egress since July last, and they are driving from 185 to 195 feet per month, through coal; they had done some work in this direction prior to July last, but it had been made a secondary consideration; they had then about 250 feet, more or less, of vertical height to overcome, in reaching the surface. At this time the company did not own the land upon which the seam of coal cropped out, the nearest point to which was about 3,600 or 3,700 feet from the shaft, and about 3,000 feet from the face of their workings. Since then they have made arrangements for the adjoining land, where the seam crops out, and have lately commenced to drive a slope to meet the one coming up from the shaft. At the present time they have 2,300 feet to complete the second mode of ingress or egress, and contemplate being through by July or August, 1871.

THE NORTHERN COAL AND IRON COMPANY—NO. 1 SHAFT, SINGLE OPENING.

The Delaware and Hudson Coal and Canal Company, owners.

This shaft, situated a short distance east of Plymouth, is 295 feet deep; they are working two seams of coal, neither of which had a second mode of ingress or egress. I served them with a notice to comply with the law in regard to the second mode of ingress or egress, since which time they have succeeded in making a connection with their No. 2 shaft, in one of the seams of coal worked, and but for disputes about wages with the men, in consequence of which work was suspended, a connection would have now been complete in the other seam of coal, and the law complied with; as it stands they have now about two weeks' work to complete the connection, through coal, but there some irregularities in the seam that have retarded their progress.

THE LANCE SHAFT, SINGLE OPENING.

William L. Lance, owner.

This shaft is located in close proximity to the borough of Plymouth; is 175 feet deep, and has a large breaker attached to the head house. In August they began to sink a small shaft to connect with the old working in an upper seam; the same is now near completion, having only 140 feet to sink, and the second mode of ingress or egress will be complete.

THE FELLOWS, DODSON & CO.'S SHAFT, SINGLE OPENING.

This shaft is operated by the above company, located almost if not quite within the borough of Plymouth, is 220 feet deep, and has a very large breaker attached to the head house. It is not long since this mine was opened, and now they have but very little gangway driven on either side of the shaft; they have about 900 feet to drive through coal, and about —— feet through rock to complete the second mode of ingress or egress. This is according to a proposed plan of connecting with the worked out seam at the Lance shaft. The rock work could be done from the Lance mines, while the Fellows & Dodson could continue in the coal towards the point of connection, thus making a second mode of ingress or egress.

THE NOTTINGHAM SHAFT, SINGLE OPENING.

Messrs. Broderick & Conyngham, lessees.

This shaft is located in the borough of Plymouth, and is 376 feet deep; has a large breaker attached to the head house, which has been on fire once since the Avondale disaster; 55 men were in the mine, but, fortunately, the fire was extinguished before it got any headway. This shaft is sunk through about 50 or 60 feet of quicksand before reaching solid rock; this would rush into the shaft like water could it have a small opening, which may be caused by any disturbance of the shaft cribbing, (wooden lining,) either from accident to the pumping or hoisting machinery, decay of the timber or the slightest movement of the strata upon which the foundation of the shaft rests.

The seam worked in this shaft is worked, also, by the same company in a slope, from which they are driving to make a connection with the shaft for the second mode of ingress or egress, and thus assisting the same operation going on in the shaft towards the slope; this has been going on since early summer but without accomplishing much; they have had stoppages from breakages of machinery, from disputes with their employees. Two shifts only working where three should have been employed, to have secured, at the earliest possible date, a second mode of ingress or egress. There has been no exertion or energy in the matter until very recently. The place or point started from was not, in my opinion, the proper place to commence to make the connection with the slope workings in the shortest possible time. From the face of the west gangway in the shaft to a point in the slope was, in the spring, about 2,000 feet in a direct line, but to go square up to the pitch of the seam, required that the shaft west gangway, or the slope east gangway, be driven 700 feet; there then remained 1,600 feet to complete the connection, making a total distance of 2,300 feet; there is an anticlinal axis where the seam of coal comes nearer to the surface than at other places. I should have preferred the determination of this anticlinal, and then have sunk a small shaft to the seam, and the work could have been going on in both places, and would have secured a second mode of ingress or egress in the shortest possible time. I do think that in a case of so much importance the second opening, or means of ingress or egress, should be made a matter of primary consideration, and carried through to its completion with dispatch, and as the law directs.

Shortly after my notice to all the operators working mines with only one mode of ingress or egress, &c., calling their attention to the law on that matter, they all stopped or proceeded to work, complying with the law, and employing only 20 men in each mine, &c. I was much pleased to meet with little or no difficulty in this matter, but it was not very long before my attention was called to the fact, that the Lance shaft, William Lance, owner, the Nottingham shaft, Thomas Broderick & Co., lessees, and the Henry shaft, H. N. Burroughs, operator, were violating the law, having their mines running nearly full handed. I made special visits to some of them in regard to this matter, and received fair promises, but the mines still continued at work, with more than the stipulated 20 men inside at one time, when I was finally compelled to apply for an injunction, which I did on the 17th day of November last, employing H. W. Palmer, of Wilkesbarre, as counsel for the Commonwealth. On this day, the Lance shaft stopped work from local causes. The case of Messrs. Broderick & Co., was postponed until the 19th day of December, when they said they should test the constitutionality of the new mining law, &c. Since which time nothing

Audenreid shaft.—This shaft is located south-west of the city. It is just being sunk, is down at present over 700 feet, and will probably reach the Baltimore vein at about 800 feet from surface. There are all indications of this becoming a fiery mine when once opened; it will have its second opening ready by the time it is down. Rendrick Bros., contractors; John T. Griffith, mining superintendent.

Hollanback shaft.—This is a new shaft located near the S. R. R., and within the city limits. It is down at present about 350 feet, it is to go to the Baltimore vein. There are indications of large quantities of gas in this shaft also. The second opening to it will be made from the Hollanback, No. 8, in the Hillman vein, and from the Diamond shaft for the Baltimore vein. Murry & Son, contractors; John J. Griffith, mining superintendent.

South Wilkesbarre shaft.—This is a new shaft, located also within the city limits. It has not been worked of late; only preparing to start, having had its head house, engine house, &c., burnt down a short time ago. It is down now about 100 feet, and is intended to reach the Baltimore vein. Smyth & Son, contractors; John T. Griffith, mining boss.

Lance shaft.—This colliery is located near Plymouth borough. It was sunk last year from the Lance vein to the Bennet vein. Gangways, air-ways, &c., have been started in the Cooper bed or the top bed of the Baltimore vein. There is to be a second opening made between this and the Dodson shaft, by driving gangways from both sides to meet. The old 8 feet fan has been replaced by a 15 feet fan. They are changing some of the hoisting machinery and remodeling the breaker, and expect to be ready to ship coal in 1873.

The plan upon which the bottom and turnouts of this shaft is being opened out, promises to be an improvement upon the old style of opening out around the bottom and tunnels of mines in the past, if properly carried out, with some slight changes as suggested by the inspector, it will give a fair chance to ventilate the mine properly by having double doors, so that the air currents on either side need not be cut from one end of the week to the other, besides having hundreds of feet on either side of the shaft without a door, hence free to pass from the obstructions of so many doors close to foot of shaft. John T. Griffith, mining superintendent: Wm. Smyth, assistant; Geo. H. Parrish, general superintendent; F. Tiffeney, assistant.

Dodson shaft.—This shaft is located in Plymouth borough and is 280 feet deep. It is sunk into the Bennet vein, in which vein the work has been opened out.

There has been considerable trouble experienced in opening this mine. A heavy stream of water was cut in the west gangway, which compelled the abandonment of the same, having cut the same twice in this same vein, and a similar one in the overlying vein, from which cause it was found necessary to abandon the west gangways in each vein for the present. It was my opinion from the outside indication that it was doubtful as regards the safety of opening a gangway westward on the Cooper vein without first ascertaining how much rock covering it had, as it might be that the rock roof of the same could be replaced by a sand bed which, if struck, would let in the water from the river bed and drown out the mine in a short time, and in all probability sacrifice many lives. Accordingly, I called the attention of the company's officials to the matter and requested them to find out the thickness of rock overlying the vein at this point. When the time arrived for them to start the gangways westward, they did not pay any attention to the matter of how much rock roof they had, but pushed on their gangways. They did not go far, however, before they struck a water seam and which caused them to abandon the same. This shows how much unnecessary risk of loosing many lives and destroying much valuable property is often run for the sake of saving a few paltry dollars and this even after being cautioned of the danger, &c. Otherwise the mine is tolerably safe, considering that there is some explosive gas generated and that the Cooper vein has some very dangerous roof, but it being very well timbered.

Ventilation is produced by a fan 15 feet in diameter, and is tolerably good at present, having had several important improvements made this year in the way of making new air bridges of large size, and splitting the air into several currents; besides this they have the stone and mortar system of building their stoppings, instead of the wooden ones, as heretofore, and which, on the whole, makes it a well ventilated mine.

All the safety appliances are in good order, such as bridle-chains, safety-catches, speaking-tube, gates at head of shaft and an adequate brake on the hoisting drum; besides, there is a convenient way to travel up and down the second opening shaft by a first-class set of ladders. Amount of air at inlet,

CONSUMER'S COAL COMPANY'S SHAFT, KINGSTON, PA.

East Boston Shaft.—No. 1 carriage dropped, first trial, 13¾ inches; second trial, 6 inches; third trial, 9½ inches. No. 2 carriage not used for hoisting or lowering persons.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY'S SHAFTS.

Avondale Shaft.—No. 1 carriage dropped, first trial, 2 inches; second trial, 1⅞ inches; third trial, 1¾ inches. No. 2 carriage dropped, first trial, 1½ inches; second trial, 1½ inches; third trial, 1½ inches.

Boston Shaft.—No. 1 carriage dropped, first trial, 1½ inches; second trial, 1¼ inches; third trial, 1½ inches. No. 2 carriage dropped, first trial, 1½ inches; second trial, 1½ inches.

RIVERSIDE COAL COMPANY'S SHAFT, PLAINSVILLE, PA.

Enterprise Shaft.—No. 1 carriage dropped, first trial, 4 inches; second trial, ⅜ inch. No. 2 carriage not used for hoisting or lowering persons.

LUZERNE COAL AND IRON COMPANY'S SHAFTS, PLAINSVILLE, PA.

Henry Shaft.—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

Prospect Shaft.—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

DELAWARE AND HUDSON CANAL COMPANY'S SHAFTS.

Pine Ridge Shaft.—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial, 2 inches. No. 2 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial; 2 inches.

Conyngham Shaft.—No. 1 carriage dropped, first trial, 12 inches; second trial, 14 inches; third trial, 8 inches. No. 2 carriage not used for lowering or hoisting persons.

NORTHERN COAL AND IRON COMPANY'S SHAFTS, PLYMOUTH, PA.

No. 1 Shaft.—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches. No. 2 carriage dropped, first trial, 2 inches; second trial, 2 inches.

No. 2 Shaft.—No. 1 carriage dropped, first trial, 3 inches; second trial, 2 inches. No. 2 carriage dropped, first trial, 3 inches; second trial, 2 inches.

No. 3 Shaft.—No. 1 carriage dropped, first trial, 3 inches; second trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

No. 4 Shaft.—No. 1 carriage dropped, first trial, 6 inches; second trial, 2½ inches. No. 2 carriage dropped, first trial, 6 inches; second trial, 2½ inches.

WILKES BARRE COAL AND IRON COMPANY'S SHAFTS.

Dodson Shaft.—No. 1 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches. No. 2 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches.

Lance Shaft.—No. 1 carriage dropped, first trial, 5 inches; second trial, 4 inches; third trial, 6 inches. No. 2 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches.

rious effects produced upon them from inhaling its fumes, unless the quantity of air passing is sufficiently large to carry that away quickly. It proves a valuable expedient to work places which are almost impossible of driving with common blasting powder, owing to the presence of unusually strong blowers of gas, and only under those circumstances can it be recommended for use in blasting coal.

The timber was discovered on fire in an air-way, near the pump, in the Lance colliery, Lehigh and Wilkes-Barre Coal Company, May 14, and it burned furiously for several hundred feet along the gangway. The roof fell to a height of about ten feet, and complicated the situation to an alarming extent. They succeeded, by strenuous efforts, and the application of plenty of water, to check it in a day or two, and finally extinguished it by that means, in the course of three weeks.

The origin of this fire could not be ascertained, but it started at a point where the steam pipe had dried everything to tinder, and where the heat was intense, and it probably ignited spontaneously.

RECORD OF COLLIERY IMPROVEMENTS FOR 1881.

Lehigh Valley Coal Company.

At the Henry shaft, compressed air was introduced to supersede steam, for the purpose of working the underground machinery. The heat radiating from the steam pipe underground, raised the temperature of the ventilation to a degree so as to cause serious disadvantage to the workmen and operators, in several ways; and to repair this, compressed air was tried, and the change proved very agreeable to all concerned.

The compressing engine is located near the boilers, at the top of the shaft, and the compressed air conducted underground through the pipe formerly used to convey steam. A description of the compressors, and the benefits resulting from the change, is given in the following letter, addressed to the writer, from Mr. Lines, outside foreman:

HENRY COLLIERY, *August 6, 1881.*

G. M. WILLIAMS, Esquire:

SIR: I give you herewith the results thus far obtained from using compressed air in our inside workings. Our compressor is a "Duplex;" size, fourteen inches to seventeen inches; stroke, thirty-six inches; with a boiler pressure of sixty-five pounds. We get an average piston speed of three hundred feet on compressor, and an air pressure of forty-eight pounds on receiver. It is running four direct acting pumps; size, lifts, &c., as follows: One pump, twenty inches; diameter of cylinder, twenty inches; length of stroke, twenty-four inches; piston speed, eighty feet per minute; discharge of water, one hundred and sixty gallons; vertical height of lift, two hundred feet.

One pump, ten inches, diameter of cylinder; twelve inch stroke; piston speed, sixty feet per minute; discharging sixty gallons of water; a vertical height of seventy-three feet.

feet in length. A second opening is effected to another lift, and the coal is twenty feet thick, and of good quality.

At No. 9 shaft, Sugar Notch, two tunnels are now in progress of driving from the Ross to the Red Ash seam, having an area of twelve by seven feet.

The Lance shaft was extended from the Bennett down to the Baltimore seam. The depth of extension was two hundred and thirty-three feet, and the total depth of the shaft, at present, is five hundred and fifty-nine feet from the surface. An air shaft is in progress of sinking, which will constitute a second opening for the other. It was down, December 31, 1881, three hundred and thirty-five feet, and, when completed, will probably be five hundred and thirty feet. There was no coal shipped from this colliery during 1881, but it will be ready to ship coal in the course of a few months, when the second opening will be effected. They have been employing an average of sixty-three persons during the year, effecting the work described.

The Stanton air shaft was down December 31, a depth of six hundred and eight feet and is to be extended to the Baltimore seam; a probable depth of eight hundred and thirty feet. This shaft is intended to improve the ventilation of the Audenreid colliery, and a fan, thirty-five feet diameter, will be erected upon it for that purpose. The shaft is twelve by twenty-five feet; part of it will probably be used to work the Hillman seam, the condition of which appears favorable for that in the shaft. They are employing an average of twenty-five persons and had two fatal accidents during the year just past.

The south Wilkes-Barre shaft was down, December 31, a depth of five hundred and eighty-six feet, and when completed to the Baltimore seam will be about one thousand one hundred feet deep. Its size is twelve by twenty-four feet, and is employing an average of twenty-one persons.

Delaware and Hudson Canal Company.

At the Mill Creek slope a new tunnel was driven from the lower to the upper split of the Baltimore seam. It is two hundred and eighteen feet in length, and has an area of seven by twelve feet. The seam is eight feet thick, and the coal is of good quality.

A new pair of hoisting engines was erected at the top of the slope to supersede the old ones. The dimensions of the steam cylinders are twenty-six by forty-eight inches, and the drum is twelve feet diameter.

At Laurel run slope a new tunnel was driven from the bottom to top split of the Baltimore seam, a distance of sixty-feet; seven by ten feet area, and has opened a convenient territory of coal.

The new tunnel in the Baltimore Tunnel colliery, noted in my last report, is completed, and the second opening effected. It is one thousand four hundred and fifty feet in length, and seven by fifteen feet area. The Baltimore seam in this colliery is very nearly exhausted, and this tunnel was driven from that seam to the Red Ash, of which they have a very large territory intact. The coal is of good quality, and fourteen feet thick. A

TABLE No. 1.—*Giving details relative to the progress of new shafts in the Wilkes-Barre District, and their depth, December 31, 1881.*

NAMES OF THE SHAFTS.	Names of Operators.	Purposes.	SIZE.		Depth on December 31, 1881.	Number of men employed.	Deepest coal seam to be cut at present.	Probable depth in feet.	Capacity of production per day in tons.	Fatal accidents to employees.	Non-fatal accidents to employees.
			Length in ft.	Breadth in ft.							
1. Dorrance, ...	Lehigh Valley Coal Company, ...	Hoisting coal, ...	52	13	250 ft.	25	Baltimore, .	1 000	1,000		
2. South Wilkes-Barre	Lehigh and Wilkes-Barre Coal Company, .	Hoisting coal, ...	24	12	586	21	Baltimore, .	1,100			
3. Stanton Air Shaft, ...	Lehigh and Wilkes-Barre Coal Company,	Hoisting and ventilating,	26	12	630	25	Baltimore, .	830	. . . .	2	1
4. Lance Air Shaft, ...	Lehigh and Wilkes-Barre Coal Company, .	Ventilation, ...	18	10	385	63	Baltimore, .	530			
5. Extension of Lance Shaft,	Lehigh and Wilkes-Barre Coal Company,	Hoisting coal, ...	28	12	559		Baltimore, .	559	800		
6. Woodward, ...	Del're, Lackawanna, and Western Coal Co.,	Hoisting coal, ...	53	10	30	30	Red Ash, .	800	1,000		1
7. Alden, ...	Alden Coal Company, ...	Hoisting coal, ...	26	12	28	18	Baltimore, .	270	1,000		
8. Bennett Shaft, ...	Thomas Waddell & Co., ...	Hoisting coal, ...	20	10	290	37	Baltimore, .	310	1,000	2	
9. No. 3 Shaft, Kingston, . .	Kingston Coal Company, ...	Hoisting coal, ...	33	12	544	22	Red Ash, . .	544	800		
10. Gaylord Shaft, ...	Gaylord Coal Company, ...	Hoisting coal, ...	47	12	575	20	Red Ash, . .	575	1,000		
11. Raubville Shaft, ...	Waddell & Walters, ...	Hoisting coal, ...	22	12	192	21	Bennett, . .	192	600		

600 feet in length. This opens to a large tract of coal, which will be extensively mined as soon as a second opening can be effected. The old No. 2 shaft, whose workings were connected with the upper Red Ash tunnel in this mine, was arranged as an escape for the men, in case of emergency, by having good accessible ladders erected up through it.

At the Stanton shaft, a force of men were kept at work through the year re-opening the mine and restoring the ventilation of the old workings. A gangway has been driven a long distance, from which a series of chambers will be opened as soon as connection can be made with the new air-shaft. The latter is now sunk to the Baltimore seam, a depth of 840 feet, and they expect to have it connected with the Stanton workings by the middle of April, 1883. A 35-foot fan was erected on top of this shaft, ready to set to work when the connection is made, which will produce splendid ventilation upon the starting of the operation. The new breaker is completed, ready for operation, as soon as the connection with the air-shaft is made.

At the No. 9 shaft Sugar Notch, the two tunnels reported in last year's report were completed—one from the Ross to the Red Ash seam was 7x12 feet area and 705 feet long, the other, not on the same level, but from the Ross to the Red Ash vein, also was 7x12 feet area and 560 feet long. A new fan was also erected on this colliery, which has improved the ventilation and made the colliery much more comfortable to work in.

At the Lance colliery a new air-shaft was sunk, which is 10x18 feet area and a depth of 520 feet, and its connection with the main shaft effected. A new 35-foot fan was erected, on top of the air-shaft, to ventilate the colliery, when ready for operation. The old breaker was pulled down, and a new one is in progress of construction, which they expect to have completed by the beginning of next May, when the mine will begin to ship coal again.

At the Nottingham shaft a new tunnel was driven from the Red Ash seam to work the Ross, none of which has yet been mined. The tunnel was 7x12 feet area, and 1,075 feet in length, and they are, at this writing, working to effect a second opening to it.

At the Reynolds slope a tunnel is in progress from the Red Ash to work the Ross seam, 7x14 area, and had been driven, at the close of the year, a distance of 300 feet. Another tunnel was driven through a large fault, which opens a large tract of coal hitherto untouched; it was 360 feet long, and has an area of 96 square feet.

At the Wanamie colliery a new tunnel was driven from the Ross to work the Red Ash seam, which has an area of 72 square feet, and is 390 feet long. A new fan, 15 feet diameter, was also erected at this colliery, which has been the means of producing much improvement in the ventilation.

The South Wilkes-Barre shaft is completed to the Hillman seam, a depth of 700 feet, and have found the vein proving better than their expectation. This has opened a large tract of hitherto solid territory of coal, and

The General Condition of the Mines.

During the year 1883, several new collieries began to operate in this district, swelling the list to an appreciable degree, and increasing the inspection work in the same proportion. The Clear Spring colliery began to send coal through the breaker January 3; the Alden colliery began January 18; the Hanover March 10; the Fuller colliery the last week in August; the Schooley breaker started September 3, and the Hillman vein breaker September 28. Beside these, the new breaker at the Lance colliery started to ship coal June 30, and the new breaker at the Stanton mine September 1. Thus eight new breakers are added to the list of this district for 1883. These new collieries are all equipped with the latest improved colliery-plant, and each is starting the operation of mining in good condition.

The ventilation of the Lance, Stanton, and Fuller collieries is largely in excess of the need of the present workings, and evidently it will continue so for some time. The ventilating systems of the other new collieries have not been completely established yet, but I expect it will be efficient when the contemplated work is accomplished.

In the old collieries, the good condition reported last year is generally maintained. A few instances exist where there is sufficient ground to complain, but even in these a slow progress is being made, and I am promised that a more satisfactory condition will soon be effected.

With the large amount of coal mined at present, the workings underground spread out rapidly, requiring extraordinary care in the manipulation of the air-currents to supply an efficient quantity of ventilation at the face of the workings. This is done remarkably well, considering the difficulties of the work.

Some difficulty is experienced in maintaining an effective discipline, from which laxity accidents frequently arise, causing injuries to the workingmen which might easily be avoided provided the discipline was more effective.

Events Causing Fire-Damp to Accumulate in Collieries.

Great danger exists when a large body of fire-damp accumulates in a coal-mine, and this danger had to be contended with at three of the collieries of this district for several months in 1883. During the first part of January the pillars of a large extent of workings in the Baltimore slope were crushing and showing the usual signs of an approaching cave, and about five o'clock, A. M., January 25, the expected cave transpired, breaking the strata clear through to the surface, and damaging a number of houses. While the pillars were being crushed, all the hitherto occluded gases were suddenly relieved and evolved into the cavities of the mine, causing the atmosphere of a large area of workings to become explosive. At the same time, from the same cause, the second opening of the Conyngham shaft was deranged and made for a while unavailable as an escapage for the latter colliery's workmen in case of emergency. The ventilation of this mine was also affected, so that a large section of the workings became

from the said tunnel by a drill-hole two and a fourth inches in diameter and eighteen feet long, about five o'clock, A. M., September 14, 1883. The water has been running continually since, but it is not all out yet.

A tunnel was driven in this mine from the Baltimore to the Hillman seam. It is seven hundred feet in length, and one hundred and twelve feet area, on a grade of eighteen degrees. The second opening was made by driving a passage to the shaft.

The new breaker erected at the Stanton mine started to put coal through September 1st, 1883. This colliery had been idle since the fire which caused the flooding of the mine in 1879. The new air-shaft was connected to the working on April 18, 1883, and they immediately went to work casing the air-shaft preparatory to setting the new thirty-five-foot fan to work.

The mine is now in excellent condition, having a very large quantity of air circulating, and plenty of margin to meet any extra requirements.

At No. 11, the Lance colliery, the old breaker was torn down and a new structure erected in its place. This started to work June 30, 1883. The colliery was equipped with a complete set of new machinery, consisting of a set of direct-acting hoisting-engines and conic drum, a breaker-engine, a pair of hoisting-engines for underground slope, but located on surface, and a thirty-five-foot fan, all of the best kind of machinery.

At the Reynolds colliery, the tunnel reported last year was completed to the Ross vein. Its total length is six hundred and forty feet. They are now working to effect a second opening to it.

At the South Wilkes-Barre shaft, a fan was erected fifteen feet diameter, dimensions of which can be seen in table of new fans.

The Susquehanna Coal Company.

This company is making rapid and sure progress in all their collieries. A pair of massive engines was erected to sink the No. 1 shaft extension from the forge seam to the red ash, and the three compartments at the southern end of the shaft were extended to a depth of two hundred and sixty-six feet below the forge vein, and they expect to cut the red ash seam in the first part of 1884. Two new shafts were opened for ventilating purposes from the surface to the Mills seam. Both are eighteen by thirteen feet area, and one is one hundred and eighty feet, and the other sixty-three feet deep. The ventilation of this company's collieries has been much improved during last year, and the spirit of the management from the highest officer to the lowest seems to be alert watching improved methods and adapting them to their mines.

A new double fan was erected on one of the above shafts, designed by Mr. J. H. Bowden, chief engineer of this company, and it produces excellent results, improving the ventilation greatly in two or three of the mines.

The underground slope in No. 2 shaft was extended during this year to a length of one thousand five hundred feet, on an average grade of eleven degrees. The tunnel reported last year in this shaft was completed to the

is continued, but another year, at least, will pass before it will reach its destination.

In the Red Ash seam of the Empire mine, a slope was made to hoist the coal from the lowest point in the mine to a point on a level with the bottom of shaft. It is one thousand one hundred and sixty feet in length, on a grade of about twenty-five degrees, and it facilitates the drawing of coal from a wide extent of territory which was hitherto out of their reach.

The old Hartford breaker took fire and burned down about eight o'clock in the evening, January 22, and the old Jersey, or No. 8 breaker, was remodeled to take its place. This, however, is not large enough to pass the coal of more than one opening—the new slope, the other two slopes remaining idle. The tunnel at the bottom of the new slope was extended from the Ross to the Red Ash seam, a distance of 380 feet, from which a large extent of coal can be mined. The slope was also extended to a further depth of 950 feet where it touched the synclinal of the basin and opened a wide field of the Baltimore seam.

In the Stanton mine a slope was driven towards the basin in line with the bottom of the new air-shaft, which opens a new lift of excellent coal. The hoisting-engine is located at the top of the air-shaft on the surface and the rope is passed down the shaft and to the slope over pulley-wheels. It works admirably, and the inconveniece of having steam pipes in the mine, and the detrimental effects of the heat radiating therefrom, is thus successfully avoided.

A tunnel is being driven from the Baltimore to the Hillman seam, the size of which is 16×8 feet on a rising grade of nineteen degrees. By the close of the year, it was driven a distance of 222 feet, and it is expected to cut the Hillman seam at a distance of about 775 feet.

In the No. 11, or Lance colliery, a slope was sunk reaching from the level of the shaft-bottom to a length of 1,350 feet, the average grade of the coal-seam being seven degrees. A new gravity plane was made also in the same mine to lower the coal from the highest point of the workings.

Delaware and Hudson Canal Company.

A new shaft was started by this company in April, 1884, and completed to the Baltimore seam before the end of the year. It is located about a quarter of a mile south-east of the Mill Creek colliery. The depth of the shaft is 132 feet, and its size 10ft.×22ft. 8 in. It was sunk for the purpose of working the coal from a small basin, which cannot be reached from the Mill Creek slope. The coal will be shipped from the Mill Creek breaker. Therefore, it is intended to maintain the present production of the colliery, although some portions of the slope are about being exhausted.

The Baltimore Red Ash shafts reported last year are still in progress of sinking. The depth of No. 1 was 304 feet at the end of the year, and of No. 2, 382 feet. Both these shafts are located in Wilkes-Barre township, and are intended to work the Red Ash seam. For dimensions see table in this report.

seventy-five. This is low enough to ensure a healthy condition of the air which the said number would have to respire, and at the same time the volume required by law would have sufficient speed or velocity to sweep the smoke away in a short time after it is produced.

The volume of air in the Boston mine became insufficient, and the company erected a new fan at the No. 3 shaft to remedy this. This change was effective and produced satisfactory results.

In the Nos. 2 and 3 shafts of the Delaware and Hudson Canal Company, at Plymouth, the air currents were divided into a larger number of splits, and the change has proved very beneficial. Both mines are now in conformity with the requirements of the law, having limited the number of persons employed in each split below seventy-five.

At the Nottingham mine of the Lehigh and Wilkes-Barre Coal Company, at Plymouth, the quantity of air was approaching the minimum allowed by law, and too many persons were placed to work in some of the splits. On December 13, the inspector requested the foreman to make preparations to increase the quantity of air and reduce the number of persons employed in each split to the lawful number. The company at once concluded to sink a new air-shaft, to provide an additional intake and upcast, upon which a fan will be placed as soon as the shaft can be completed.

The foremen of the Lance and Reynolds collieries were also notified that too many persons were employed in some of the air-currents, and they were distributed properly in a few days thereafter.

In the No. 1 shaft, Nanticoke, there were more than the lawful number of persons employed in the "main west gangway split," and after receiving a letter from the inspector, requesting compliance with the law, it was immediately complied with by adding another split of air.

In many instances, the provisions of the law are overlooked, until the inspector requests compliance. In underground slopes, and particularly where the pitch is small, the second openings are frequently not effected or driven until the inspector pushes the matter. There were several instances during the year under consideration where the inspector had to request such work to be done; but generally, upon requesting, the work is promptly started and pushed to completion.

I find that the operators are generally disposed to have their collieries worked in such a manner that the inspector will have nothing to say, but the foremen have a tendency to delay costly preparations in cases where no imminent danger is threatened, and where the law is not strictly complied with I find that the fault generally lies with the foreman. Naturally, he desires to make the business of his employer as profitable as he can, and sometimes he is tempted to economize unwisely by aiming to do that.

Automatic speed recorders have been attached to a number of the fans on the gaseous mines, and they are working very satisfactorily.

Colliery Improvements During the Year 1896.

The coal trade was unusually lax, requiring work for less than two-thirds time; such improvements only as were urgently needed were made during 1896, and such as were made and had effect on the condition of the mines are recorded in the following:

Improvements by the Lehigh and Wilkes-Barre Coal Company.

In the Empire mine a rock plane on a rise of 25 degrees was driven from the Ross to Baltimore seam in the abandoned Diamond colliery. It is 10x10 feet area and 435 feet in length. It enables the ventilation to be improved and they can work the remainder of the coal in that part of the Diamond mine.

At the South Wilkes-Barre colliery the No. 4 tunnel was extended to a length of 1,200 feet. It is driven from the Hillman through an anticlinal to cut the same seam on the other pitch.

No. 2 slope was sunk and connected to the No. 1 air shaft, effecting a third opening by which the ventilation will be effectively improved.

At the Lance No. 11 colliery two short tunnels were driven from the Cooper to the Five Foot seam. Their lengths are 200 and 250 feet respectively, and they have sectional area of 7x12 feet.

Improvements by the Delaware and Hudson Canal Company.

At the No. 2 colliery the shaft was driven from the Bennett to the Red Ash seam on an extension of 273 feet, making the total depth of the shaft from the surface 859 feet.

Improvements by the Susquehanna Coal Company.

At the No. 1 shaft a rock tunnel was driven from the Lee to the Lee seam through an anticlinal. It is 600 feet in length and 8x16 feet area.

A rope haulage was installed in the Forge seam in place of a mine locomotive, which is a decided improvement to the quality of the air.

In the No. 4 slope and No. 2 shaft several minor improvements were made. A tunnel was driven from the Hillman to the Mills seam. It is 500 feet in length with 7x14 area. An extension was made to the No. 5 slope which added 600 feet to its length. Size, 7x14 feet, grade 11 degrees. An extension of 300 feet was also made to the No. 11 slope.

In the No. 6 colliery Glen Lyon, 5 new gravity planes were made, varying in length from 200 to 500 feet, and a tunnel was driven from the Twin to the Ross seam. It is 700 feet in length and 7x14 feet area.

At the Empire colliery several short tunnels were driven from the top split of Red Ash to Ross seam and through a fault on the west side.

A new pair of hoisting engines 20″×36″ were put up at the No. 2 shaft to hoist from the underground slope.

At the South Wilkesbarre shafts, the damage that was done by the fire of 1890 was repaired, and a much more reliable system of ventilation was effected by driving new passages. A new fan 35′×12′, having an engine 20″×48″, is also in course of construction. The experiment of trying to ventilate this gaseous mine by a twelve-foot Cappell fan has not proven satisfactory, and the new fan is expected to effect a much desired improvement.

At the Stanton colliery the damaging effects of the cave of 1890 were repaired, and so was the effects of the South Wilkesbarre fire on the rock plane connecting the two collieries. This plane is now in working shape and openings are being driven to connect with the air-shaft, which when effected, will place the Hillman vein workings of this mine in good condition for work.

A tunnel was driven across the basin in the Baltimore seam, near the bottom of the underground slope, a distance of 456′, which has enabled them to ventilate a very gaseous portion of workings which has been idle for more than four years, owing to the prevalence of an unusual quantity of explosive gas.

A new air-shaft was also sunk for the Red Ash seam a depth of 318′ upon which a ventilating fan 24′ diameter, an engine 20″×36″, and two batteries of Babcock & Wilcox boilers were erected.

At the Jersey No. 8 colliery a new air shaft was sunk, having an area of 12′×12′ and a depth of 57′, upon which a new fan 24′ diameter, having direct acting engine 30″×36,″ were erected. Several other minor improvements were also made at this colliery.

At the No. 9 colliery, Sugar Notch, the underground slope was re graded and a new lift opened. The hoisting engines were taken out and new ones erected on the surface to do the work. These engines are 24″×48″ direct-acting on a parallel drum 9′ diameter. This has made a very agreeable change in the ventilation. Three tunnels were driven at different levels to work the Twin, Shaft and Top split seams.

At the Lance No. 11 colliery a new tunnel was driven from the Bennett to the Cooper seam, a distance of 222′. They have also improved the ventilation by enlarging the airways at contracted points through the mine. They also put in a system of water pipes in the gaseous gangways to be ready for extinguishing fires in case the gas-feeders should be ignited. A 100-horse power Dimmick & Smith high-pressure boiler was added to the plant on the surface.

At the Nottingham colliery the third and fourth east gangways closed by the cave of last year were reopened, and the standing gas removed by driving airways around the cave.

A short rock tunnel for ventilating purposes, 43 feet long and 7×12 feet area from the top to the bottom split of the Red Ash seam, was driven.

At the No. 8 Jersey colliery two new tunnels were driven from the Baltimore to the Ross seam, one in each of the two lower lifts of the new slope, and they are continued to tap the Red Ash seam. Size of each is 7×12 feet, and their lengths will probably be 600 feet each when completed. They are now at work driving second openings for the Ross seam.

At the No. 9 colliery, Sugar Notch, the underground slope is being extended, and a traveling way has been completed 900 feet in length on a grade of 20 degrees.

At the No. 11 Lance colliery a new air shaft is in progress of sinking, 12×30 feet area, and it will be about 600 feet in depth when completed. At the close of the year it was at a depth of 40 feet. Three new gravity planes of various lengths were completed, to run coal down from elevated workings. A new Guibal fan thirty-five feet diameter was erected as an auxilliary to the old one. It exhausts 229,630 cubic feet of air per minute when running fifty revolutions. This also has a self-recording pressure meter connected to the return air and an automatic alarm attached to give alarm in case the ventilation is reduced.

At the Nottingham colliery a new air shaft has been sunk to the Ross seam. It has an area of 12×30 feet and a depth of 175 feet.

A new fan 24 feet in diameter is in progress of erection and will be operated by a horizontal direct-acting engine 20×36 inches.

At Wanamie Nos. 18 and 19 two new tunnels have been driven at different points from the Baltimore to the Cooper seam. Each is 165 feet in length and 7×12 feet area.

The No. 19 slope is being extended to open another lift.

Beside improvements recorded above, a number of new steam boilers were added to the plants of several of the collieries, and several other minor improvements were effected.

Improvements by the Delaware and Hudson Canal Company.

At the Baltimore Tunnel colliery, the underground slope on the Red Ash seam was extended a distance of 500 feet, making the total length of the slope equal 900 feet. The average grade is 18 degrees. At the Boston colliery a new fan has been erected on the foundation of the old one which was torn down. This is 20 feet diameter and running 100 revolutions exhausts 50,000 cubic feet of air per minute under a pressue of 0.75 inch water gauge. The size of the engine is 14×48 inches, running the fan by a belt transmission.

At the No. 2 colliery, Plymouth, an underground slope has been sunk to a length of 500 feet on a grade of 12 degrees, which is the inclination of the seam. It opens a lift of excellent Baltimore vein coal. The engine to hoist from this, is located on the surface.

and at the end of the year it was driven to a length of 440 feet on grade of 20 degrees.

This will also open some coal for the Maxwell breaker in addition to the production of the shaft.

The woodwork of the Maxwell breaker is completed ready to be equipped with machinery. It will be ready to prepare coal for the market by the time the shaft is completed.

At the No. 9 colliery, Sugar Notch, the underground slope was extended a distance of 300 feet where a new lift was opened. A rock tunnel was driven on a rise of 45 degrees, having an area of 12½x8½ feet, and a length of 104 feet, for the purpose of improving the ventilation.

At the Lance No. 11 colliery important improvements are in progress and some were completed. A new underground slope was sunk, extending farther south than the bottom of the old slope. It is 800 feet long on a grade of 8 degrees and opens a considerable area of coal which has been hitherto unavailable.

An air passage was driven, also, through rock a distance of 200 feet, having a sectional area of 84 square feet.

A new air shaft is in progress of sinking for this colliery for the purpose of enlarging the volume of air. Its size is 12x30 feet, and it was at a depth of 300 feet at the end of the year.

At the Nottingham colliery a great improvement has been made by the introduction of compressed air to run the underground pumps, instead of steam. There are 8 pumps used in this mine, and the steam necessary to run them heated the air to an almost intolerable degree. The two duplex Ingersoll air compressers, with Corliss engines, were located on the surface. Their size is 28x34¼x48 inches, having a capacity for producing 11,000 cubic feet of free air per minute. One pair furnishes sufficient air to run the 8 pumps and one is operated during the day and the other during the night. The farthest pump is at a distance of 7,200 feet from the compressors. The air pipe to the first pumps is 14 inches diameter, and from there to the other pumps 12 inches. They are working satisfactorily, and the temperature of the mine ventilation has been greatly reduced.

At the Wanamie, No. 18, colliery a short tunnel was driven from the Baltimore to work the Cooper seam. Its size is 7x12 feet, and its length 175 feet.

Improvements by the Delaware and Hudson Canal Company.

At the No. 2 Baltimore colliery a new underground slope was driven a distance of 450 feet on a dip of 20 degrees to work the coal of the red ash seam below the level of the shaft.

At the No. 3 Baltimore they are sinking an underground slope on the red ash seam and it was down a depth of 600 feet at the end of

Lehigh and Wilkes-Barre Coal Company.

Hollenback No. 2 Colliery—

Return airway in rock from the Diamond basin; 12x8x400 feet.
No. 2 Red Ash slope being sunk in coal in the bottom split vein.
Annex on east and west side of breaker for the preparation of stove and chestnut coal.

South Wilkes-Barre No. 5 Colliery—

No. 1 airshaft has reached the vein; 37x12x650 feet.
Tunnel has been driven from Stanton to Hillman vein.
Rock slope finished from Hillman to Baltimore veins and second openings in rock finished to same.
New fan, 35 feet diameter, has been erected at No. 5 shaft.
Erected 250 horse power Stirling boilers.
Erected 500 horse power National boilers.
Erected 470 feet of 8-inch steam line to fans.

Sugar Notch No. 9 Colliery—

Main airway enlarged to 90 square feet; 1,050 feet in length.
Ross slope extended in rock 120 yards.
Tunnel, Twin to Ross veins.

Lance No. 11 Colliery—

Rock slope to Ross veins finished; sunk a distance of 400 feet this year.
No. 2 airshaft completed to Ross vein, and second openings are now being driven to connect with the rock slope workings.
No. 12 plane partly in coal and partly in rock has been finished.
No. 2 slope in coal has been finished.
Erected 250 horse power National boilers.
Erected 430 feet extra steam line to fans.

Nottingham No. 15 Colliery—

The Ross slope is being extended in rock through the anticlinal.
The Red Ash No. 3 slope is being extended in coal.
Erected one 24 feet by 8 feet Guibal fan on No. 1 airshaft.
Erected 300 horse power Stirling boilers.
Erected 4,000 feet 8-inch steam lines to fans.

Wanamie No. 18 Colliery—

No. 5 slope is being sunk in coal in the Ross vein.
Two bore holes, 200 feet deep each, have been put down for hoisting and pumping purposes.
No. 19 slope has been sunk in coal almost to the basin.
Erected one pair geared engines, 18x30-inch, with 8x10-foot drums.

different manner than that heretofore employed. There is no back pressure on the piston caused by forcing the steam through the breaker, the pipes from the exhaust being very large and the steam conducted at once to the highest point required. From this point the steam travels downward through the system of pipes, with the condensed water, thus utilizing the heat in the latter, as well as the latent heat in the steam. The water which collects in the pipes is let off by traps which adjust themselves to any pressure, the heating pipes in the breaker by this arrangement taking the place of surface condensers and assisting, instead of retarding the breaker engine in its work. The pipes are also connected to a pipe direct from the boilers by means of an automatic reducing valve, which is set to supply steam from the boilers when the pressure in the pipes has fallen 8 pounds below atmospheric pressure. This arrangement provides for the heating of the breaker when the breaker engine is not in service.

Operations at the new colliery were commenced on the 16th day of December, 1895, and up to the present time no changes throughout the entire breaker have been required. The daily output is not yet up to the maximum, but before a great while it is expected that the colliery will be able to ship 4,000 tons daily.

No. 9 Sugar Notch.—One tunnel through rock from Twin to Ross seam 351 feet long, 7x12 feet area.

Lance No. 11.—Two new Sterling boilers, 125 horse power each. A thirty-five foot fan is in course of erection on the new aid shaft which was sunk in 1894.

Improvements by the Delaware and Hudson Canal Company.

Baltimore Tunnel Colliery.—A new gravity plane was made extending towards the outcrop 600 feet.

No. 2 Baltimore Colliery.—The inside slope was extended to a length of 1,000 feet and is being continued.

Boston Colliery.—The new shaft was completed to the Red Ash seam which was cut at a depth of 475 feet. Its size is 12x33½ feet.

No. 3 Plymouth.—A new breaker to replace the structure which was burned on November 15, 1894, was finished by July, 1895, in which month it started to prepare coal, and worked seven and three-fourths days. It was erected about 300 feet west of the location of the old one which is a very desirable improvement. A pair of first motion hoisting engines with a brick engine house has been erected at the shaft, and the whole plant and outside arrangement is now in a satisfactory condition.

A new breaker is in course of erection at the new No. 5 shaft which was sunk and completed last year. The shaft is equipped with machinery and they are now commencing to drive gangways in the Red Ash seam.

Rock airway, Baltimore to Five Foot, 20 yards. Tunnel from bottom to top split red ash, 10 yards. Steel head frame at shaft.

Jersey Colliery.—Rebuilt Jersey breaker to screen culm banks of collieries No. 6 and No. 8.

Sugar Notch Colliery.—Steel head frame at shaft. New trestle from head frame to breaker.

Lance Colliery.—Tunnel from Cooper to Five Foot, 55 yards. Tunnel from Baltimore to Cooper, 35 yards. Rock airway, Baltimore to Cooper, 35 yards. Pair of 18x30-inch engines erected at No. 2 airshaft for operation of Red Ash plane.

Wanamie Colliery.—Tunnel, Baltimore to Cooper, 20 yards. An nex to breaker to secure better preparation and increase output. Two hundred and fifty horse-power Babcock & Wilcox boilers.

Maxwell Colliery.—Rock airway, Ross to Baltimore, 50 yards; 30x 48-inch Corliss engines for Red Ash shaft. Two hundred and fifty horse-power Babcock & Wilcox boilers.

Improvements by the Delaware and Hudson Company, 1899.

Baltimore No. 2 Colliery.—No. 5 slope in Red Ash vein now down 1,300 feet and probably in basin; 820 feet driven in 1899. No. 1 tunnel from bottom split, Red Ash to top split, 307 feet long. Rock return airway for No. 1 tunnel, 87 feet long. One Ingersoll air compressor 20x18x30 inches. Air used for 10x12-inch engines on plane in Red Ash vein carried down bore hole 630 feet long at Pine street.

Baltimore Tunnel, No. 4 Shaft.—Completion of No. 5 slope in Red Ash vein, 1,600 feet long. Now in operation. Engines, pair 18x36-inch on surface, in stone engine house, 20x40 feet. Rope runs through bore hole. Boiler plant, three locomotive type boilers, 60x23 feet 3 inches in brick boiler house, 46x60 feet. This plant displaces the twelve cylinder boilers at mouth of tunnel and one locomotive boiler at Pine street. No. 6 slope, Red Ash vein, now down 1,000 feet.

Baltimore Slope.—No. 3 slope in Red Ash vein extended. Now down 1,700 feet and in basin; 300 feet driven in 1899. Endless rope haulage, 900 feet long, transporting coal from head of slope to foot of shaft. Engines, 10x10 inches, located at head of shaft. Ropes carried down pump shaft. The track gauge was changed in July, 1899, from 4 feet 8½ inches to 3 feet.

Conyngham.—No. 6 plane, Abbott vein, now up 1,400 feet, still driving. No. 7 plane, Kidney vein, now up 1,020 feet, completed. No. 2 slope, in Baltimore vein, down 900 feet in basin. The air shaft at main shaft has been retimbered and relined, as has the one at Hillman shaft. One Ingersoll air compressor, 20x18x30 feet. Air pipes passes down shaft to Hillman vein, where the air is used to operate two hoisting engines, 10x12 feet, and one pump, 24x10x24 feet.

The board of examiners was G. M. Williams, Mine Inspector; Edward Mackin, superintendent, and Frank Mills and David L. John, miners. Seventeen applicants for mine foreman certificates were examined, and the following named were recommended to have certificates: William T. Davies, Charles A. Brown, Harry Gaughan and Thomas E. Edwards, of Wilkes-Barre; William S. Davies and Oliver Rhydderch, of Edwardsdale; James Wilson and Gomer Evans, of Plymouth; John Rousing and James Stirling, of Westmore.

The following named persons received certificates of qualification for assistant mine foreman: James Coughline, Luzerne; Peter Tully, John Dietz, John C. Parry, Lewis Lewis, William E. Thomas, Edward H. Williams, Thomas W. Jones and Ivor Davies, of Wilkes-Barre; Michael Nork and Thomas Morgans, Glen Lyon; David Morris and James H. Davy, Wanamie; William Newland, Alden Station; John P. Evans, Illtyd Evans, William H. Faust, Benjamin A. Waters, Arthur D. Evans, Lewis B. Lewis, William E. Bowen, Llewelyn Williams and Ivor T. Phillips, of Nanticoke; John Whittington and David Roberts, Sugar Notch; John Abrahamson, William A. Roberts and John Boyer, of Parsons.

Improvements by the Lehigh and Wilkes-Barre Coal Company in the Year 1900.

Hollenbach Colliery.—Tunnel from bottom to top split Red Ash, 49 yards. Return airway in rock, 19 yards.

South Wilkes-Barre Colliery—Bore hole to drain water from Kidney to Hillman Vein. Tunnel Hillman to Stanton, 159 yards. No. 4 tunnel extended 50 yards. Tunnel Baltimore to Five-Foot, 63 yards. Fuel conveyor breaker to boiler house.

Stanton Colliery—Rock plane Hillman to Kidney vein, 60 yards. One pear 24x48-inch first motion engines erected at Stanton air shaft for operation of No. 4 rock plane. One thousand horse power. Babcock & Wilcox boilers to replace cylinder boilers at breaker plant. Additional 6-inch steam line from breaker plant to air shaft.

Sugar Notch—Tunnel from bottom to top split, Baltimore vein. Tunnel from Ross to Red Ash vein, 70 yards.

Lance Colliery—Tunnel Five-Foot to Hillman, 189 yards, partly finished. Tunnel bottom split to top split, Baltimore, 57 yards. Annex to breaker to prepare buckwheat coal.

Nottingham Colliery—One pair 24x48-inch first motion engines for operation of new slope in Ross vein. An 8-inch bore hole, 280 feet long, to conduct rope from surface to head of slope.

Reynolds Colliery.—Rock plane Red Ash to Ross, 50 yards. Partly finished.

out one of the screens, and the assistant foreman saw him at his work at 3.30 P. M., but he fell into the elevator shaft, seventy-five feet away from his work.

James Dudson, a laborer in the Conyngham, had been notified on the morning of December 22 not to run any loaded cars out of the counter in which he was working, as there were runners employed for that purpose. After loading their last car, he and his partner ran it out to the gangway; the front end of the car struck the head block, throwing the hind end off the road, catching Dudson's head against a prop, killing him instantly.

Joseph Depedaro fell into the conveyors at the North American Washery, although he had been ordered not to go near them, as the culm he was wheeling was blocking up the conveyor line, and should have been dumped at the foot wheel. In spite of his orders he went twenty feet beyond the foot wheel, and when he fell he was dragged around the wheel and killed.

John Pelkis, a miner at No. 1 Shaft, Kingston Coal Company, was struck by a small piece of coal flying from a blast on December 30. The injury he received seemed very slight, as there was only one cut visible on his head, but he died December 31.

Improvements Made by the Lehigh and Wilkes-Barre Coal Company During the Year 1902.

Hollenbeck No. 2.—Erection of new boiler house at shaft and the installation of two batteries of water tubular boilers of 500 horse-power each, with a forced fan draft system, and under ash ducts.

A second opening from the top split to the bottom split in Red Ash seam, No. 2 Tunnel, east, to provide ventilation for these workings.

Extension of No. 2 Slope on a grade of seven degrees through rock, from the bottom split to the bottom split in the Red Ash seam, cutting top split of Red Ash seam. This extension was made for the purpose of opening up a larger area for No. 2 Slope.

South Wilkes-Barre No. 5.—Erection of a 35-foot Guibal fan at No. 1 air shaft for ventilating western portion of South Wilkes-Barre mine.

Stanton No. 7.—Erection of forced fan draft system at shaft boiler house.

Sugar Notch No. 9.—Erection of new boiler house and installation of two batteries of tubular boilers of 500 horse power each, with a forced fan draft system and under ash ducts.

Lance No. 11.—Erection of new boiler house at shaft and installation of one battery of 500 horse power water tubular boilers.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance Colliery

Outside.—Duplex air compressor, simple steam, compound air; forced fan draft system for boilers, and addition to new boiler house.

Inside.—No. 18 tunnel, Red Ash to top Red Ash, 15 yards. No. 19 tunnel, Red Ash to top Red Ash, 15 yards. No. 20 tunnel, Red Ash to top Red Ash, 15 yards. No. 21 tunnel, Cooper to Five Foot, 50 yards.

Nottingham Colliery

Outside.—Started erection of new breaker; shaft hoisting engines; No. 1 slope engines and No. 2 slope engines placed on new foundations, and new houses erected for the same; colliery supply store; colliery shop; extended brick compressor house, for accommodation of three stage air compressors.

Inside.—Eighteen inch by 30 inch hoisting engines and engine room in rock, on No. 2 slope anticlinal. Pumping plants on 5th, 7th and 9th, Red Ash levels, remodeled with the addition of two simple duplex pumps and two bore holes for water from Ross to Red Ash, thereby concentrating all pumping in Red Ash vein.

Reynolds Colliery

Outside.—Five hundred H. P. battery B. & W. boilers.

Inside.—No. 8 Rock plane, through Red Ash fault, 125 yards.

Wanamie

Outside.—Five hundred H. P. battery B. & W. boilers.

Inside.—Pumping plant No. 6 Red Ash slope; extending No. 6 slope through rock, 100 yards; No. 11 tunnel, Baltimore to Red Ash across basin No. 2 drift, 190 yards.

PARRISH COAL COMPANY

Parrish Colliery

One 8 inch bore hole for flushing; one crusher for crushing slate and bone, for flushing; one pair breaker engines; No. 6 slope extended 300 feet; intake air shaft, concreted from surface to rock; one 30,000 gallon water tank; one 20,000 gallon water tank.

Buttonwood

Tunnel driven from Kidney to Abbot vein about 560 feet; one 35 foot fan, also fan engine 22x36; one saw engine, etc., for cutting prop timber, etc.; outside railroad, plane and engine, for handling timber, etc., from railroad to head of shaft; concrete wall erected around coal shaft head, also around boiler house; one 30,000 gallon water tank.

high water in the Susquehanna river, which has resulted so disastrously to this colliery heretofore.

Woodward Colliery

New steel tower over No. 1 shaft, installation of endless rope haulage on breaker trestle and to convey empty cars to No. 2 shaft, new brick and concrete pump room, lamp room and fire-boss shanty near the entrance of No. 1 shaft.

Breaker repairs consist of the installation of mechanical pickers, elevators, rollers, etc., together with a new 12 foot dust fan, which has been quite an improvement in this breaker.

Haulage roads and return airways were enlarged and widened, increasing the area of some of these openings from 48 square feet to 90 square feet.

No. 2 shaft was retimbered during the year to within 250 feet of the surface. A brick partition has also been erected between the air shaft and hoistways in this shaft for a distance of 212 feet from the bottom. This work will be completed as weather conditions will permit.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery

Outside.—Colliery shop.

Inside.—Rock plane airway Cooper to Five Foot for No. 21 tunnel return, 20 yards; 10 inch bore hole Stanton to Red Ash for pumping plant; No. 22 tunnel Cooper to Cooper, 26 yards; rock plane airway Stanton to Hillman for No. 14 tunnel return, 40 yards; No. 11 tunnel extended to Cooper, 95 yards.

Nottingham No. 15 Colliery

Outside.—Oil house; three stage air compressor; 2,000 H. P. water tube boilers; fuel conveyor.

Inside.—Compressed air haulage motor for shaft level haulage.

Reynolds No. 16 Colliery

Inside.—Tunnel turnout on No. 8 plane, 36 yards.

Wanamie No. 18 Colliery

Outside.—Supply store; 24 foot ventilating fan No. 2; locomotive house; 24x48 inch hoisting engines, No. 6 slope; 10 double dwellings.

Inside.—Rock plane airway Red Ash to surface, 175 yards; No. 12 tunnel Ross to Baltimore, 105 yards; No. 13 tunnel Ross to Ross.

of the shaft, in the breaker, after the car was dumped, he gave the signal to the engineer to lower. It was presumed that after he had given the signal for the cage to descend that he made an effort to take the ticket off the car, and in so doing lost his footing, and was precipitated to the bottom of the shaft.

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Nottingham colliery, Reynolds colliery, Wanimie No. 18 and Wanimie No. 19.—Condition good as to safety, drainage and ventilation.

DELAWARE AND HUDSON COMPANY

Plymouth No. 2, Plymouth No. 3, Plymouth No. 4, Plymouth No. 5, and Boston.—Condition good as to safety, drainage and ventilation.

WEST END COAL COMPANY

West End in good condition; drainage good; a very notable improvement in regard to ventilation, especially in outside drifts.

Ross vein in long drift, is only in fair condition in regard to ventilation, but expect to have this vein well ventilated in short time.

PLYMOUTH COAL COMPANY

Dodson.—Condition good as to safety, drainage and ventilation.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Woodward and Avondale.—Condition good as to safety, drainage and ventilation.

PARRISH COAL COMPANY

Parrish and Buttonwood.—Condition good as to safety, drainage and ventilation.

KINGSTON COAL COMPANY

Kingston No. 2, Kingston No. 3.—Condition safe, drainage good, ventilation good; special mention should be made as to the good ventilation now existing in the orchard vein, since the installation of a new fan.

GEORGE F. LEE COAL COMPANY

Chauncey.—In safe condition, drainage good, ventilation fair.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery

Outside.—Supply store, brick oil house, re-inforced concrete retaining wall, 500 H. P. water tube boilers.

Nottingham No. 15 Colliery

Outside.—Complete new breaker and surface improvements, 500 H. P. water tube boilers.

Boston

No. 9 Plane, Top Split, Red Ash vein, extended 600 feet.

No. 13 Plane, Bottom Split, Red Ash vein, graded and driven 1000 feet, 600 feet of which was driven through fault cutting the Top and Bottom Splits of the Red Ash vein.

8 inch rope hole for No. 13 Plane drilled 225 feet and pair of 14x20 engines installed.

Air return in rock driven from Ross vein to Top Split of Red Ash.

Steel tower erected to take the place of frame structure over main shaft.

Condition of colliery is good.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11

Outside.—Fuel conveyor.

Inside.—Compound condensing pump and rooms.

Condition of colliery is good.

Nottingham No. 15

Outside.—Colliery office.

Inside.—Duplex pump, 9th East.

Condition of colliery is good.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Avondale

The appearance outside at this colliery has been considerably improved by the erection of a concrete retaining wall extending along the hillside from the breaker to the fan house.

The installation of feed water regulators, etc., in boiler room is a decided improvement over the old method of feeding the boilers.

Inside.—Two 7x12 short rock tunnels were driven on No. 4 East Gangway Ross vein, through fault.

The installation of a double motor electric hoist on No. 7 Slope, Ross vein, is a decided improvement over the old steam engine.

The erection of concrete piers, or props, in several places in this colliery might be worthy of mention.

Condition of colliery is good.

Woodward

Outside.—New steam lines from the boiler plant to ventilating fan, hoisting engines and power station have made a decided improvement in the outside appearance and efficiency of this colliery.

The breaker has been improved by the installation of mechanical pickers, rock crushers, etc., together with two Phillips steam dumps.

The brick partition separating hoist way and air way No. 2 Shaft was partly completed during the year; it is now completed. It has been a source of improvement to the ventilation of this colliery.

The erection of a steel bridge under this breaker over railroad tracks adds strength to the building and will prevent the building from getting on fire from sparks from locomotives passing under it.

Inside.—Two rock tunnels were driven connecting Cooper vein with 5 Foot vein and Red Ash with Ross vein.

A rock slope is being sunk from the surface to the Abbott vein. This work will be completed in 1907.

The erection of a concrete and iron air bridge, No. 2 Slope, Red Ash vein, has made a decided improvement in the ventilation of this section.

DELAWARE AND HUDSON COMPANY

Boston Colliery.—General condition as to safety good.
Plymouth No. 2 Colliery.—General condition as to safety good.
Plymouth No. 3 Colliery.—General condition as to safety good.
Plymouth No. 4 Colliery.—General condition as to safety good.
Plymouth No. 5. Colliery.—General condition as to safety good.

PARRISH COAL COMPANY

Parrish Colliery.—General condition as to safety good.
Buttonwood Colliery.—General condition as to safety good.

PLYMOUTH COAL COMPANY

Dodson Colliery.—General condition as to safety good.

KINGSTON COAL COMPANY

Gaylord Colliery.—Ventilation and drainage fair, condition as to safety good.

GEORGE F. LEE COAL COMPANY

Chauncey Colliery.—No. 3 Slope, Ventilation and drainage good. Condition as to safety good.
Breaker Level Drift.—Ventilation fair, drainage poor. Condition as to safety good.

CHRISTIAN AND DAINTY COAL COMPANY

Hillside Colliery.—Ventilation poor, drainage good. Condition as to safety good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery.—Inside: No. 24 Tunnel, Red Ash to Top Red Ash.
No. 23 Tunnel, Baltimore to Cooper.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Avondale Colliery.—The ventilating fan at the main air shaft was rebuilt during the year. Work of connecting Nos. 5 and 7 slopes, Ross vein, by a rock slope on a 20 degree pitch, is under way.
Two electric reel device locomotives were installed for transportation purposes.
The work of installing an inside electric sub-station No. 2 Slope, Red Ash vein, to be connected by the Nanticoke power plant by high tension lines through a 14 inch bore hole from the surface, is under way and will be completed early in 1908.
The work of installing a 500 gallon electrically driven centrifugal pump, Ross vein is under way.
The old steam engine at foot of No. 9 plane has been disposed of and a 160 H. P. electric hoist has been installed to take its place.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery, Inside.—No. 25 Tunnel, Cooper to Baltimore.
Nottingham No. 15 Colliery, Outside.—New wash house.
Inman No. 21.—Sinking shaft. Continued sinking Baltimore and Red Ash shafts.

KINGSTON COAL COMPANY

Kingston No. 2 Colliery.—A new washery, capacity 1,000 tons per day, has been completed midway between No. 2 breaker and No. 4 breaker, said washery complete with duplicate shakers, rolls, elevators and conveyors and Jeffrey crushers.

Three bore holes driven so that all waste from the breaker is flushed into the mines.

Shipment began from the washery in the month of May.

A new brick boiler house equipped with 600 H. P. water tube boilers, feed pumps and water heaters.

A wet addition was completed to the breaker equipped with duplicate shakers, elevators, rolls and Jeffrey crushers.

The dry part of the breaker is being entirely remodeled, work on which will be completed in the fore part of 1909.

All circular screens are being substituted with shakers.

The old plane has been abandoned and a new location made away from the breaker and at a much easier grade, which removes the unsafe condition.

A new brick office and retail scales complete.

The tracks on the loaded and empty sides of the breaker have been changed and new railroad scales set in place.

A new steel concrete bridge has been completed over Jackson avenue dispensing with the old wooden structure.

Special attention has been given the remodeling of the emergency hospital in the Nos. 2 and 3 Shaft districts; also a brick combination hospital and foreman's office built at the old slope.

The equipment has been increased with two new locomotives and cars for the Mountain tunnel development.

Gaylord Colliery.—A new washery, with a capacity of 1,000 tons per day, was completed and operation begun in March; the washery is completed with duplicate shakers, rolls, elevators and conveyors and Williams crushers, and also acts as a wet side or mud screen adjunct to the breaker.

Two new Goyne pumps 28 x 10 x 36 pump silt through 8 and 10 inch culm lines 3,000 feet to bore holes, so that all the refuse from the washery and breaker is flushed into the mines.

Series of six holes have been completed for flushing purposes.

Two bore holes for steam exhaust and culm pipe and a new pump outfit completed in Bennett vein.

During the months of July and August the breaker was remodeled and all circular screens dispensed with, shakers being substituted, also modern rolls, crushers, etc.

"An era in the history of mining anthracite in the Wyoming coal field has been inaugurated by the success of the Dundee Coal Company in reaching a superior vein of eleven feet in thickness at a depth of nearly 800 feet below the surface.

From a distance we have watched the progress of this shaft with anxious eyes, and we are sure that the pleasure to us of their success can very little be less than to the members of the company. Much credit has been thrown on our coal field by the partial and unsuccessful exploration for coal in Hanover and Newport. Borings have been abandoned at a depth of three or four hundred feet, leaving doubt about the existence of coal, in the minds of strangers, and, indeed, in the minds of some of the less sanguine of our own citizens.

The Dundee Coal Company, composed principally of our own citizens, resolved to sink its shaft to a depth of 1,000 feet if coal could not sooner be obtained. The largest vein cut had been but four feet, with many smaller ones. Still, without hesitation, yard after yard was cut. Mr. F. Koerner, an intelligent and energetic man, had charge of the work, which progressed as rapidly as the hard rock would permit, until 780 feet had been passed. Then indications of coal appeared and an auger was put down three feet to a small eight-inch seam of slate below which was a vein of fully eight feet of beautiful coal. To the bottom of the vein is 792 feet, and to provide for the dropping of the water from above the shaft was sunk a few feet deeper, probably 800 feet in all."

The story is continued with a narrative of the personal experiences of the editor in a descent of the shaft. A large stream of water entered at a depth of 250 feet, but was cared for by pumps. The editor mined a few specimens of coal at the bottom with illumination furnished by a few gas jets pouring forth from the vein itself. He says, in his story, that the vein was supposed to be the Mills vein, found at Nanticoke, and that other veins of greater thickness were believed to be underlying it. This belief was well founded, for the territory in which this vein was located is now considered the richest in the Wyoming coal field, and the lower veins are found at a depth of from 1,800 to 2,000 feet. The ancient chronicler also tells of the gas found in the vein, for it was the presence of this gas in large quantities and the lack of knowledge of proper ventilating methods in those days that caused the subsequent abandonment of the mine.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery, Inside.—Tunnel, Cooper to Five Foot, No. 1 Slope, 5th West.

Nottingham No. 15 Colliery, Outside.—Corliss breaker engine.

Reynolds No. 16 Colliery, Inside.—Rock plane, Ross to Ross, No. 4 tunnel East.

DELAWARE AND HUDSON COMPANY

Plymouth Nos. 1 and 2 Colliery.—A return airway was driven from No. 14 plane, Abbott vein to No. 1 shaft.

An air shaft was sunk 55 feet from surface to Lance vein workings and 300 feet of return airway was driven in vein.

A 50,000 gallon water tank was erected and pipe connections made for boiler supply.

Plymouth No. 3 Colliery.—Extensive repairs were made to breaker and the timbering in main shaft was replaced by concrete from top to bottom. A new 8-inch rope hole was drilled 425 feet from surface for No. 6 plane, Red Ash vein.

Plymouth No. 5 Colliery.—No. 7 plane, Bennett vein, was driven 1,200 feet and an inch rope bore hole was sunk 290 feet from surface.

No. 3 plane, Bennett vein, was driven 250 feet.

Boston.—No. 14 plane was driven from the Boston Split Red Ash 250 feet through rock to the Top Red Ash and 600 feet in the latter vein.

No. 15 plane, Bottom Red Ash vein, was driven 1,100 feet.

The Boston breaker was torn down and the coal is now being prepared at No. 5 breaker.

LEHIGH AND WILKES-BARRE COAL COMPANY

Nottingham No. 15 Colliery.—Inside: Built fireproof mule barn. Remodeling pumping plants, No. 1 slope. Completed rock manway from surface to Ross vein at Reynolds.

Outside: Completed mule barn at Reynolds, steam line to River pump and bore hole.

Lance No. 11 Colliery.—Inside: Completed fireproof mule barn. Installing concrete and steel timbering in No. 4 tunnel and shaft landing and also in small engine and pump rooms. 12-inch bore hole for steam line to shaft level pump; Tunnel for air return, Stanton to No. 2 air shaft.

Inman No. 21 Colliery.—Finished development in Baltimore vein.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Woodward Colliery.—Completed the installation of, and put in operation the 20-foot ventilating fan on No. 2 shaft to take the place of two 16-foot ventilating fans. The new fan is giving much better results than the old ones gave. The work of sinking a slope on the Five Foot seam is under way, and a rock tunnel has been driven for a second opening from No. 3 East lift, No. 1 slope, Lance vein to Cooper vein.

Avondale Colliery.—The work of reopening this colliery after the squeeze of 1910 in the Red Ash vein is about completed. The Ross vein, however, is still under water. Completed the work of installing large capacity centrifugal pumps, electrically operated, in Red Ash vein. Preparations are now being made for the installation of larger capacity pumps in the Ross vein, by which this seam will soon be unwatered.

Loomis Colliery.—The work of development is going on as fast as circumstances permit. Gangways are being driven east and west of Nos. 1 and 2 shafts in the Mills and Hillman veins. The work of installing and electrically operated plunger pump at the foot of No. 2 shaft is under way. The buildings for the housing of the shaft hoisting engines, mule barns, store room, boiler house, etc., are under way and will be of fireproof construction.

Along the old river road they are erecting large and commodious houses as residences for the foreman and their assistants.

This Company made special effort during the year to reduce the number of accidents in and about the mines. Notices have been posted at the mines calling attention to the fact that "safety is the first consideration," and the pay envelopes have also been printed with the inscription "Safety First Consideration."

PARRISH COAL COMPANY

Buttonwood Colliery.—Inside: Completed 3 concrete engine houses. Built new pump room at foot of shaft, also repaired and concreted the other two pump rooms. Built concrete barn in Abbott vein and one in Stanton vein. Drove 2 rock tunnels through a fault in Stanton vein, each 100 feet long, for production. Extensive work on No. 11 slope in Stanton vein to shorten haulage and place engine. Silting in Abbott vein to strengthen pillars near shaft.

Outside: Washery was completed.

GEORGE F. LEE COAL COMPANY

Chauncey Colliery.—Safety conditions, ventilation and drainage good.

WEST NANTICOKE COAL COMPANY

West Nanticoke Colliery.—Safety conditions, ventilation and drainage good.

BRIGHT COAL COMPANY

Hillside Colliery.—Safety conditions, ventilation and drainage good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Nottingham No. 15 Colliery.—Inside: Completed remodeling of pumping plants on No. 1 slope.

Lance No. 11 Colliery:—Inside: Completed concreting of shaft walls and installed fire doors at top of hoisting shaft.

Outside:—Completed power house.

Buttonwood No. 22 Colliery.—Completed No. 1 tunnel from Stanton to Baltimore vein; also tunnels from Hillman to No. 1 tunnel and No. 1 tunnel to Stanton, for haulage. Completed concrete walls at top of hoisting shaft.

Inman No. 21 Colliery.—Inside: Completed tunnels on both sides of Baltimore shaft to Hillman vein for landing.

DELAWARE AND HUDSON COMPANY

Plymouth No. 3 Colliery.—Completed outlet of G or Stanton vein to Plymouth No. 3 shaft, 7 by 12 by 80 feet, on 14 degree pitch.

Completed tunnel 7 by 12 by 280 feet, light car road, to G or Stanton vein; tunnel, 7 by 12 by 320 feet, light car road, to Cooper vein; plane, 7 by 12 by 60 feet, on 18 degree pitch, for car haul; also car haul, 60 feet, on 18 degree pitch.

Plymouth No. 5 Colliery.—Completed tunnel 7 by 12 by 400 feet, G or Stanton vein, to Plymouth No. 5 shaft; also tunnel 7 by 12 by 90 feet, G or Stanton vein, through fault.

Concreted car haul, G or Stanton vein, 145 feet on 8 degree pitch.

Installed electric hoist on No. 2 plane, Cooper vein, operated by Flory 150 H. P. engine.

Installed 16 by 20 inch Flory steam hoist engine to operate No. 13 plane in Red Ash, in Boston section.

Completed pump room in Red Ash vein 11 by 18 by 38 feet, of concrete and steel; also bore hole, 16 inches by 325 feet, Red Ash vein to surface for pumping.

Plymouth No. 2 Colliery.—Completed air return and outlet from Snake Island to surface 7 by 16 by 170 feet long; air return Abbott to Snake Island 7 by 12 by 130 feet on 35 degree pitch; air return Lance to Abbott 7 by 12 by 130 feet on 30 degree pitch; also tunnel 7 by 12 by 300 feet G or Stanton vein to Plymouth No. 2 shaft.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Woodard Colliery.—Are installing a 20-foot multi-blade ventilating fan on No. 2 shaft, a duplicate of the one installed in 1912.

Driving rock tunnels from Cooper to Lance vein for development and ventilation.

Lance No. 11 Colliery.—Inside: Completed No. 8 slope, Top Baltimore to Bottom Baltimore; No. 28 slope, Bottom to Top Red Ash; and No. 29 tunnel, Top Baltimore to Five Foot. Installed a 10 inch by 36 inch compound pump in Hillman vein.

Parrish No. 23 Colliery.—Inside: Completed No. 1 slope, Baltimore to Baltimore; and built a new barn. Installed electric haulage on 2nd West Baltimore and a centrifugal pump and gravity water pipe to No. 14 tunnel.

Buttonwood No. 22 Colliery.—Inside: Completed No. 10 tunnel, Kidney to Abbott; No. 11 tunnel, Stanton to Stanton; and No. 12 tunnel, Surface to No. 6 vein. Installed electric haulage on shaft level and 2nd East, No. 2 plane; also new pumping plant on shaft level.

Outside: Erected colliery shop, breaker engine-house hoisting house, timber yard and saw mill. Reconstructed the power plant and boiler plant. Installed electric haulage, Buttonwood to Inman No. 21, and breaker wash pump and reservoir.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Woodward Colliery.—Steam generators have been replaced by electric motor generators. Electric power is being generated at the Nanticoke power plant and transmitted by high tension lines, transformed and stepped down as necessity demands at the colliery.

Concrete walls and I beams have been placed around the shafts, thus reducing the fire risk considerably. Completed several rock tunnels for development and ventilation purposes.

Installed two 20-foot fans outside.

Loomis Colliery.—Completed a new shaft known as Loomis No. 3, near Butzbach's Landing, from surface to Hillman. Preparations are being made for the widening out of the Old Dundee shaft.

Avondale Colliery.—Completed reopening of the Red Ash vein; also second opening for No. 9 tunnel, Ross to Hillman, to be connected at the Five Foot vein. The Ross vein section, No. 5 slope, is still under water. Installed pumping equipment to remove the water from this colliery, the flooding of which was caused by the inflow of a large quantity of water from the Susquehanna River bed after the squeeze of November, 1910.

KINGSTON COAL COMPANY

Kingston No. 2 Colliery.—Inside: Completed two tunnels, one from Cooper to Bennett vein, and the other from Cooper to Lance vein, for haulage and second opening, also a tunnel in No. 3 shaft through roll in the Eleven Foot vein. Installed an electric hoist in No. 1 plane, Ross vein; and a new system of culm and surface clay and rock flushing. An emergency hospital was built near the main turnout of the Eleven Foot vein in the slope. The sides around the foot of No. 2 shaft were reinforced with concrete-steel.

Outside: Installed a new 6-inch bell mouth water line, 2,400 feet in length from fresh water tanks for fire emergency, and a new 8 inch by 6 inch by 10 inch Scranton Duplex pump. Fitted up brick

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11, Nottingham No. 15, Inman No. 21, and Buttonwood No. 22 Collieries.—Safety conditions, ventilation and drainage, good.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Avondale, Loomis and Woodward Collieries.—Safety conditions, ventilation and drainage, good.

DELAWARE AND HUDSON COMPANY

Plymouth Nos. 2, 3 and 5 Collieries.—Safety conditions, ventilation and drainage, good.

KINGSTON COAL COMPANY

Kingston No. 2 and Gaylord Collieries.—Safety conditions, ventilation and drainage, good.

GEORGE F. LEE COAL COMPANY

Chauncey Colliery.—Safety conditions, ventilation and drainage, good.

WEST NANTICOKE COAL COMPANY

West Nanticoke Colliery.—Safety conditions, ventilation and drainage, good.

PLYMOUTH RED ASH COAL COMPANY

Red Ash Colliery.—Safety conditions, ventilation and drainage, good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery.—Completed No. 30 tunnel, Hillman to Stanton; tunnel, Baltimore to Baltimore off No. 4 slope; and No. 31 tunnel, Baltimore to Cooper vein.

Nottingham No. 15 Colliery.—Completed No. 6 tunnel, Top Ross to Ross. Installed a 14 by 48 inch pump on shaft level, and a new pumping station on 11th East.

Inman No. 21 Colliery.—Completed East tunnel from Hillman shaft level.

Buttonwood No. 22 Colliery.—Installed an electric pump on No. 3 slope, and an electric hoist on No. 13 slope.

In the Parrish mine an electric haulage was installed on No. 13 slope, also two electric locomotives. Completed No. 10 tunnel, and

EXPLOSION AT LANCE NO. 11 COLLIERY

REPORT OF INSPECTOR D. T. DAVIS, TWELFTH DISTRICT

February 8, 1916, an explosion of gas occurred at Lance No. 11 Colliery, Lehigh and Wilkes-Barre Coal Company, at about 12.45 P. M., in what is known as No. 5 Slope, Ross seam, 6 East, Southrise gangway, by which 7 persons were killed and one person seriously injured. In order to fully ascertain to what extent No. 5 Slope and slope airway generated gas, tests were made when the slope was idle and all workmen were absent from this section of the mine. One test consisted in opening the two check-doors on Southrise gangway for thirty minutes, which resulted in diminishing the quantity of air provided for the face of slope and slope airway. No gas was found. The second test consisted in opening main doors on 6 East, and leaving check-doors on Southrise still open for a period of thirty minutes. No standing gas was found in any portion of the slope face or slope airway. No indication of a cap was to be observed in the lamp. The only place where gas could be detected by the safety lamp was against the pillar along the anticlinal axis. The first theory advanced by the mine officials was that an outburst of gas had taken place at the foot of the anticlinal along the return airway, that explosive gas had been detected coming from a crack in the bottom rock, the crevice extending a distance of twenty-five feet in length and about two inches in width. I made a test of this crevice, but could not detect any gas.

I also made tests in chambers Nos. 1 and 2 Southrise gangway where the brattices in the crosscuts between chambers had been destroyed, depriving them of the current of air, but could not detect any gas.

The opinion that an outburst of gas took place was rather premature and unfounded. Nothing of a substantial nature to support this theory could be advanced, for these underlying seams had been mined by the slope and slope airway advancing, and as these openings were but a few feet away the coal was giving off gas naturally from this source.

The opening in the bottom rock, about two feet above the vein, may have been an old one and was invisible on account of being covered with the debris of the mine. In this immediate vicinity the props were charred very badly, and I attribute this condition to the main body of gas which had reached this point becoming ignited by a smaller body of gas (by the lamp of Stanley Szuska) on the split of air that contained 17,000 cubic feet per minute, the flame trailing back to the greater body of gas which was moving sluggishly on the smaller split of air 8,000 cubic feet per minute.

I am of the opinion that a large accumulation of gas had taken place in the face of the slope and slope airway, and when the trap door placed in the stone wall between slope and slope airway was

closed and the air assumed its natural course, the velocity of the current was not sufficient to move the body of gas immediately, but lessened the volume and finally moved the remaining gas, which was ignited in the vicinity of the crevice and produced much flame; but the gas was extinguished by the concussion of the explosion that occurred on the main current, (a few of the walls having been destroyed) thereby creating a large percentage of carbon monoxide, (miners' white damp), and a portion of the current of air short-circuited and carried the products of incomplete combustion upon the men, resulting in their suffocation.

REPORT OF COMMISSION OF INSPECTORS

Hon. James E. Roderick,
Chief of Department of Mines,
Harrisburg, Pa.

Dear Sir: As per your instructions, we, the undersigned mine inspectors, on the 9th day of February, 1916, made an inspection of No. 5 Slope, 5 and 6 East, also 6 East Southrise, Ross seam, Lance No. 11 Colliery, of the Lehigh and Wilkes-Barre Coal Company, wherein an explosion of gas occurred February 8, 1916, about 1.00 P. M., resulting in the death of seven persons and the serious injury of one other person.

The object of the inspection was to determine as far as possible the cause of the explosion and its initial point.

No. 5 Slope, Ross seam, and 13 plane, is practically one mile in length, and was driven on the dip of seam on an average grade of 14 per cent. The foot of the slope is one thousand feet vertically beneath the surface. A short distance below 6 East lift an anticlinal was encountered, which divided the vein into three splits. The Upper or Ross seam proper was mined until the seam assumed its original pitch of the slope, and afterward abandoned until such time as a gangway could be driven in the basin at the bottom of the Southrise, and when directly opposite the slope two places would be driven to tap the slope and slope airway. This was the purpose of the Southrise gangway to still further develop No. 5 Slope proper.

On the Southrise gangway chambers Nos. 1 and 2 had been driven over the anticlinal and were going to the dip. Safety lamps were used in the chambers, but the workmen had been given permission by the mine foreman to use naked lights on the gangway. The foreman stated that the purpose of using safety lamps in these two chambers was to prevent feeders of gas from becoming ignited by open lights. Monobel is used for blasting and is fired by an electric battery. It appears that on the day of the explosion, John Davis, section foreman, and William Davis, fire boss, made an inspection of all working places in No. 5 Slope, Ross seam, and then made an inspection of the old workings, which they completed about 11.45 A. M. The fire boss, having completed his day's work, went home. The section foreman, (Mr. Davis) returned to 4 East to eat his lunch and while

so engaged an explosion occurred which opened doors violently and extinguished the lights of the men employed in this lift. Mr. Davis, with another person, hastened down the slope to 6 East and saw George Gorki, a runner, lying unconscious on slope road opposite 6 East lift. He entered the Southrise gangway to chamber two and found Stanley Szuska, a miner, in an unconscious condition. The evidence of the presence of after-damp in a dangerous quantity was so convincing that in order to save his own life he immediately retreated toward the slope. Feeling the effects of his experience in endeavoring to rescue the men, he sat down on the slope road and was discovered by the mine foreman and others who had reached the scene of the disaster. The mine foreman immediately made an examination of the main doors on 6 East gangway and found them destroyed. The third door, which had been fastened against the pillar, was found in good condition and closed. This directed the current into the Southrise gangway, which enabled them to proceed with the work of rescuing the men employed on this gangway. Unfortunately Mr. Davis did not have the presence of mind at the moment to close this emergency door (which had been erected to meet such a need). The closing of the door would have diverted the current of 25,000 cubic feet of air in the Southrise gangway, and in all probability the lives of several men would have been saved.

The damage to the mine on Southrise gangway was about six sets of timber dislodged and a few others staggered; two check doors and three walls between airway and gangway destroyed; brattice in crosscuts were destroyed and several props dislodged in chambers Nos. 1 and 2. In 6 East, main doors were destroyed, and between slope and slope airway two walls destroyed. Props were badly charred.

On the morning of February 9, we had decided to commence our inspection on the slope and slope airway, but on account of the walls having been blown down these places had filled with gas. We then proceeded to Southrise gangway, afterward to 6 East workings, and finally to 5 and 4 East. February 10, we made an examination of the face of slope and slope airway, the gas having been removed the night previous. These slope workings are ventilated direct from a shaft located a short distance west of the head of No. 5 Slope extension. 25,000 cubic feet of air, distributed in two splits, are provided for this slope; 17,000 cubic feet are directed in 6 East and 8,000 cubic feet for the faces of slope and slope airway, both currents meeting on Southrise gangway and traveling as one split of air for the remaining slope workings, thence to the fan. This volume of air is ample and adequate for this section of the mine. The fan is the Guibal type, 35 feet in diameter, running 49 revolutions per minute, with a water gauge of 2.1 inches.

After a very thorough examination of all portions of the slope, we are of the unanimous opinion that gas accumulated in the face of No. 5 Slope and No. 5 Slope airway, Ross seam, due to a trap door remaining open, that was erected in a wall between slope and slope airway at the bottom of the anticlinal. The open trap door allowed the short circuiting of the air, which deprived these two places of the necessary amount of air to keep them clear of explosive gas, and the closing of this trap door by some unauthorized person before an examination was made of the faces of these two places to ascertain their

condition, resulted in moving upon the men employed in 6 East Southrise gangway a body of gas, which was ignited by the open light of Stanley Szuska, a miner.

D. T. DAVIS,
Inspector of 12th Anthracite District.
THOMAS J. WILLIAMS,
Inspector of 11th Anthracite District.
JOHN B. CORGAN,
Inspector of 10th Anthracite District.

Verdict of the Coroner's Jury

"That the deceased came to his death February 8th, 1916, at Plymouth, Pa., from inhaling after-damp coming from an explosion of gas in 6 East airway leading to Southrise of Mine No. 11 of the Lehigh and Wilkes-Barre Coal Company." It was decided death was due to an unavoidable mine accident.

EXPLOSION AT HOLLENBACK COLLIERY

REPORT OF INSPECTOR T. J. WILLIAMS, ELEVENTH DISTRICT

On March 9, a serious explosion occurred at the Hollenback Colliery of the Lehigh and Wilkes-Barre Coal Company, in the Red Ash vein, No. 6 Slope, 1st East gangway, at about 12.45 P. M., causing the death of six persons.

As soon as I heard of the accident I went to the mine, entering about 3.45 P. M. I found that a fierce fire was raging in the 1st East gangway, and learned from John D. Joseph, the inside superintendent, that all the men working in this lift, with the exception of one, who had left for his home prior to the explosion, were still in the affected section.

Several efforts were made by Mr. Joseph and other mine officials, together with the inspector of mines, to rescue the men entombed, but owing to the dense smoke and poisonous gases given off by the fire it was physically impossible to explore the affected section. After making some changes in the ventilation we were enabled to approach the face of the 1st East gangway by following the ventilating current up chamber No. 16 from the slope airway. Upon reaching the gangway we found the body of George Horney, the rock unloader, whose clothing was still burning. We then traveled along the gangway to chamber No. 9, or the inside chamber on the gangway, where we encountered a serious fire, the extent of which was such that our efforts to extinguish it by the use of water were of little avail. This in connection with frequent explosions prompted my colleagues, D. T. Davis, Frank Kettle, D. J. Thomas, foreman, and myself to withdraw the workmen until we further investigated. After the investigation we concluded that it would be unsafe to make any further effort to extinguish the fire owing to the dangers present by reason of gas explosions and roof conditions.

nel was driven from Cooper to Lance vein; distance 100 feet. Built 250 feet of concrete walls and steel I beams for roof and side supports on Cooper vein haulage road, and 300 feet on Baltimore haulage road, No. 3 shaft.

Installed two electric locomotives, one in Hillman vein, No. 2 shaft, and one in Baltimore vein, No. 3 shaft.

Outside: Installed one generator set, switchboard, etc., complete. Erected new steam lines from steam plant to the several hoisting engines.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery.—Extended No. 8 slope, Cooper to Baltimore; No. 31 slope, Baltimore to Cooper; rock plane airway, Bottom to Top Red Ash; No. 22 plane, Stanton to Hillman; and rock plane airway, Hillman to Kidney vein.

Nottingham No. 15 Colliery.—Completed No. 7 tunnel, Ross to Ross vein.

KINGSTON COAL COMPANY

Kingston No. 2 Colliery.—Drove a new traveling way and airway in Cooper vein through culm-filled district and connected with Lance vein tunnel. Two short tunnels were driven from Cooper to Bennett vein.

In No. 3 shaft, a second opening was made from East Red Ash to the Ross tunnel on the west side. Forty-six shafts were driven from Ross to Ross Split vein. Completed a short tunnel through roll from Eleven Foot vein to Eleven Foot vein.

In the slope, a 2-inch bore hole was drilled from Eleven Foot to Ross vein, for drainage.

Installed a 5-ton Jeffrey storage battery locomotive in lower lifts of Ross and Red Ash veins.

Outside: A concrete and steel foot-bridge has been erected over main tracks, with concrete and steel passageways, foot-paths, fences, etc., for the safety of employes.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in the High School Building, Plymouth, June 6 and 7. The Board of Examiners was composed of D. T. Davis, Mine Inspector; Harry G. Davis, Superintendent, Kingston; William H. Chappell, Miner, Plymouth, and Lewis R. Thomas, Miner, Edwardsville.

The following persons passed a satisfactory examination and were granted certificates:

MINE FOREMEN

Philip Callender, Daniel R. Edmunds, David T. Morgan, Frank B. Davenport, Clarence E. Rosser, Kingston; Fred B. Hicks, Henry Hosey, Isaac J. Thomas, Robert J. Tischler, William J. Hobbs, Milton Jones, Thomas H. Lewis, Joseph R. Thomas, Plymouth; Gwilym Jones, Dorranceton; Herbert Morris, William R. Roberts, William Price, Alfred Hazell, John Morris, Albert G. Wilczock, Michael A. Putera, Edwardsville.

The entire mine has been equipped with the Koehler type safety lamp replacing the Davey and Clanny safety lamps.

Installed an overwinding device on No. 3 shaft hoisting engine.

Completed a 7 foot by 12 foot rock tunnel, 700 feet long, from the Lance to the Five Foot vein, No. 1 shaft.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery.—Completed No. 32 tunnel, Cooper to Five Foot vein and No. 33 tunnel and plane, Stanton to Hillman vein.

Nottingham No. 15 Colliery.—Completed extension of 14 inch compressed air line to 11th east and installed a 75 H. P. electric hoist on Nos. 1 and 6 slopes.

Outside: Installed a 100 H. P. electric hoist on No. 4 slope.

KINGSTON COAL COMPANY

Kingston No. 2 Colliery.—The cribbing between the surface and the solid rock in No. 2 shaft has been removed and replaced with reinforced concrete. Installed two storage battery locomotives in the Lance and Cooper veins and an electric hoist on the new plane in the Bennett vein.

At No. 3 shaft, the cribbing between the surface and the solid rock in the shaft has been removed and replaced with reinforced concrete. Fifty short shafts or rock holes were driven to the Ross split vein from the Ross vein. Installed two storage battery locomotives complete with charging station for each locomotive.

Installed three storage battery locomotives complete with charging panels, and two electric hoists, one in the Ross vein and one in the Red Ash vein.

Outside: One corrugated iron waiting station for miners was constructed at the head of No. 2 shaft and one near the head of No. 3 shaft.

Four Dutch ovens were added to the grate space of four boilers at No. 2 boiler plant.

Installed a cross compound Corliss engine 16 inches and 30 inches by 42 inch stroke, direct connected to a 300 K. W. Westinghouse generator as an auxiliary for generating power required for the new additional storage battery locomotives at No. 2 colliery.

Gaylord Colliery.—Completed boiler plant pump house and 17 K. W. lighting set. This machine furnishes power to all of the arc lights on the property and for the lighting of buildings; the hospital, ambulance room and electric shop; a brick and concrete mule bath, and a brick colliery office building, 27 feet by 50 feet.

Installed several chemical engines and fire extinguishers and a 44 foot, 150 ton track scale and also a 22 foot Barker 25 ton truck scale for retail coal. A new motor driven ambulance was purchased, as required by law.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in Plymouth, May 7 and 8. The Board of Examiners was composed of David T. Davis, Inspector, Wilkes-Barre; Henry G. Davis, Superintendent,

CONDITION OF COLLIERIES

HUDSON COAL COMPANY

Plymouth No. 5 Colliery.—Condition as to safety, ventilation and drainage, good.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Woodward Colliery.—Condition as to safety, ventilation and drainage, good.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 and Nottingham No. 15 Collieries.—Ventilation, drainage and condition as to safety, good.

KINGSTON COAL COMPANY

Kingston No. 2 and Gaylord Collieries.—Ventilation, drainage and condition as to safety, good.

PLYMOUTH RED ASH COAL COMPANY

Plymouth Red Ash Colliery.—Ventilation, drainage and condition as to safety, good.

SHAWNEE COAL COMPANY

Shawnee Colliery.—Ventilation, drainage and condition as to safety, good.

IMPROVEMENTS

HUDSON COAL COMPANY

Plymouth No. 5 Colliery.—Remodeled the breaker. At Plymouth No. 3, rock plane was completed from Top Red Ash to Ross bed, a return airway 39 feet long, and tunnel from Five Foot to Stanton vein, 625 feet long. At Plymouth No. 4, a rock plane was driven from Top Red Ash to the Top Ross vein, 500 feet long. In the Boston section, No. 8 tunnel was extended to Top Split of Ross bed, and return airway was driven. Also rock plane from Top Split of Red Ash to Bottom Split of Ross bed was completed, and return airway was driven 54 feet long.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 Colliery.—Completed No. 22 plane from No. 15 tunnel east, Stanton to Kidney vein; No. 21 plane from No. 14 tunnel east, Hillman to Kidney vein; No. 9 slope Hillman from No. 14 tunnel east to basin; No. 11 slope, Stanton, driven to the south line of No. 20 plane.

Nottingham No. 15 Colliery.—Installed a 75-hp. electric hoist at Nos. 1 and 6 slopes.