in the business of mining coal; and they seem to be ready and willing to do their whole duty in the matter of providing an adequate amount of pure air for their workmen. They have considerable room for improvement, however, in several of their collieries, but I feel very confident that they will inaugurate the necessary improvements without unnecessary delay.

The Delaware and Hudson canal company is the third large corporation in the district, and the third also in regard to ventilation. The greater number of the collieries of this company are free from explosive gas, and their proper ventilation for that reason has been sadly neglected. Indeed I must say that I was astonished to find this pioneer company in the business of mining coal in the Lackawanna Valley, so far behind its younger competitors. When I entered upon my duties as inspector, this company had some of the very worst ventilated collieries in the Lackawanna Valley. The mine ventilation law of 1870, so far as those collieries were concerned, was a dead letter. It seemed that the doctrine and practice of the managers of these works was: "As it was in the beginning, so it is now, and ever shall be." There was no effort made to improve the ventilation, and their workmen were suffering untold misery in consequence. The men in their employ have become old in appearance, decrepit, asthmatic and consumptive; and their lives have been materially shortened by a process of slow starvation for the want of the proper quantity of oxygen to sustain life. It is an astounding fact that the old miners of Carbondale can be recognized from all others throughout the valley by their wornout and asthmatic appearance.

The above remarks are applied especially to No. 1 shaft, White Bridge tunnel, No. 3 shaft and the Coal Brook collieries at Carbondale. I cannot understand how matters were allowed to go on in the manner I have faintly described above, nor how the plain requirements of the law were so glaringly ignored for so long a time after the law was enacted. It certainly was not caused by the ignorance of the general mine superintendent, for the gentleman holding that position is above the average in intelligence, and has had many years' experience as a mine manager. The excellent ventilation of other collieries under his charge—Leggett's Creek shaft, Providence, for instance—is positive proof of his intelligence and competency, so that the plea of ignorance will not avail for this inexcusable negligence. Then the cause must be sought for in some other direction, and I believe it is found in the fact that the Carbondale mines have been worked on this health-destroying and man-killing system for the past fifty years or more, and in the absurd tenacity with which the managers cling to the old system, with no better reason for it than that it *is* old. They have excused, and justified themselves in the course they have pursued, also, to a great degree, with the defence that there is no gas evolved in their collieries;

but that, as I have already shown, is no defence. In the three collieries first named they have relied entirely through all these long years on natural ventilation for a supply of air for their workmen. They have done literally nothing to assist nature to do the work, and as the workings extend from year to year the ventilation gets worse and worse.

Soon after I entered upon the duties of my office, I gave No. 3 shaft, Carbondale, my particular attention; and after making a thorough examination of the workings I immediately called the attention of A. H. Vandling, Esq., general agent for the company, to the condition of the colliery, and in reply to my communication Mr. Vandling assured me that the matter would be attended to immediately. His note is couched in the following words:

"Noting your favor of the 4th inst. (December, 1876,) concerning ventilation in our Carbondale mines—the results of your examinations and conclusions are surprising, for the reason that I was not previously aware of such deficiency or sufficient cause for complaint. The matter will have our due and immediate attention."

I am happy to state that improvements were projected immediately after this correspondence, which, when perfected, will remove all cause for complaint, and will put those collieries on an equality, regarding ventilation, with the best ventilated collieries in the district. An air-shaft is to be sunk for No. 3 shaft, and a fan is to be placed there; and I expect this will be followed with another fan for No. 1 shaft, and another for the Coal Brook colliery in place of the miserable little furnaces they now have there at the bottom of very shallow shafts, and hence almost worthless. I feel under great obligation to A. H. Vandling, Esq., general superintendent, for his prompt co-operation and manly course in relation to my efforts to enforce the mine ventilation law; and I am certain that the miners at Carbondale, before another year ends, will have cause to bless him for his prompt action in the premises.

Miscellaneous Companies and Operators.

The collieries of the smaller companies, in regard to ventilation, may be divided into three classes—the first class having good and satisfactory ventilation, the second class having middling, and the third class having poor and very unsatisfactory ventilation. The first class consists of the following collieries: Roaring Brook colliery, Dunmore; Jermyn's shaft, Green Ridge; Mt. Pleasant slope, Hyde Park; Pine Brook shaft, Scranton; Green Ridge slope, Dunmore; Capouse shaft, Hyde Park; and Meadow Brook collieries, Scranton. The second class consists of the following: Erie shaft, Carbondale township; Phœnix shaft, Ravine shaft, Twin shaft, Seneca slope, and Butler shaft, Pittston; Hillside colliery, Pleasant Valley; Filer & Livey's collieries, Winton; Greenwood colliery, Lackawanna township; Columbia colliery, and Beaver mines, Pittston. The following make up the third class: Sibley shaft, Old Forge township; Everhart colliery, Jenkins township; Jermyn's slope and shaft, Jermyn; Park coal company's slope, Hyde Park; Fair Lawn slope, Scranton; Jones & Simpson's colliery, Archbald; and Tompkins shaft, Pittston. All are graded, as regards merit, in the order in which they are named in each class. The collieries which are not named in the above classification, I as yet know comparatively nothing about. I have suggested important improvements in many of the collieries in the third class, and the owners and agents have shown a ready disposition to act on the suggestions given. Some of them, it is true, complain of the hard times and consequent lack of funds to provide themselves with the necessary mechanical power to properly ventilate their mines, but all admit that the improvements demanded are sorely needed. I deeply sym-

pathize with these parties, and if it were possible, in justice to the workmen and in compliance with my oath-bound duty under the law, for me to pass them by and allow them to continue working without the improvements I have demanded, it would give me great pleasure to do so. I have not been disposed to use severe measures towards any party; but I have invariably signified my willingness for them all to continue working, provided extra precautions are taken to guard against and avoid accidents while the improvements demanded are being made.

Air Measurement Reports.

During the months of October and November I received but few air measurement reports, and several of those that I did receive were only measurements at the inlet and outlet, and only one measurement for the month, while the law very properly requires weekly measurements to be made "at the inlet and outlet, and at or near the face of all gangways; and all measurements to be reported to the inspector once per month." The most important measurements—those that should be made "at or near the face of all gangways"—were omitted. Of course such reports were but little better than none at all. It is of very little importance what quantity of air enters into and exits out of a colliery unless it is properly conducted to the face of the workings.

It was very important that I should receive true air measurement reports when I first entered upon my duties as inspector, to enable me to judge of the condition of the several collieries until such time as I could make a personal visit of inspection to each, and I demanded such reports from all the collieries. Almost all the mining bosses complied with my demand, but the reports of many of them were utterly worthless. Some of them knew nothing about the relative value of figures, and did not know how to take air measurements; and, in one instance, a mining boss actually attempted to measure the air with a tape-line! I have reports which are curiosities, and I shall keep them carefully on file, and hand them over to my successor in office. There are some collieries which did not make air measurement reports up to the end of the year, and the unavoidable inference is, that they have no air that they can measure.

I was considerably provoked by the attempt of a few presumptious semi-superintendents to impose upon me by sending false air reports—reports of air measurements which were never made. They evidently supposed that the "new inspector" was an ignoramus, upon whom they could impose with impunity. They are welcome to all the pleasure and satisfaction they derived from their attempt to impose upon the "new inspector," but I surmise that they would sell out all the capital they made thereby very cheap. One of them must pardon me for displaying a sample of his handiwork by inserting one of his reports, which is only one of a dozen others just like it which accompanied it. His scientific report is as follows:

"SIR:—The following is a true report of actual air measurements for the month of November, 1876:

Local name of each split.....	Number of current.....	Number of cubic feet in inlet.....	Number of cubic feet in face of gangways.....	Number of cubic feet at outlet.....	Number of men and boys.....	Number of mules and horses.....
	1	9,500	1,500	20,000	30	3
	2	8,000	2,000		28	4
	3	40,000	10,000	46,200	65	9
	4	18,000	15,000	19,400	50	6
First week's measurement, —th—total.....	.....	75,500	28,500	85,600	173	22
	1	9,500	1,500	20,000	30	3
	2	8,000	2,000		28	4
	3	40,000	10,000	46,200	65	9
	4	18,000	15,000	19,400	50	6
Second week's measurement, —th—total.....	.....	75,500	28,500	85,600	173	22
	1	9,500	1,500	20,000	30	3
	2	8,000	2,000		28	4
	3	40,000	10,000	46,200	65	9
	4	18,000	15,000	19,400	50	6
Third week's measurement, —th—total.....	.....	75,500	28,500	85,600	173	22
	1	9,500	1,500	20,000	30	3
	2	8,000	2,000		28	4
	3	40,000	10,000	46,200	65	9
	4	18,000	15,000	19,400	50	6
Fourth week's measurement, —th—total.....	.....	75,500	28,500	85,600	173	22

Now, every intelligent man will see at a glance that the above is a fraud on its face. Here are eleven measurements for four consecutive weeks exactly alike. Verily, the gentleman who performed such a miracle must be in league with the "prince of the power of the air." But if the gentleman has succeeded in attaining such absolute control of the air as the above figures indicate, then why does he not utilize a much greater proportion of the air he claims to have at the inlet, by conducting it to the face of his gangways, and through to the face of all the chambers to the workmen where it is so much needed? In the two first splits there are 17,500 cubic feet at the inlet and only 3,500 cubic feet at the face of the gangways, which show a loss of 14,000 out of 17,500 cubic feet. The reason for this is self-evident and need not be advanced. But how comes this wonderful uniformity in these figures for four consecutive weeks? Evidently there was but one measurement made, and the measurement for one week was set down in the report, over and over, and over again, for the other three weeks of the month; and this was done to cover up their neglect to make weekly measurements as the law requires, and with the purpose of imposing on the inspector.

MINE INSTRUMENTS.

The anemometer is the only instrument that has come into general use in our collieries. But there are a few which are not supplied even with this instrument; and in some instances the same anemometer has been obliged to do service for two, three and even a half dozen collieries. In such cases the air measurements are irregular, and frequently omitted altogether because the anemometer may be at another colliery several miles away. The thermometer and barometer are but very seldom used, and but few of them can be found in the possession of our mine managers; and, indeed, but few of our mining bosses have the remotest idea what use can be made of them, especially the barometer. There are honorable exceptions, however; and

these men are by far the most efficient and competent superintendents and mining bosses in the district. The water-gauge is very rarely seen around our mines. But very few know how to use it, and many do not know what it is good for, and have never seen one. The use of these scientific instruments, however, are being discussed, and I have strong hopes that the near future will bring many of them into use.

Steam Engines and Machinery.

The Delaware, Lackawanna and Western railroad company have 45 hoisting engines, of 2,038-horse power; 16 breaker engines, of 910-horse power; 34 pumping engines, of 2,553-horse power; 12 fan engines, of 600-horse power—making a total of 108 engines, with a combined horse power of 6,191. They have 194 boilers to provide steam for these engines. The Pennsylvania coal company have 32 hoisting engines, of 1,010-horse power; 7 breaker engines, of 225-horse power; 30 pumping engines, of 850-horse power; 4 fan engines, of 80-horse power—making a total of 73 engines, with a combined horse power of 2,165; and 96 boilers. The Delaware and Hudson canal company have 25 hoisting engines, of 1,211-horse power; 7 breaker engines, of 418-horse power; 17 pumping engines, of 921-horse power; 5 fan engines, of 321-horse power—making a total of 54 engines, with a combined horse power of 2,871; and 89 boilers. All the smaller companies and single operators combined have 60 hoisting engines, of 2,432-horse power; 34 breaker engines, of 1,311-horse power; 27 pumping engines, of 690-horse power; 8 fan engines, of 362-horse power—making a total of 129 engines, with a combined horse power of 4,795; and 232 boilers. This will make a grand total of 162 hoisting engines; 64 breaker engines; 108 pumping engines, and 29 fan engines—363 engines in all, having a combined horse power of 15,832; and 611 steam boilers to provide steam for them.

The supervisory care of the inspector over this vast amount of machinery with its innumerable additions of rolls, screens, cages, safety-catches, bridle chains, ropes, sheeve wheels, drums, brakes, signals, and many other things, is a fearful responsibility, and cause of inconceivable anxiety. Great care is exercised, as a rule, by all the engineers, and I am highly gratified that no accidents, excepting those that occurred through falling on screens, have happened in connection with machinery during the year. I am thoroughly convinced that all screens should be roofed over, and then it will be impossible for the slate pickers or any one else to fall upon them, as has been so often the case. The proposed covers to the screens can be put on in sections, so that they can easily be removed when the screens need repairing.

New Collieries and Openings.

Jermyn's New Shaft, Green Ridge.

The sinking of the above named new shaft was commenced by John Jermyn, Esq., on the 21st day of June, 1875, and the work of sinking was finished in six months and eleven days—that is, on the 2d day of January, 1876. The shaft is located at Green Ridge, Scranton, on a tract of land of about three hundred acres, leased by Mr. Jermyn from Messrs. Meylert & Sanderson.

Knowing that he had a difficult task on his hands, Mr. Jermyn was very careful in starting. And it was very necessary for him to be careful, for he had forty-six (46) feet of quick-sand to go through before he reached the surface of the rock. The size of the shaft is 32x17 feet, and the timber used was 12x14 inches. The timbering was done from the top. The

first four sets of timber were mortised together and firmly bolted on to the fifth set. Each set of timber was bolted thus with twelve one-inch bolts, which were four feet long, so that every fourth set of timber was bolted to the three sets above it. This frame work was forced down with two pieces of cast-iron, weighing 900 pounds each, and a frame twenty feet high was made for each of these, and they were used in the same manner as pile drivers are used, and the timber was thus forced down without any trouble. There were castings, nine inches wide, bolted under the bottom set of timber, which had a flange four inches deep, cutting its way through the sand. Buntons of 8x14 inch timber were put in every ten feet across the shaft; but when they had gone down 35 feet the pressure was so great that the timber were breaking in the centre. To remedy this, false sets of timber were put in inside of the others, leaving a space of two feet between them, which was filled with cement and small stones about the size of an apple. Four hundred barrels of the best quality of cement were used for this purpose, and it was hoped that the surface water would be thus kept out, but it was only partially successful. Buntons were put in with the inside timber every four feet, and each set was braced in the four corners of the shaft with 8x12 timber. The outside timber was hemlock and the inside was pine. The sinkers did not put in the timber. This work was done by carpenters, who framed the timber and put them in place, and who took especial care that the frame-work was kept square. The bucket was filled in a space of only four feet square. The sides and ends of the shaft were not touched, for they kept running in to the centre continually.

There were three pumps in the shaft the whole time—two of them in continual operation, and the third, an extra one, ready at all times when one of the others should need repairing; and they used a pair of small engines, with 8x10 link motion, of Dickson's manufacture. After striking the rock, and after securing the timbering, cementing, &c., the further sinking was suspended for a time for the purpose of putting in permanent boilers. Then they resumed and commenced sinking through the rock. They first went through 32 feet of hard sand stone, and then met with a seam of coal four feet six inches thick, with six inches of slate in it. The coal is of a very poor quality and will not be worked for many years. Then they went through 14 feet of slate rock and met with another seam of coal, of very good quality, six feet and six inches thick, with four inches of slate intermixed. Below this they had 45 feet of tough slate rock, and then struck a nine-feet seam of coal of excellent quality, with only three inches of bone in the whole thickness. A sump was made in this coal for the water. Then they sank through 40 feet of very hard rock, upon which drills would make no impression. It was very slow work sinking through this, but perseverance overcame even this, and still another seam of coal, six feet thick, was met with, but this seam has slate all intermixed, making it utterly unmarketable—in the present condition of the trade, at least. Next they had 40½ feet of slate rock, and met a three-feet seam of very good coal; then 40 feet of hard rock, which worked very well, and then met six feet six inches of coal of very good quality, with a foot of fire clay near the bottom. This seam was struck on a saddle, and as they worked in some distance the fire-clay seemed to be thinning out, but as there was considerable gas evolving, and as they had no fan as yet, they did not enter very far. They made a sump here and then stopped sinking. The distance from the surface of the rock to the bottom is 255 feet. The sinking through the rock was done entirely with Rend Rock powder, which was fired with a battery, and not the least accident happened to any one from beginning to end.

Second Opening.—The second opening is 100 yards from the main shaft, and is also a shaft 10x15 feet in the clear. They had 55 feet of quicksand to sink through in this shaft, and the work was done in the same manner as in the main shaft, but they did not sink so fast. They have a pair of 14x30 link motion engines, with compound brakes, at this shaft. No coal is hoisted—only the workmen and materials for the use of the inside workings. There are two of the largest size steam pumps, of Guild & Garrison's make, of Williamsburg, N. Y., put in here, and one of them is more than sufficient to take out the water. These pumps give entire satisfaction, and only cost $1,450 each, and the expense of putting them in is very trifling.

The Breaker.—The breaker is a mammoth concern. It is located in a hollow, and for that reason they were obliged to build it very high so as to insure fall enough for their chutes to the railroad. About a million feet of lumber was used in its construction, and the greater part of it is pine, shipped from Williamsport. It has two sets of rolls and six screens, and can make all sizes of coal, or run it all into stove, chestnut and pea coal, according to the demands of the market; and the breaker has a capacity of 800 to 1,000 tons per day.

Outside Improvements.—They have a fan of twenty feet diameter and five feet face, which is driven by an 18x22 link motion 80-horse power engine, and it is run at about fifty revolutions per minute, giving all the ventilation that can be desired. The fan house is built of brick. They have four hoisting engines, 220-horse power, and a 60-horse power breaker engine. The boiler house is built of brick and contains 12 boilers. There is also a machine shop connected with the works, in which there is a 15-horse power engine, which runs a lathe, bolt cutter, the saws in the carpenter shops and a fan for blast in the blacksmith shop. The carpenter shop is large and commodious, and is fitted up with circular and rip saws, and all the modern improvements for dispatching work. The blacksmith shop is also of the first class.

Note.—The time consumed to sink through the 46 feet of quicksand in the main shaft was just five weeks; the time required to go through the rock, a distance of 255 feet, including the coal seams, was six months and eleven days; the time in which all this work was done—sinking the two shafts, building the breaker, boiler house, engine house, fan house, shops, office, and the whole thing complete—was just eleven months and two days. John Jermyn, Esq , deserves great credit for the untiring energy he has displayed and the enterprise he has manifested in undertaking and successfully accomplishing this great task, which he did on his own individual responsibility. And this must be my excuse, if any is needed, for this extended notice of his colliery.

No. 13 Shaft.

This shaft was sunk by the Pennsylvania coal company—the sinking being almost all done during 1876. It is located in Lackawanna township, near Moosic. It is 31 feet 6 inches long by 12 feet wide, and about 137 feet deep, from the top of the cribbing to the bottom of the coal seam. The coal is raised 65 feet above the top of the cribbing, making the full depth of the shaft about 202 feet. They have no second opening to this shaft, but expect to make a connection with the Law shaft as soon as possible. No coal was shipped from here during the year.

Jones & Simpson's Slope.

This is new slope, located at Archbald, and owned by Jones, Simpson & Co. The area of the slope is 6x10 feet, and its length is 547 feet. The

angle of inclination is 9° 35′. The slope was driven part of the way through coal, at a cost of $364, but there were 28⅔ yards of rock to cut, from nought up to eight feet, which cost $283 33, and 77 yards driven through sandstone, which cost $3,080. The whole cost for sinking the slope was only $3,952 33. They have a pair of engines, 13-inch cylinder and 18-inch stroke; estimated horse power, 50; the size of their drum is six feet diameter, which has an approved brake attached to it. There is no second opening to the slope, but they are driving for one toward No. 1 drift, and expect to make a connection soon.

Other New Openings and Connections.

The Delaware, Lackawanna and Western railroad company have made connections between the Hampton shaft and the Oxford shaft, at Hyde Park, and between Tripp's slope and the Brisbin shaft, in the Third ward, Scranton. They have also sunk an air shaft, at Hyde Park, into the workings of the Oxford shaft, and connects also with the Hampton shaft workings. A fan is to be placed at this air shaft which will assist in ventilating both collieries named.

The Pennsylvania coal company have completed a new slope at No. 1 tunnel, in Pittston township, which is intended for hoisting coal. They have also made a second opening for No. 4 slope, in Jenkins township, which is to be used also for ventilation; and the workings of old No. 10 shaft in the 14-foot seam, have been connected with the new No. 10 shaft, in Pittston. No. 2 shaft, Dunmore, was sunk to the lower seam.

The Delaware and Hudson canal company have made a connection, in the 14-foot seam, between Marvine and Leggetts Creek shafts, Providence; and at No. 1 shaft, Carbondale, an air shaft has been sunk, and two more air shafts at No. 3 shaft, and still another at the Coal Brook colliery. These air shafts are only poor-make shifts, unless mechanical means are used to produce ventilation. There are too many of them in Carbondale. What is needed there is a system of air courses inside of the collieries.

At the Filer colliery, Winton, a drift has been driven from a ravine into the workings, for a traveling way for the men to go to and from their work. A new drift has been opened at the Greenwood colliery for mining coal, and the same company have made an additional opening for coal at the Sibly colliery, in Old Forge township. An opening has been made at the Green Ridge slope for ventilation. The above are all the openings and connections made in the district during the year, so far as I am informed.

Idle and Abandonded Collieries.

The Archbald shaft, Lackawanna township, and Oxford shaft, Hyde Park, owned by the Delaware, Lackawanna and Western railroad company, were idle all through the year; the last work done at the Hyde Park shaft was done in February, and the Scranton coal company's drifts at Bellevue were idle. Bellevue slope and shaft worked only 22½ days.

No. 1 shaft, Pittston township, owned by Pennsylvania coal company, was idle; No. 2 and No. 3 shafts were abandoned as hoisting shafts, and are now used as pumping shafts.

The Marvine shaft, Providence; Powderly slope, Carbondale township, and Breaker, Forrest and Jefferson tunnels, Carbondale City, all owned by the Delaware and Hudson canal company, were idle.

The following collieries have also been idle: Rolling Mill colliery, Scranton, consisting of a slope, tunnel and drift; the Ontario colliery, Pleasant Valley, and the Heidelberg colliery, Pleasant Valley. Spring Brook No. 1

and No. 2 drifts, Lackawanna township, and Carbon Hill slope, Old Forge township, were abandoned by the Glenwood coal company, in September, 1876, on account of the poor quality of the coal.

Experiments on Fans and Furnace.

I have not had time to experiment but little on account of multiplicity of other duties; but Benjamin Hughes, Esq., general mine superintendent for the Delaware, Lackawanna and Western railroad company, together with Thomas D. Davies, Esq., his assistant, and others, have made some very interesting tests on fan and furnace ventilation, which are too good to pass by unnoticed. One of the tests was made with the water-gauge on the fan at Pyne shaft. The fan is 12 ft. diameter, 4 ft. face and has two circular inlets 6 ft. each, and was run at two and a-half revolutions to engine's one. The area, where the velocity of the air was taken, is 105 ft. From the tests made, we have the following table:

Tests made on Fan at Pyne Shaft, Lackawanna Township, Pa.

Revolutions of engine.	Revolutions of fan.	Velocity of the air per minute.	Water-gauge.	Amount of ventilation in cubic feet per minute.	Amount of air exhausted per revolution of the fan.	Horse power.
40	100	760	.6	79,800	798	7.5
45	112½	835	.8	87,675	779	11.0
50	125	950	.9	99,750	798	14.1
55	137½	1,016	1.0	106,680	776	16.8
60	150	1,108	1.1	116,340	775	20.1
68	170	1,255	1.2	131,775	775	24.9

After the above tests were completed the doors at the head of the shaft and slope were thrown open, making two inlets; the fan was run at the speed of the last test, and gave 141,750 cubic feet per minute. This is an exceedingly favorable showing, and if all our mine managers would devote part of their time in testing their ventilators in this manner they would be richly rewarded in the valuable information and experience gained, which must result in great good to themselves, to their employers and to the miners.

Another series of tests were made on the fan at Taylor shaft, Lackawanna township. The dimensions of this fan are as follows: Diameter, 14 ft.; face, 4½ ft.; area of section where the ventilation was measured, 92 ft.; and fan running two revolutions to engine's one. In this case we have the following table:

Tests made on Fan at Taylor Shaft, Lackawanna Township, Pa.

Revolutions of engine.	Revolutions of fan.	Velocity of the air per minute.	Water-gauge.	Amount of ventilation in cubic feet per minute.	Amount of air exhausted per revolution of the fan.	Horse power.
40	80	725	.4	66,700	833.75	4.20
45	90	775	.6	71,300	792.02	6.74
50	100	862	.8	79,304	793.	9.99
55	110	917	.85	84,364	766.94	11.29
60	120	1,012	1.1	93,104	775.86	16.14
70	140	1,175	1.4	108,100	772.14	23.84

The result of the test made on the power of the furnace at the Dodge shaft, Lackawanna township, by the same gentlemen, is equally creditable to them as the above. The furnace is a double one, with grate surface of 48 square feet for each, or a combined surface area of 96 square feet; the

downcast and upcast shafts are 300 feet deep; the barometer indicated an atmospheric pressure of 29.4: the mean temperature in the downcast is given at 24° Fah., and 153° as the mean temperature in the upcast; the motive column or the difference in weight of air column in the shafts was 5.103; the amount of ventilation was 115,330 cubic feet per minute; and the horse power of the furnace (worked out as per formula of J. J. Atkinson and others) is 17.834 H. P.

If the gentlemen had gone a step further, and had calculated the percentage of power expended to overcome the friction and actually expended to produce the ventilation, in each of the foregoing experiments, they would have added much to their value. They will do so undoubtedly, and will not rest until they have completely mastered the subject of scientific ventilation in all its various phases.

Forest City Colliery.

This colliery is located in Clifford township, Susquehanna county, and is therefore outside of my district. It consists of a drift, which is worked by the Hillside coal and iron company, for which Samuel Hines, Esq., Scranton, is agent. The other officials are: W. E. Colborn, general mine superintendent; David M'Donald, mine boss; and B. F. Storm, outside foreman. They employed 58 men and boys during the year 1876, and mined 13,508 tons of coal. A fatal accident occurred at this colliery on the 6th day of December, caused by a premature explosion of a blast. Thomas Donohue, the miner, and John Gilmartin, the laborer, were tamping a hole, when the powder exploded, killing Gilmartin instantly, and severely injuring Donohue. The accident was promptly reported to me by Mr. Hines, but I did not feel that I had any right to make an investigation because the colliery is not within my district.

TABLE No. 1.—List of deaths reported to the Inspector of the Eastern District of the Wyoming Coal Fields, Luzerne county, State of Pennsylvania, and the cause as shown by his investigation, for the year ending 31st day of December, A. D. 1876.

DATE.	NAMES.	Age.....	Widows.....	Orphans.....	COLLIERY WHERE ACCIDENT OCCURRED.	Date of investigation.....	NATURE OR CAUSE OF ACCIDENTS CAUSING DEATH.
Jan. 8,	William Dempsey...	12	....	....	Fair Lawn slope, Scranton.....	Jan. 8,	Killed by being caught under a coal car in the mine.
14,	Thomas E. Davies..	49	1	5	Park Coal Co.'s slope, Scranton.....	17,	Killed by a fall of roof immediately after firing a blast.
18,	William Scelne.....	14	....	....	Pine Brook shaft, Scranton.....	19,	Fatally injured by being crushed between a mine car and prop; died next day.
20,	Henry Falkenhagen.	46	....	....	Taylor shaft, Taylorville.....	21,	Killed by falling down the shaft at night; he was not an employee.
Mar. 6,	John Linnen.....	30	1	5	Coal Brook tunnel, Carbondale.....	Mar. 8.	Killed by being crushed between a car and side of the tunnel.
24,	John Morrissy.....	17	....	....	Leggett's Creek shaft, Providence..	25.	Fatally injured by a piece of rock roof falling upon him, crushing his skull; died next day.
25,	Anthony Kelly	45	1	4	Pine Brook shaft, Scranton.....	27.	Killed by a fall of roof.
25,	T. Killcullen	26	....	....	.....do	27,	Killed by same fall of roof.
23,	John Cotten	29	....	....	Mt. Pleasant slope, Hyde Park.....	28,	Killed by a fall of roof.
31,	Thomas Brennan....	24	1	....	Erie shaft, Carbondale township	April 1,	Killed by a fall of roof.
Apr. 28,	John Munley	13	....	....	Elk Hill colliery, Blakely township.	May 4.	Killed by being crushed by falling under a mine car.
May 13,	John Williams	17	....	....	Diamond No. 2 slope, Scranton.....	16,	Killed by a blast; he left the chamber and went around the pillar for safety from the blast, but went exactly opposite to where the blast was put on the other side, and when the blast exploded it broke through the pillar and killed him. [gas.
20,	Frank Paff.....	20	....	....	Oxford Air shaft, Hyde Park.....	21,	Killed by being hurled down the shaft 310 feet by an explosion of carbureted hydrogen
20,	John Powell	30	1	....	.....do	21,	Killed by the same explosion that killed Paff; but Powell lived in the most excruciating pains for ten days when he died.
20,	John Snyder	50	1	5	Central shaft, Hyde Park.....	22.	Killed by a fall of top coal.
23.	Michael Clarke	70	....	....	Diamond No. 1 breaker, Scranton...	23.	Killed by being smothered with culm, caused by culm chute giving way, literally burying him alive.
25,	John Andrews.....	33	1	5	Jermyn's slope, Jermyn	26.	Killed by a fall of roof.
25.	William Bodycomb .	22	....	....	..... do	26.	Killed by same fall of roof as Andrews. [day.
30.	Owen Reap.....	38	....	....	Hampton shaft, Hyde Park.....	31,	Fatally burned by an explosion of carbureted hydrogen gas; died the evening of same
June 3.	James Gallagher	40	....	....	Hillside colliery, Pleasant Valley ...	June 5.	Killed by a fall of roof.
July 13.	John Fadden	19	....	....	Gipsey Grove colliery, Dunmore	July 15.	Killed by a fall of roof.
Aug. 10.	Henry Lebourne	39	1	1	Elk Hill colliery, Blakely township.	Aug. 12.	Killed by a fall of top coal.
Sept. 5.	Benjamin Williams.	19	....	....	Diamond No. 1 slope, Scranton.....	Sept. 6.	Killed by being crushed between mine cars.
12.	John M. Jeffreys....	16	....	....	No. 9 shaft, Pittston.....	13.	Killed by a fall of roof.
23.	Patrick Murray	48	1	10	Roaring Brook colliery, Dunmore...	25,	Fatally burned by an explosion of powder while he was making a cartridge with his lamp on his head; died October 3d from the effects of his burns.
Oct. 2.	John Gribbin.....	16	....	....	Gipsey Grove colliery, Dunmore	Oct. 3.	Killed by falling down the shaft while playing.
3.	John Rutledge.....	51	1	5	No. 8 shaft, Pittston	4.	Killed by a fall of roof.
4.	Francis Davies.....	13	....	....	Pyne shaft, Lackawanna township..	9,	Killed by being crushed between the pony screen and timber encasing it. (This was the first case investigated by me.)
9.	Michael Killcan	50	1	3	No. 2 slope, Port Griffith.....	11,	Fatally injured by cars striking him which had run away on the slope, breaking his legs and otherwise injuring him; died October 18.
12.	James Flemmings ..	12	....	....	Sibley shaft, Old Forge township....	13.	Killed by being crushed by a mine car under which he fell.
17.	Michael Holland	40	1	....	.....do	18,	Killed by barring down top coal upon himself immediately after firing a blast.
18.	Michael Malia	35	1	4	Leggett's Creek shaft, Providence..	20,	Killed by a fall of roof.
20.	Joseph Phillips.....	13	....	....	Cayuga shaft, Providence.....	21,	Fatally burned by an explosion of "cartridge powder," which was being carried into the mine encased only in a paper wrapper by Peter Gerrity, who was also burned. The boy died at one o'clock, A. M., next morning.
24.	Fred. Stickle	40	....	....	No. 10 shaft, Pittston.....	25,	Fatally injured by a premature explosion of a blast. This accident occurred on the 14th but was not reported until the 24th, at which date the man died from his injuries.
26.	Patrick Houston	35	1	2	Meadow Brook tunnel, Scranton.....	27.	Killed instantly by a fall of roof through his own criminal negligence.
Nov. 1,	John F. Montford...	47	1	10	Jermyn's slope, Jermyn.....	Nov. 2,	Killed instantly by a fall of top coal.

Nov. 21,	Thomas Phillips.....	36	1	7	Cayuga shaft, Providence.....	Nov. 22,	Killed instantly by a fall of bony coal.
25,	Andrew Loftus.....	45	1	5	White Oak colliery, Archbald	27,	Fatally burned by an explosion of powder which was ignited from a spark from his lamp, which he had hanging from his hat while making a cartridge. Died December 2d from his injuries.
Dec. 6,	William Coleman ...	45	1	3	Law's shaft, Pittston township.....	Dec. 7,	Killed instantly by a fall of roof which he was barring down.
21,	Michael Burns.....	15	....	....	Leggett's Creek shaft, Providence..	23,	Fatally injured by having his head crushed between bumpers of cars while attempting to couple them while in motion: he was taken home alive but died the same day.
25,	Samuel Carter.....	37	1	....	Von Storch slope, Providence.....	27,	Killed by an explosion of carbureted hydrogen gas. This man was a "fire boss" and had gone into the mines on Christmas morning, pursuant to orders from the general mine superintendent, to see that the mine was clear of gas. He was found dead, being fearfully burned by the explosion, and finally asphyxiated no doubt with the carbonic acid gas generated by the explosion. It appears that he did not have his safety-lamp with him, as it could not be found anywhere near him after many hours' search. The lamp, however, is missing and its disappearance is a mystery.
26,	Joel Hale.....	30	1	4	Tompkins' shaft, Pittston	28,	Both of these men were fatally burned by an explosion of carbureted hydrogen gas while they were engaged in "brushing out the gas" from their chambers. They were violating the plain letter of the law by entering before "the cause of danger was removed;" and the mine boss was much to blame for allowing the men to enter in violation of the law. Hale died December 28, and Randall lingered in great agony until January 2, 1877, when he died also.
26,	George Randall.....	23	1	1	.....do.....	28,	

TABLE No. 2.—List of accidents reported to the Inspector of the Eastern District of the Wyoming Coal Fields, Luzerne county, State of Pennsylvania, and the cause as shown by his investigation, for the year ending 31st day of December, A. D. 1876.

DATE.	NAMES.	Age	Wife	Children.	COLLIERY WHERE ACCIDENT OCCURRED.	Date of investigation.	NATURE OR CAUSE OF ACCIDENT.
Jan. 11..	Peter Mullen	....	....	....	Erie colliery, Carbondale township.	Jan. 12.	Collar bone broken by a piece of coal falling on him.
12..	David Jones.....	27	....	....	Marvine shaft, Providence.....	13.	Slightly burned by an explosion of carbureted hydrogen gas.
19..	John M'Gowan	40	1	....	Phœnix shaft, Pittston	20.	Slightly injured by a fall of roof.
26..	Thomas Coursey	....	....	....	Von Storch slope, Providence.....	28.	Severely injured by the balance car turning over upon him on the slope.
27..	Patrick Madden.....	....	....	....	Leggett's Creek shaft, Providence..	29.	Injured by an explosion of a cartridge which he was forcing into a drill hole.
Feb. 5..	James Irwin	....	1	....	Fair Lawn slope, Scranton.....	Feb. 5.	Injured by being crushed by a mine car.
12..	John Nolan.....	....	....	....	Elk Hill colliery, Blakely township.	12.	Burned by an explosion of powder. Nolan carried a lighted lamp over a keg of powder, and a spark from the lamp ignited it, burning Farry and himself.
12..	Michael Farry	....	....	....	Elk Hill colliery, Blakely township.	12.	
12..	Benjamin Huff.....	....	....	....	No. 5 shaft, Jenkins township.....	14.	Leg, arm and collar bone broken by falling in front of a car which was in motion.
Mar. 11..	Henry Taylor	30	....	....	Sibley shaft, Old Forge township....	Mar. 11.	Leg and arm broken by an explosion of powder.
23..	David Walters.....	25	....	....	Von Storch slope, Providence.....	23.	Injured by a fall of roof while taking out timber.
23..	Edward Tierney	....	....	....	No. 5 shaft, Jenkins township.....	24.	Head crushed by being caught between two mine cars.
25..	David Morgan	....	....	....	Mt. Pleasant slope, Hyde Park.....	27.	Injured by a fall of roof.
April 6..	John Foundation....	27	....	....	Phœnix shaft, Pittston	April 8.	Burned slightly by an explosion of carbureted hydrogen gas.
6..	James Greene.....	35	....	4	Phœnix shaft, Pittston	8.	Burned same way as the above.
8..	Anthony Thornton..	....	....	....	Leggett's Creek shaft, Providence..	10.	Slightly injured by a fall of roof.
13..	Cornelius Carey....	30	....	....	Twin shaft, Pittston	15.	Severely injured by an explosion of a blast which had apparently missed fire.
18..	Frank Mangan.....	48	....	....	Sloan shaft, Lackawanna township..	19.	Slightly injured by a fall of roof.
May 2..	Edward M'Donald..	40	1	....	Winton slope, Winton	May 5.	Leg broken by a fall of top coal.
3..	John Linnen	....	....	....	Eddy Creek shaft, Olyphant.....	6.	Burned slightly by an explosion of carbureted hydrogen gas.
9..	John Burns.....	....	....	....	Leggett's Creek shaft, Providence..	9.	Burned by an explosion of carbureted hydrogen gas.
9..	Patrick Henehan....	....	....	....	No. 10 shaft, Pittston	10.	Both of these men were burned by an explosion of powder.
9..	Patrick Condon	....	....	....	No. 10 shaft, Pittston	10.	
20..	Robert Armstrong..	23	....	....	Oxford air-shaft, Hyde Park	21.	These three men were burned by an explosion of carbureted hydrogen gas, which had accumulated under a platform which was put across the shaft at the rock vein, and upon which they were working in company with Frank Paff and John Powell, who were killed. A plank was taken up and one of the men dropped his lighted lamp into the gas, causing a terrible explosion.
20..	David Hill.....	37	1	....	Oxford air-shaft, Hyde Park	21.	
20..	Michael Stafford	24	....	....	Oxford air-shaft, Hyde Park	21.	
24..	Michael M'Guinness	....	....	....	No. 6 shaft, Pittston	24.	Collar-bone broken and otherwise injured by being caught between a car and loose rock.
24..	Tobias Gibbons	35	1	....	Spring Brook shaft, Moosic.....	.....	Slightly injured by a fall of top coal.
27..	Martin Murphey....	55	1	....	Ravine shaft, Pittston.....	May 29.	Severely injured by a fall of coal.
30..	John Gaffeny.....	17	....	....	Hampton shaft, Hyde Park.....	30.	These men were slightly burned by an explosion of carbureted hydrogen gas.
30..	Edward Kellett.....	15	....	....	Hampton shaft, Hyde Park.....	30.	
June 14..	John Reese	22	1	1	Brisbin shaft, Providence.....	June 15.	Burned slightly in the face, arms and body by a premature explosion of a blast.
16..	Job D. Davies.....	28	1	1	Spring Brook shaft, Moosic..... ...	16.	Slightly injured by a fall of top coal.
20..	James Andrews.....	....	....	....	Coal Brook tunnel, Carbondale.....	22.	Arm broken with a blow from a hammer.
24..	William Marshall...	16	....	....	Central shaft, Hyde Park.....	26.	Slightly injured by being kicked by a mule.
30..	Richard Clupper....	....	....	....	White Oak colliery, Archbald	July 1.	Slightly injured by being kicked by a mule.
July 11..	Benjamin Daniels ..	23	1	....	Spring Brook shaft, Moosic	12.	Skull fractured by a fall of top coal.
12..	Owen Owens	40	1	....	Brisbin shaft, Providence	13.	Slightly injured by a fall of roof.
13..	Patrick M'Andrews	....	....	....	White Oak colliery, Archbald	13.	Face and arms burned by an explosion of powder.
25..	John Barry.....	34	1	....	Von Storch slope, Providence.....	26.	Injured by a fall of roof.
25..	Martin Swift.....	....	....	....	Carbon Hill shaft, Lackawanna tp..	27.	Burned slightly by an explosion of carbureted hydrogen gas.
26..	Martin M'Guire	16	....	....	Von Storch slope, Providence.....	28.	Injured by being run over by mine cars.
27..	John Lanning.....	48	1	....	Brisbin shaft, Providence	29.	Injured by a fall of bony coal.
28..	William Ratchford,	30	1	3	Phœnix shaft, Pittston	31.	Slightly burned by an explosion of carbureted hydrogen gas.
28..	William Sullivan....	35	1	3	Phœnix shaft, Pittston	31.	
28..	John Barrett.....	40	....	2	Phœnix shaft, Pittston	31.	
28..	Timothy Falvey.....	25	....	....	Phœnix shaft, Pittston	31.	

	31..	John Rooney	....	....	....	Von Storch slope, Providence
Aug.	4..	Martin Dunn	....	....	....	No. 10 shaft, Pittston
	9..	John Farrell	....	....	....	Stark shaft, Moosic
	18..	Michael Judge	18	....	....	Pyne shaft, Lackawanna township
	18..	Edward Cusick	....	....	....	Von Storch slope, Providence
	26..	James Moran	....	....	....	Mt. Pleasant slope, Hyde Park
	26..	John Devine	....	....	....	Green Ridge slope, Scranton
	29..	William Logan	....	....	....	Green Ridge slope, Scranton
Sept.	1..	Morris Evans	51	1	....	Spring Brook shaft, Moosic
	4..	Michael Regan	11	....	....	Dodge shaft, Lackawanna township
	5..	James O'Boyle	....	....	....	No. 2 slope, Port Griffith
	5..	Anthony Hamson	....	....	....	No. 4 slope, Pittston
	11..	Henry Jenkins	11	....	....	Von Storch slope, Providence
	14..	Edward Riley	37	1	4	Meadow Brook tunnel, Scranton
	14..	David Chilton	....	....	....	No. 3 shaft, Carbondale
	15..	James Casey	38	1	2	Pyne shaft, Lackawanna township
	16..	William Raymond	45	1	....	Diamond mines, Scranton
	18..	David D. Davies	28	1	....	Spring Brook shaft, Moosic
	18..	James Riley	17	....	....	Meadow Brook tunnel, Scranton
	22..	Samuel Edwards	....	....	....	Seneca slope, Pittston
	23..	Darby Grossman	16	....	....	Diamond mines, Scranton
	28..	Daniel M'Andrews	45	1	4	Central shaft, Hyde Park
	28..	Thomas Duffy	52	1	2	Taylor shaft, Taylorville
	29..	Fred. Bunnenblust	37	....	....	Taylor shaft, Taylorville
	30..	Joseph Evans	18	....	....	Sloan shaft, Lackawanna township
	30..	John Foreby	....	....	....	Butler shaft, Pittston township
	30..	Llewelyn Jones	25	1	....	Sloan shaft, Lackawanna township
Oct.	7..	Thomas Syddons	14	....	....	Winton slope, Winton
	14..	John P. Thomas	39	1	3	Continental shaft, Lackawanna tp
	17..	Patrick Driscol	40	1	5	Connell's new slope, Lacka. tp
	17..	William Thomas	35	1	3	Connell's new slope, Lacka. tp
	17..	William Horan	55	1	....	Sibley shaft, Old Forge township
	19..	Andrew Davit	50	1	6	Leggett's Creek shaft, Providence
	19..	Rees W. Lloyd	46	1	2	Sloan shaft, Lackawanna township
	20..	Peter Gerrity	19	....	....	Cayuga shaft, Providence
	23..	Patrick Jennings	35	1	4	Filer colliery, Winton
	21.	John Adrian	19	....	....	No. 10 shaft, Pittston
	30.	Peter Herman	18	....	....	Capouse shaft, Hyde Park
Nov.	6.	Thomas Heshon	30	1	....	Greenwood colliery, Lacka. tp
	6..	Valentine Connelly	32	....	....	Greenwood colliery, Lacka. tp
	6..	Michael Ferguson	40	....	....	Fair Lawn slope, Scranton
	7..	Algernon Patten	27	1	4	Eddy Creek shaft, Olyphant
	7..	John Webber	30	1	3	Butler shaft, Pittston
	8..	Joshua Hutchings	37	1	1	Butler shaft, Pittston
	10..	Evan J. Jones	35	1	7	Continental shaft, Lackawanna tp
	11..	Patrick Scanlon	15	....	....	White Oak colliery, Archbald
	17..	Thomas S. Davies	42	1	3	Continental shaft, Lackawanna tp
	18..	John Strong	35	1	.	Filer colliery, Winton
	20.	James Black	13	....	....	Mt. Pleasant slope, Hyde Park
	21..	James Moran	40	1	4	Pyne shaft, Lackawanna township

Aug.	1.	Injured slightly by a premature explosion of a blast.
	4.	Burned by an explosion of powder.
	11.	Foot crushed and otherwise injured by a fall of roof.
	18.	Injured by falling off a trestling to the ground a distance of 20 to 25 feet
	21.	Injured inwardly by a fall of roof.
	26.	Injured by a fall of roof.
	26.	Slightly burned by an explosion of carbureted hydrogen gas.
	30.	Slightly injured by a fall of coal.
Sept.	2.	Leg broken by a fall of top coal.
	7.	Severe flesh wound in the leg. He fell in front of and got under a car.
	8.	Leg broken by falling in front of a trip of cars, while attempting to jump on the cars going up the slope.
	8.	Slightly injured by a fall of roof.
	11.	Leg and collar-bone broken and two fingers taken off by falling in front of and under the cars.
	15.	Arm broken by being stricken with a piece of coal from a blast.
	16.	Severely injured by being squeezed between the cars.
	18.	Injured by being hit with coal from a blast.
	18.	Injured by a fall of roof.
	19.	Small bone at the ankle broken by a fall of top coal.
	20.	Arm broken by falling under a car when trying to unhitch his mule.
	25.	Arm and one rib broken by a fall of top coal.
	26.	Arm broken by falling under a car on the culm dump.
	28.	Severely cut on the head.
	29.	Severely injured by a fall of roof.
	30.	Slightly injured by a fall of top coal.
Oct.	2.	Slightly injured by being caught between two mine cars.
	2.	Two fingers cut off by being caught between a car and the roof as car jumped the track.
	2.	Slightly injured by being hit with coal from a blast.
	9.	Cut in the head by a run-away car.
	16.	Jaw-bone broken and otherwise injured about the head and shoulders by a premature blast, caused by using oil containing kerosene to make the match with which the blast was fired.
	17.	Both of these men were severely burned in their faces, arms, hands and shoulders by an
	17.	explosion of carbureted hydrogen gas. One of them was "brushing out the gas" and the other walked in to meet him with his naked light, apparently to show him light, and the inevitable consequence was an explosion, which it is hoped has taught them a lesson they will not soon forget.
	18.	Cut about the head by a fall of top coal.
	20.	Severely injured internally by a fall of roof.
	21.	Slightly burned in the face and hands by an explosion of carbureted hydrogen gas.
	21.	Burned by an explosion of "cartridge powder," which he was carrying into the mine encased only in a paper wrapper.
	24.	Leg broken by coal from a blast.
	30.	Eye put out by a piece of coal from a blast.
	31.	Leg broken by a fall of roof.
Nov.	8.	Back injured by a fall of roof.
	8.	Back injured by same fall of roof.
	8.	Leg broken and otherwise injured by falling under a car upon which he was riding up the slope, contrary to orders and in violation of law. He fell while attempting to jump off, near the mouth of the slope.
	9.	Arm and face badly cut and shoulder bruised by a premature explosion of a blast.
	10.	Back slightly cut by a fall of coal and roof.
	10.	Hips injured by a fall of roof.
	13.	Rib broken and back and hip injured by a fall of roof.
	13.	Arm broken by coupling cars while they were in motion.
	18.	Several ribs broken and severely injured in the chest and shoulders by a fall of roof.
	21.	Head cut and injured in the loins by a fall of roof.
	23.	Internally injured by falling from a joist in the breaker.
	23.	Ankle dislocated and bone fractured by a fall of top coal.

TABLE No. 2—*Continued.*

DATE.	NAMES.	Age.....	Wife.....	Children.	COLLIERY WHERE ACCIDENT OCCURRED.	Date of Investigation.	NATURE OR CAUSE OF ACCIDENT.
Nov. 22..	Thomas Maschal....	16	....	....	Dodge shaft, Lackawanna township.	Nov. 23.	Hips and loins severely injured by being crushed between a car and pillar.
23..	Thomas Clarke.....	25	1	2	Stark shaft, Moosic.....	24.	Slightly injured by being squeezed between a car and a prop.
23..	James O'Malia.....	35	1	3	Dawson shaft, Pleasant Valley	24.	Slightly injured by a fall of roof.
25..	Fred. Miller.....	22	....	....	No. 2 slope, Dunmore	27.	Face and eyes injured by going into a chamber where a blast was being fired.
28..	John Burke, Jr.....	30	1	2	Eaton colliery, Archbald.....	Nov ...	Face, neck and hands burned by an explosion of powder while making a cartridge with his lamp in his hat.
28..	Richard Bevan.....	61	1	....	No. 2 slope, Port Griffith.....	29.	Arm broken and badly cut by a fall of roof.
29..	Patrick Jourdan	17	....	....	Diamond slope, Scranton	29.	Leg crushed by cars so that amputation was necessary, which was done.
29..	Frank Gebhart.....	43	1	3	No. 10 shaft, Pittston.....	29.	Face, breast, arms and shoulders severely burned by an explosion of powder while making a cartridge with his lamp hanging in his hat.
Dec. 1..	Patrick Pace	40	1	....	No. 2 slope, Port Griffith.....	Dec. 2.	Leg injured slightly by a piece of coal sliding against him.
4..	David Hughes	19	....	....	Continental shaft, Lackawanna tp.	5.	Leg broken below the knee by a "T iron rail" falling upon it.
8..	Thomas Edwards...	14	...	....	Dodge shaft, Lackawanna township.	8.	Injured slightly by being kicked by a mule.
11..	John Cawley	45	1	....	Diamond slope, Scranton	13.	Hip dislocated by a fall of roof.
12..	Owen Murtough.....	37	1	2	Dodge shaft, Lackawanna township.	13.	Leg broken by a fall of top coal, which fell immediately after firing a blast.
12..	Michael Ford.....	38	1	2	Dodge shaft, Lackawanna township.	13.	Face cut by a piece of rock falling from the roof.
12..	Thomas Evans	13	....	....	Von Storch slope, Providence.....	14.	Body bruised by falling under a mine car.
12..	Asa B. Wells.....	27	1	....	Stark shaft, Moosic.....	14.	Arm broken by falling upon the pony screen while clearing away culm.
16..	Samuel Broadhead..	45	1	....	Hillside colliery, Pleasant Valley ...	18.	Leg broken in two places by falling over an eight-feet stone wall.
18..	Isaac Hinscriff.....	24	....	....	Phœnix shaft, Pittston.....	20.	Face and hands slightly burned by an explosion of carbureted hydrogen gas.
19..	Patrick Goldin.....	....	1	....	No. 6 slope, Pittston.....	20.	Legs severely bruised by a fall of coal.
20..	Thomas W. Morgan	50	1	3	Twin shaft, Pittston.....	23.	Back and hips severely sprained and bruised by a fall of roof.
21..	Morris Mangan	45	1	8	Meadow Brook tunnel, Scranton	23.	Slightly injured by a premature explosion of a blast.
21..	Patrick Hopkins...	40	1	5	No. 10 shaft, Pittston	26.	Face and hands slightly burned by an explosion of carbureted hydrogen gas.
27..	Thomas Swift.....	55	1	5	Eaton colliery, Archbald.....	29.	Hip injured by a fall of coal.
28..	Daniel James	55	1	....	Sibley shaft, Old Forge township....	29.	Both legs and one arm severely bruised and head slightly cut by coal from a blast.

TABLE No. 3.—Number of persons killed and injured, and cause of accidents, in the Eastern district of the Wyoming coal fields, Luzerne county, Pa., during the years 1872-3-4-5-6.

CAUSES OF THE ACCIDENTS.	1872.		1873.		1874.		1875.		1876.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Explosions of carbureted hydrogen gas	5	21	....	....	6	10	3	1	6	21	20	56
Falls of roof	19	43	....	....	26	26	18	20	16	29	78	118
Falls of coal	17	25	....	....	13	8	11	25	4	15	45	73
Falling down shafts	4	3	....	....	1	2	1	2	2	.....	8	7
Explosions of blasting powder	7	6	....	....	.....	3	1	10	3	12	11	31
Premature blasts	.....	21	....	....	6	13	10	5	.....	.....	.....	.....
Crushed by mine cars	8	40	....	....	13	18	12	15	9	19	42	92
Miscellaneous under ground	1	15	....	....	2	5	2	16	2	19	7	55
Above ground	6	10	....	....	2	4	4	8	2	5	14	27
Whole numbers	67	187	....	....	69	89	62	102	44	120	226	459
Whole number of widows		38	....	....		38		36		21		133
Whole number of orphans		119	....	....		112		118		79		428

TABLE No. 4.—Coal production and number of persons employed, &c., &c.

	1872.	1874.	1875.	1876.	Averages and totals.
Production of coal per year in tons	6,580,450	6,357,879	7,956,452	4,862,512	25,737,293
Number of persons employed	15,261	16,561	17,808	17,152	16,670
Ratio of production for each person employed	423.3	383.9	446.8	283.46	385.5
Ratio of production for each life lost	97,917	92,143	128,340	110,511	113,882
Ratio of production for each person killed and injured	25,828	40,202	48,515	39,453	57,162
Ratio of persons employed for each life lost	227.77	240.00	287.22	389.81	73.76

TABLE No. 5.—This table gives the amount of coal mined, in tons; kegs of powder used, days worked, number of persons employed, ratio of coal mined per employee, per accident, per life lost, for each working colliery, during the year 1876, and ratio of coal mined per accident and life lost in 1874-5-6.

Delaware, Lackawanna and Western Railroad Company.

Name of Collieries.	Tons of coal shipped to market.	Home consumption.....	For motive power, &c.....	Total coal mined.	Kegs of powder.	Days worked.....	Number of employees.....	Ratio of production per person employed.....	Ratio per person killed and injured.....	Ratio per person killed.....	Ratio for 1874-5-6 per person killed and injured.	Ratio for 1874-5-6 per person killed.....
Pyne shaft	93,801	203	3,600	97,607	2,134½	129½	305	320.02	24,401.75	97,607.	26,974.20	134,871.
Taylor shaft and drift	99,406	1,072	3,428	103,906	3,106	149½	351	296.	34,635.33	103,906.	35,101.53	128,705.33
Archbald shaft	5,933	122	2,345	8,400	274	39	117	.....	.....	.....	19,278.33	No death.
Sloan shaft	94,590	400	3,000	97,990	2,605	148¾	293	331.41	24,497.50	No death ..	28,317.15	368,123.
Dodge shaft	88,881	1,039	2,200	92,120	2,344	138⅛	302	305.	18,422.	....do.....	25,194.14	88,179.50
Scranton coal company	763	.....	2,190	2,853	23	.....	4	.....	.....	.....	33,500.	100,501.
Bellevue shaft and slope	9,274	40	3,000	12,314	312	22⅛	358	.....	.....	.....	30,364.	61,268.
Hampton shaft	104,415	356	4,616	109,387	3,062	153¾	344	317.98	36,462.33	109,387.	36,552.50	91,381.25
Continental shaft	96,169	608	2,210	98,987	2,442	162⅛	318	311.28	24,746.75	No death ..	27,725.54	180,216.
Central shaft	110,992	1,000	6,500	118,462	2,609	172⅛	276	429.93	39,487.75	118,462.	35,421.	70,842.
Hyde Park shaft	3,765	128	150	9,043	236	13¼	270	.....	.....	.....	No accident	for 3 years.
Diamond, No. 2 shaft	120,062	976	3,312	124,350	3,355	162½	360	345.42	124,350.	124,350.	66,588.71	116,530.
Diamond, No. 2 slope	50,907	398	2,830	54,135	1,247	162½	319	329.72	9,022.50	27,067.50	30,204.20	151,471.
Tripp's slope	48,762	398	1,885	51,045	1,686	162½			No accide	ut nor death	17,288.37	121,022.
Brisbin shaft	49,702	150	2,000	51,852	1,640	93	269	192.76	17,284.	No death .	20,730.	No death.
Cayuga shaft	93,539	511	2,023	96,076	2,732½	158	261	359.37	32,025.33	48,038.	27,478.30	51,031.11
Total for D., L. & W. R. R. Co	1,075,934	7,404	45,289	1,128,627	29,748	.....	4,150	271.95	28,939.15	125,493.	32,287.71	113,856.66

Pennsylvania Coal Company.

No. 1 tunnel, Pittston township	25,200	.....	700	25,900	864	227	70	370.	No accident	nor death...	97,588.	No death.
No. 2 slope, Port Griffith	39,843	.....	1,275	41,118	1,337	226	99	415.33	10,029.50	41,118.	19,549.87	52,133.
No. 4 slope, Jenkins township	65,294	.....	570	65,864	2,523	228	136	481.29	65,864.	No death ..	131,166.50	262,233.
No. 6 slope, Pittston ....do	26,236	.....	.....	26,236	1,007	216	52	504.54	26,236.	....do.....	91,247.	No death.
No. 1 shaft....do .....do	975	.....	830	1,805	20	.....	27	.....	.....	.....	No accident	nor death.
No. 4 shaft....do.....borough	77,629	.....	500	78,129	3,005	229	150	520.86	No accident	nor death...	61,752.20	102,920.
No. 5 shaft, Jenkins township	67,943	.....	500	68,443	2,633	238	150	456.28	34,221.50	No death ..	36,171.	84,399.
No. 6 shaft .....do	57,887	.....	1,000	58,887	2,665	238	153	384.88	58,887.	....do.....	53,381.25	106,762.50
No. 7 shaft .....do	77,803	.....	1,225	79,118	3,043	239	161	492.42	No accident	nor death...	73,056.50	97,408.66
No. 8 shaft, Pittston township	73,505	.....	1,000	74,505	2,866	216	197	378.20	74,505.	74,505.	84,884.	127,326.
No. 9 shaft.....do....borough	46,394	.....	725	47,119	1,812	217	142	331.82	47,119.	47,119.	24,049.14	56,114.66
No. 10 shaft....do....township	126,666	.....	3,730	130,396	5,015	220	355	367.31	18,628.	130,396.	39,716.	103,281.80
No. 11 shaft, Jenkins....do	41,038	.....	780	41,818	1,608	238	103	406.00	No accident	nor death...	150,344.	150,344.
No. 12 shaft, Pittston ...do	59,230	.....	1,125	60,355	2,325	227	132	458.00	....do.....	....do.....	32,286.	32,286.
Brown's colliery, Pleasant Valley	11,625	.....	.....	11,625	347	219	11	1,056.81	....do.....	....do.....	No accident	nor death.
Law's shaft ....do	41,537	.....	2,025	43,562	1,674	223	120	363.00	43,562.	43,562.	43,562.	43,562.
Dawson's shaft ....do	65,478	.....	725	66,203	2,546	219	171	387.15	66,203.	No death ..	130,363.	No death.
Stark shaft.....do	85,800	.....	1,000	86,800	4,108	220	232	374.13	28,933.33	....do.....	35,979.87	64,763.60
No. 2 shaft and slope, Dunmore	48,127	.....	290	48,417	1,862	226	123	393.65	48,417.	....do.....	59,451.	No death.
Gipsey Grove colliery....do	95,041	.....	352	95,363	5,431	213⅛	241	390.82	47,481.5	47,481.5	78,118.60	97,648.25
Total for Pennsylvania coal company	1,133,311	.....	18,352	1,151,663	46,804	.....	2,828	407.23	44,678.57	161,523.28	53,276.58	107,919.23

DELAWARE AND HUDSON CANAL COMPANY.

Von Storch slope, Providence	130,751	1,460	3,400	135,611	3,875	138¾	548	247.46	16,951.37	135,611.	19,058.64	59,558.25
Leggett's Creek shaft, Providence	84,523	.....	2,625	87,148	2,489	134½	406	214.65	12,449.71	29,049.33	24,541.69	78,543.
Biddy Creek shaft, Olyphant	67,953	163	2,450	70,566	2,822	140	351	201.	35,283.	No death ..	46,016.	161,045.50
Grassy Island shaft....do	77,939	324	2,745	81,008	3,240	134½	341	237.56	No accident	nor death...	50,355.17	No death.
White Oak colliery, Archbald	76,907	820	2,875	80,602	2,686	159¾	368	261.69	20,150.	80,602.	35,237.	88,092.50
White Bridge colliery, Carbondale	18,081	.....	.....	18,081	603	108¾	235	76.94	No accident	nor death...	No accident	nor death.
No. 3 shaft.....do	12,980	.....	760	13,680	456	138¾	214	63.93	13,680.	No death ..	15,854.50	No death.
Coal Brook colliery.....do	113,683	.....	3,250	116,933	3,897	118	652	179.35	58,466.50	116,933.	72,610.	145,232.
Total for Delaware and Hudson canal co	582,817	2,767	18,045	603,629	20,068	.....	3,055	197.59	25,151.20	100,604.81	31,615.38	111,871.22

MISCELLANEOUS COMPANIES AND OPERATORS.

Everhart colliery, Jenkins township	53,568	.....	1,300	54,868	1,919	200¾	156	351.72	No accident	nor death...	94,948.	94,948.
Tompkins' shaft, Pittston	15,700	320	1,690	17,620	1,121	156	101	175.44	8,810.	8,810.	5,252.85	9,392.50
Seneca slope.....do	28,502	5,906	2,000	36,408	1,456	124	174	209.24	36,408.	No death ..	27,541.	55,082.
Ravine shaft.....do	18,875	.....	2,500	21,375	855	75	188	113.69	10,687.50	....do.....	47,242.33	No death.
Twin shaft.....do	26,680	.....	3,000	29,680	1,187	116	76	390.	14,840.	....do.....	35,516.25	71,032.50
Rock Hill tunnel.....do	15,000	426	300	15,726	630	137	56	280.82	No accident	nor death...	No accident	nor death.
Beaver colliery .....do	20,139	.....	264	20,394	513	233	36	566.50	....do.....	....do.....	....do.....	....do.
Phœnix shaft, Pittston township	26,791	166	3,650	31,107	901	150¾	122	254.97	3,638.37	No death ..	6,276.25	69,038.
Columbia mines .....do	17,573	.....	150	17,723	419	146¾	45	393.84	No accident	nor death ..	38,813.	38,813.
Butler shaft..... do	60,389	3,643	2,190	66,222	2,437	214	235	281.79	32,074.	No death ..	33,416.16	101,248.50
Hillside colliery, Pleasant Valley	65,588	924	4,400	70,912	2,594	175½	306	231.73	35,456.	70,912.	40,599.40	202,997.
Spring Brook, Lackawanna township	46,538	1,000	276	47,814	1,880	92	226	211.56	9,563.	No death ..	21,522.	279,786.
Greenwood colliery.....do	82,000	700	4,260	86,960	3,800	142	321	268.30	43,480.	....do.....	23,523.77	42,342.80
Carbon Hill, Old Forge township	15,000	326	810	16,136	653	81	241	69.85	16,136.	....do.....	28,155.	136,930.
Sibley shaft.....do	34,328	268	1,200	35,796	1,526	136	269	133.07	7,155.20	17,898.	19,245.44	43,302.25
Meadow Brook T, Scranton	66,807	.....	1,400	68,207	2,230	140	278	245.45	22,735.66	68,207.	28,838.33	86,515.
Meadow Brook S.....do	73,429	893	980	75,302	2,480	140	275	273.82	25,100.	No death ..	67,019.80	No death.
Park coal company slope, Hyde Park	36,200	13,533	1,200	50,933	2,680	224	137	371.77	50,933.	No death ..	35,719.50	35,719.50
Mt. Pleasant slope.....do	78,000	6,000	2,500	86,500	3,000	190	275	314.54	21,625.	86,500.	22,499.70	32,143.85
Capouse shaft.....do	108,646	5,839	3,700	118,185	4,770	182	354	333.85	118,185.	No death ..	125,314.50	No death.
Pine Brook shaft, Scranton	68,500	325	5,000	73,825	2,593	150	247	349.17	18,456.25	18,456.25	19,309.29	42,480.
Fair Lawn slope.....do	28,442	3,301	630	32,373	1,347	189	122	265.35	10,791.	16,186.50	21,775.60	54,439.
Jermyn's No. 2 shaft, Scranton	22,322	200	1,800	24,322	741	.....	173	134.80	No accident	nor death...	No accident	nor death.
Green Ridge slope, Dunmore	132,515	6,390	2,375	141,280	5,551	192½	317	407.16	70,640.	No death ..	51,843.37	207,373.50
Roaring Brook colliery, Dunmore	97,000	1,866	2,400	101,266	5,063	163½	311	325.61	101,266.	101,266.	53,534.14	124,913.
Elk Hill colliery, Blakely	42,110	300	.....	42,410	1,650	215	178	238.25	21,205.	21,205.	71,466.	107,199.
Filer colliery, Winton	103,856	.....	6,600	110,456	4,418	.....	332	332.70	55,456.	No death ..	40,123.50	No death.
Winton..... do	11,594	600	3,300	15,494	1,851	.....	277	164.22	22,747.	....do.....	13,479.40	....do.
Eaton colliery, Archbald	83,437	1,150	616	85,203	2,844	157½	321	262.97	42,601.50	....do.....	45,471.87	181,887.50
Jermyn's slope, Jermyn	65,000	.....	1,000	66,000	2,673	130	215	307.00	22,000.	22,000.	119,380.	119,380.
Do.....shaft....do	54,800	400	5,000	60,200	2,524	130	212	284.00	No accident	nor death...	264,993.	264,993.
Erie shaft, Carbondale township	90,478	1,572	5,500	97,550	3,200	180	310	314.65	48,775	97,550.	55,118.25	73,491.
Chestnut Hill, Carbondale	1,798	1,616	54	3,468	230	51	52	66.68	No accident	nor death...	No accident	nor death.
Total for miscellaneous companies, &c	1,721,696	57,564	71,955	1,851,215	71,122	.....	6,931	266.98	28,048.71	92,560.	41,257.	99,540.

RECAPITULATION.

Delaware, Lackawanna and Western R. R. Co	1,075,934	7,404	45,289	1,128,627	29,748	.....	4,150	271.95	28,039.15	125,403.	32,286.21	113,850.87
Pennsylvania coal company	1,133,311	.....	18,352	1,151,663	46,891	.....	2,828	407.23	44,678.57	164,523.	35,104.38	109,238.89
Delaware and Hudson canal company	582,817	2,767	18,045	603,629	20,068	.....	3,055	197.59	25,151.20	100,605.	26,407.60	111,871.21
Miscellaneous companies	1,721,696	57,564	71,955	1,851,215	71,122	.....	6,934	266.98	28,048.71	92,560.	26,685.40	99,540.
Local sales—estimated	.....	127,378	.....	127,378	3,639	.....	185	.....	.....	.....	.....	.....
Grand total	4,513,758	195,113	153,641	4,862,512	171,378	.....	17,152	283.49	29,649.46	110,511.63	39,458.52	109,582.

TABLE No. 6.—Number of steam engines, their horse power, and number of boilers, their dimensions, &c.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY.

NAMES OF COLLIERIES.	Hoisting engines.	Horse power.	Breaker engines.	Horse power.	Pumping engines.	Horse power.	Fan engines.	Horse power.	No. of boilers.	Length in feet.	Diameter in inches	Steam pressure.	Kind of steam-gauge.	Time of boilers in use.
Pyne shaft, Lackawanna township	2	300	1	60	1	250	1	40	12	30	30	85	Ashcroft's	6 years.
Taylor shaft and drift, Taylorville	2	80	1	30	1	100	2	100	12	32	34	85	American	9 years.
Archbald shaft, Lackawanna township	2	80	1	60	1	150	1	60	10	40	36	75	Ashcroft's	6 years.
Sloan shaft ..... do	2	100	1	50	1	25	1	40	12	30	34	80	....do	6 years.
Dodge shaft ..... do	2	80	1	60	2	101	.....	.....	9	32 & 38	34	80	....do	6 years.
Scranton coal company ..... do	2	160	1	100	1	60	1	40	12	32	34	70	....do	7 years.
Bellevue shaft ..... do	2	80	.....	.....	1	100	.....	.....	9	40	36	90	Welling's	10 years.
Bellevue slope ..... do	4	160	1	60	1	21	1	60	9	40	36	90	....do	2 years.
Hampton shaft ..... do	4	108	1	60	2	130	.....	.....	13	36	34	70	American	9 years.
Continental shaft ..... do	2	80	1	30	3	200	1	40	9	40	36	65	....do	15 years.
Central shaft, Hyde Park	2	80	1	80	2	300	1	40	12	30	36	80	....do	6 years.
Hyde Park shaft ... do	2	120	1	60	.....	.....	.....	.....	6	36	34	75	....do	6 years.
Oxford shaft ..... do	4	155	1	60	5	140	.....	.....	12	30	36	80	....do	8 years.
Diamond, No. 2, shaft, Scranton	5	130	1	65	4	360	1	80	19	40 & 30	34	75	....do	12 years.
Diamond slope ..... do	2	120	1	35	3	200	.....	.....	7	40	36	75	....do	12 years.
Tripp's slope ..... do	2	45	.....	.....	3	76	.....	.....	7	36	34	65	....do	12 years.
Brisbin shaft ..... do	2	80	1	60	1	40	1	60	12	30	36	80	....do	5 years.
Cayuga shaft ..... do	2	80	1	40	2	300	1	40	12	32	30	80	....do	6 years.
Total for D., L. and W. R. R Co	45	2,038	16	910	34	2,553	12	600	194	.....	.....	.....	.....	.....

PENNSYLVANIA COAL COMPANY.

No. 1 tunnel, or No. 5 slope, Pittston twp	2	40	.....	.....	2	40	.....	.....	3	36	30	75	.....	.....
No. 2 slope, Port Griffith	1	40	.....	.....	5	170	.....	.....	6	46	30	80	.....	.....
No. 4 slope, Jenkins township	3	60	.....	.....	1	20	.....	.....	{2 {3	20 36	}30	75	.....	.....
No. 6 slope, Pittston township	1	25	.....	.....	.....	.....	.....	.....	Gets	steam fr	om No. 8	shaft.		
No. 1 shaft ..... do	2	60	.....	.....	3	45	1	20	6	36	30	75	.....	.....
No. 4 shaft, Pittston borough	1	40	.....	.....	1	40	2	40	7	36	30	75	.....	.....
No. 5 shaft, Jenkins township	1	40	.....	.....	1	10	.....	.....	3	36	30	75	.....	.....
No. 6 shaft ..... do	2	65	1	25	.....	.....	.....	.....	6	36	30	75	.....	.....
No. 7 shaft ..... do	1	40	.....	.....	2	130	.....	.....	5	36	30	75	.....	.....
No. 8 shaft, Pittston township	1	40	1	25	.....	.....	.....	.....	5	36	34	75	.....	.....
No. 9 shaft, Pittston borough	2	60	.....	.....	1	10	.....	.....	3	36	30	75	.....	.....
No. 10 shaft, Pittston township	3	105	1	40	3	65	.....	.....	3	36	30	75	.....	.....
No. 11 shaft, Jenkins township	1	40	.....	.....	.....	.....	.....	.....	3	36	30	75	.....	.....
No. 12 shaft, Pittston township	1	40	1	40	1	30	.....	.....	6	36	30	75	.....	.....
No. 13 shaft, Pleasant Valley	1	40	.....	.....	1	40	.....	.....	5	36	30	75	.....	.....
Law's shaft, Pleasant Valley borough	1	40	.....	.....	2	100	1	20	6	36	30	75	.....	.....
Stark Shaft, Lackawanna township	3	80	1	25	5	70	.....	.....	5	36	30	90	.....	.....
Dawson shaft, Pleasant Valley	1	40	1	40	.....	.....	.....	.....	3	36	30	75	.....	.....

No. 2 slope, Dunmore	2	55							3	36	30	80	Ashcroft's	8 years.
No. 3 shaft, Gipsey Grove, Dunmore	1	30	1	30					4	36	30	80	....do	7 years.
No. 4 shaft, Gipsey Grove, Dunmore	1	30							3	36	30	80	....do	5 years.
No. 2 and No. 7 shafts, Pittston					2	80			6	36	30	70	....do	
Totals, Penn'a coal company	32	1,010	7	225	30	850	4	80	96					

Delaware and Hudson Canal Company.

Von Storch slope and shaft, Providence	5	251	1	61	2	140	1	85	23	36	31	80	Ashcroft's & American	14 years.
Leggett's Creek shaft.....do	5	220	1	61	7	307	1	49	14	30	36	80	Ashcroft's	12 years.
Marvine shaft.....do	3	200	1	61	2	120	1	70	9	36	34	80	Belfield's	6¾ years.
Eddy Creek colliery, Olyphant	5	271	1	36	3	177	2	117	15	36	34	80	Utica and Ashcroft's,	10½ years.
Grassy Island shaft.....do	4	92	1	61	1	77			12	36	34	80	Ashcroft's & American	12 years.
White Oak colliery, Archbald			1	61					6	36	31	80	Utica	16 years.
Powderley's slope, Carbondale township		Idle all	the	year										
No. 3 shaft, Carbondale city	2	117			2	100			6	36	34	60	Utica	5½ years.
Coal Brook colliery.....do	1	56	1	77					4	30	34	60	....do	10½ years.
Totals, D. and H. canal company	25	1,211	7	418	17	921	5	321	89					

Miscellaneous Companies and Operators.

Everhardt colliery, Jenkins township	2	80	1	40					5	30	30	60		12 years.
Tompkins shaft, Pittston	1	45	1	30	3	75			6	30	30	60	Utica	18 years.
Seneca slope.....do	1	30	1	30	1	30			4	32	30	70	....do	10 years.
Ravine shaft.....do	1	45	1	100					4	30	30	65		10 years.
Twin shaft.....do	2	45	1	40	1	25	1	20	9	30 & 28	33	70		10 years.
Beaver colliery.....do	1	30							2	40	30	55	Utica	13 years.
Butler shaft, Pittston township	1	40	1	40	2	30			7	30 & 39	30	70	Wisner & Strong	12 years.
Phœnix shaft.....do	1	60	1	40			1	12	6	32 & 27	30 & 32	60		5 years.
Columbia colliery...do			1	30					2	31	30	50	Utica	12 years.
Hillside colliery, Pleasant Valley	2	90	2	85	2	40	1	10	10	30	30	60	American	5 years.
Spring Brook, Moosic	2	30	1	25					6	30	30	60	....do	6 years.
Greenwood colliery, Lackawanna township	2	80	2	125	3	60			13	30	30	60	....do	1½ years.
Sibley shaft, Old Forge township	2	90	2	85	2	40	1	10	10	30	30	60	....do	5 years.
Carbon Hill shaft, Old Forge township	3	85	1	25	1	60			8	30	30	60	....do	16 years.
Meadow Brook tunnel, Scranton	1	52	1	40	1	Donkey			4	32	34	70	H. Belfield's	½ year.
Meadow Brook shaft.....do	1	100	1	45	2	Donkey			7	31	34	60	Schofield's	2 years.
Park coal company's slope, Hyde Park	2	130	1	35					6	30	34	80	Shafer & Badenberg	1 year.
Capouse shaft.....do	4	160	1	40	1	80	2	80	12	30	36	70		3 years.
Mount Pleasant slope.....do	2	100	1	35	4	25	1	150	11	35	30	70		3 years.
Pine Brook shaft, Scranton	2	60	1	40	1	70			9	30 & 24	36	60		12 years.
Fair Lawn slope.....do	1	25	1	35					4	30	30	75	Utica	3 years.
Jermyn's No. 2 shaft do	4	220	1	60			1	80	12	36	34	80	Gifford's	1 year.
Green Ridge slope, Dunmore	4	180	1	25					9	40	34	75		7 years.
Roaring Brook colliery, Dunmore	3	95	2	45	1	60			13	36-22-24	36-34-30	75	Ashcroft and Utica	8 years.
Elk Hill colliery, Blakely township			1	30					2	50	30	70		16 years.
Filer colliery, Winton	4	180	1	45					12	30	30	80	Dickson's	1¾ years.
Winton colliery, Winton	2	90	1	45					6	30	30	80	....do	2½ years.
Eaton colliery, Archbald	2	50	1	25					4	40	34	60	Best	5 years.
Jermyn's slope, Jermyn	2	60	1	30					4	36	34	80		7 years.
Jermyn's No. 1 shaft, Jermyn	1	60	1	30	1	60			9	36	34	80		1 year.
Erie shaft, Carbondale township	2	60	1	21	1	35			9	31	32	70		6 years.
Rolling Mill Mines, Scranton	2	60							7	40 & 36	34 & 36	60	Mercury	7 years.
Tota's, Miscellaneous companies, &c	69	2,432	34	1,311	27	690	8	362	232					