

There is also a communication between this and the Hutcheson shaft, in regard to which there has been much trouble and litigation between the company and Mr. Hutcheson.

Last spring notice was given to Mr. W. G. Payne, superintendent in charge, to have the mine better ventilated, and some suggestions were given as to what improvements should be made so as to obtain the desired result. The same was faithfully promised, but notwithstanding the time given, of several months' duration, Mr. Payne insisted in moving an old ten-feet fan to the new shaft, running the same by wire rope transmission of power, and even now, after having spent as much capital as would have been required to have built and put into operation a good fan 15 feet in diameter, the mine is so very poorly ventilated that I was inclined to apply for an injunction to have it stopped in November, the time of my last visit. I could not find but 12,000 cubic feet of air at the foot of the air shaft, and could not find sufficient air current to run the instrument, in the cross-cuts, at any point near the face of the mine. I had to condemn a brake that had been put on the hoisting drum, after much time and money had been spent, as it would not answer the purpose. In a word, much trouble is had in having things done at all, and much more in having anything done satisfactorily. The mine is not yet in a satisfactory condition, either as regards ventilation or the safety appliances attached to the machinery for hoisting and lowering persons.

Mr. Wm. G. Payne, superintendent in charge; Wm. Evans, mining boss.

A. J. DAVIS & Co.'s MINES.

Warrior Run.—These mines are located as their name indicates, at Warrior Run, and consists of two drifts, now abandoned, and two slopes, one of which is on the Red or B vein, 300 feet long, which is a new work not much opened, and the other on the E vein, from which they have a tunnel south to the D vein. The latter slope workings are ventilated by a fan 15 feet in diameter. Their mines have been lying idle this year until the month of November.

Mr. Jas. E. Roderick, general superintendent; John C. Jones, mining boss.

DELAWARE AND HUDSON CANAL Co.'s MINES.

These mines consist of four slopes, three shafts and 1 tunnel, to wit:

Baltimore, No. 1 tunnel.—This mine is located about 1½ miles south-east of Wilkesbarre and was driven into the Baltimore vein. Their present workings are in a slope some 1,200 feet long, commencing at a point a little east of the tunnel, inside. This mine has lost much time during 1872; had some heavy and damaging falls of roof, and subsequently was drowned out for a long time. They had to drive a second opening, owing to the above mentioned fall closing the old one, also a new traveling road had to be made for the same reason. The ventilation is not very commendable, yet I have received no complaints. Natural ventilation, 19,200 cubic feet. Number of persons employed inside, 78.

A. Nicolls, general superintendent; Wm. M'Gregor, assistant superintendent; Jas. Tretheway, mining boss.

Baltimore, No. 2 shaft.—This mine is located east of and adjoining the No. 1 tunnel mine. It is a shaft 80 feet deep and has near its bottom, a little westward, a slope — feet long. Another part of the mine is worked through a tunnel which has an inside slope.

This mine has been working about 30 years and evolves a small quantity of carburated hydrogen gas (fire-damp.) Several persons have been slightly burnt in this mine, caused generally through their own carelessness.

Ventilation.—Produced by natural means; 19,470 cubic feet per minute at inlet; at face of mine, 9,260 cubic feet of air per minute. Number of persons employed, 82.

A. Nicolls, general superintendent; Wm. M'Gregor, assistant superintendent; Ed. Hahn, mining boss.

Baltimore, No. 3 slope.—This mine is located east of and adjoining No. 2 shaft of the Co.'s mines. It is a slope on the Baltimore vein, — feet long, and

evolves a small quantity of fire-damp. It has a good traveling road, (made in 1871,) for the ingress and egress of persons employed.

Ventilation.—This mine is well ventilated considering that it is done by natural means, without the assistance of any mechanical or artificial means. No. of persons employed, 120.

A. Nicolls, general superintendent; Wm. M'Gregor, assistant superintendent; Wm. W. Reese, mining boss.

Laurel Run slope.—This mine is located near a small village called Laurel Run, about 2½ miles south-east of Wilkesbarre. There is but one mine between it and the No. 3 Baltimore of the same company. It is a slope on the Baltimore vein, which is split at this point. It has three lifts and has a good traveling road for the ingress and egress of persons employed. The top bed, which is just being opened out, generates explosive gases, but there has not been any discovered in the lower seam as yet.

Condition.—The mine is in a tolerably good condition. The seams are small, 5 or 6 feet in thickness, and take much powder to mine them, thereby requiring a large amount of air to carry off the powder smoke.

All the stoppings along the slope, between the main gangways and their parallel air-ways, are being re-built with stone and mortar instead of wooden brattice, producing very good results.

Ventilation.—Amount of air at inlet, 69,800 cubic feet, and at face of mine, 39,500 cubic feet per minute. Number of persons employed inside, 161.

A. Nicolls, general superintendent; Wm. M'Gregor, assistant superintendent; Hugh M'Donald, mining boss.

Pine Ridge Shaft.—This colliery is located east of Wilkesbarre, and near Milners' station.

It is a shaft 400 feet deep sunk into the lower bed of the Baltimore vein. This mine gives off great quantities of carburetted hydrogen, (fire-damp,) as may be seen from the following:

On the 11th day of May, 1872, an explosion of fire-damp by which four persons named David Davis, David Morgan, Thomas Morgan and Evan Davis were fearfully burned, resulting in the death of David Davis and David Morgan. The other two survived, but are much disfigured and crippled in the hands for life to all appearance. On the 13th I examined that portion of the mine where the accident occurred, in company with John J. Moore and others. We found that one of the workmen at the time of the accident, was in the act of taking down some coal over a check A in tunnel, which caused him to let said check-door open for a short time. In the meantime a party of the company's mine surveyors descended the shaft and not meeting the boss at the foot, they proceeded at once to make their way into that part of the mine where they had been making a survey the days previous. They had no idea of any great danger in traveling this road, as they had been led out over the same road the evening previous by the mine boss, to avoid the inconvenience of passing so many cars on the main road, while they had their surveying instruments to carry with them; but just as they were almost through the air-way on the top vein, and near the main road, the explosion above mentioned took place. We then measured the air passing through the top vein, when the door A in the tunnel was open. We tried it for twenty minutes. Gas accumulated three feet deep for quite a distance along the roof in the air-way—air passing through at the time of its accumulation 9,120 cubic feet per minute. We then closed said door A and found that the gas would ignite in the lamp (safety) for eight or ten minutes at the point where the explosion took place, and that while there were 16,320 cubic feet of air per minute passing.

We then measured all the air passing in through the tunnel at C, a part of which had to pass over the check-door A, the balance through the air-way in top vein just mentioned, at B, and found 33,862 cubic feet of air per minute passing.

We found that if check-door A would be left open, the more air would enter through the under vein D and pass through door frame of A and tunnel C; notwithstanding this, the gas would ignite at the door A from a lamp on a person's head, there being a large gas-feeder in the roof at that point, besides decreasing the quantity passing in at the top vein B, thereby allowing the gas to accumulate therein. The person that was taking down the coal over door A was doing it according to instructions from his boss, neither of whom thought for a moment of any person traveling in through the top vein B, which had such strong gas feeders so that it was not used for traveling; still the air was circulated through and no danger was anticipated, even should any one travel through the same from the shaft, which was only a distance of some 400 or 500 feet.

the Ross seam, and is expected that the Red Ash seam will be reached within the depth of 525 feet, or 80 feet from present depth.

Luzerne Coal and Iron Company's Oakwood shaft.—This shaft, although sunk into the top bed of the Baltimore seam, has not been completed. The timbering and lining not having been finished, but is being done at present. In all probability a connection will be made between the Oakwood and Prospect shafts about the same time that the timbering will be completed. Total depth of this shaft to the top bed of Baltimore seam is — feet.

Delaware and Hudson Canal Company's shaft, No 3, second opening.—This shaft is located near Plymouth, and although having penetrated the seam for some time past, has not been completed, neither has the connection been effected between it and the former. It is expected that a communication will be made during the early part of 1875.

Baltimore No. 3 Shaft, (D. and H. C. Co.)—This shaft is located near the main road between the city of Wilkesbarre and Parson's station. It penetrated the Baltimore seam at the depth of 360 feet, having been started during 1873, and cut into the coal in December, 1874.

This shaft is intended for an air-shaft and a pump-way, as it connects with the No. 3 slope, and was intended as a suitable place to erect the proper machinery to ventilate and drain the working of the same.

SECOND OPENINGS.

There are but four shafts in this district at work—deficient in this respect, namely: Prospect shaft, L. C. and I. Co.; Nos. 4 and 3 shafts of the D. and H. C. Co.'s, near Plymouth, and the Hollenback shaft of the L. and W. B. C. Co. As previously stated each one has its second opening under way.

A second opening has been had, between the new and old shafts in West Pittston.

VENTILATING FANS.

The following fans have been erected during the year—besides two not included in this table, built to enable the combatting of the great subterranean fire mentioned elsewhere in this report, to wit:

BALTIMORE OLD MINES FIRE.

On the fifth day of January, 1874, about ten (10) acres of the surface over the over the old mines caved in.

This mine had been opened over thirty years ago, and mining operations suspended and resumed again as circumstances required. At this time there were but few persons working there, and they were taking out whatever coals they could from pillars, &c., before the final abandonment of the same. There was an underground slope through which some coals were being hoisted from other old workings, and the whole coal then hauled to the surface through a rock tunnel opening.

At the head of the inside slope just mentioned were placed two steam boilers to generate steam for an engine located there to raise coals from the slope; besides that, it being in the heart of winter, the boys, runners and drivers had a fire in an old boiler ring with a grate in the bottom of it.

When the cave took place it was first thought that the fire could be extinguished without much outlay or danger, by cutting passages through the cave to the seat of the fire and the use of water; but after that, some time had elapsed, it was found necessary to employ some other means.

The officials next determined to build an embankment of sand and loose earth around the same, inside, or rather to fill the spaces between the pillars, at the outer edge of the cave, with the material above mentioned.

The sand and earth had to be hauled from the surface in cars and roads laid for the purpose. This operation was commenced and was continued for some five or six months; at times 360 persons would be employed during the 24 hours, during which time no less than 90 car loads of sand and clay would be packed into the spaces between the pillars, each car containing about three cubic yards of earth, equal to 270 cubic yards each 24 hours.

It was thought by the officials that the building of this enclosure around the outer edge of the cave containing the fire, would, first of all, shut off the draught and thereby prevent the rapid spread of the fire, also prevent the gases from the same from falling down and intermingling with the fresh air entering the other mines.

It was found necessary to clear away all loose coal and rubbish from the floor to the roof, and wherever the check tier or bottom coal had been left in any of these openings it also had to be lifted before any of the sand, &c., could be packed in.

At times the imprisoned element would force its way out alongside the pillar of coal. The whole water pressure at their command, consisting of several 2½ inch hose and pipes, fed from a reservoir on the surface with about — feet of head, would then be applied in forcing the prisoner back into his hiding place, and at the same time sealing up the passage behind him by the application of this hydraulic pressure, as it were.

During all this time a great amount of timbering had to be done to sustain the roof, and much bratticing had to be built to confine a passage for a current of fresh air to circulate near the working forces; the whole by this time presenting an appearance putting one in mind of ancient amphitheatres, as illustrated in works of literature, with its double circular enclosures; the inner one built with sand and earth, to keep the monster fire in, and the second to enable workmen to continue their labors. Spectators were enabled to pass around for various purposes between these enclosures, without which no person could be safe in making a circuit, or working.

The ventilation finally had to be obtained by the erection of a fan, 17 feet in diameter, at the No. 2 shaft, which was connected by air passages from the foot of the shaft to the passage above described, around the fire.

Some time in August the company's officials, not feeling quite satisfied with the result of their experiments, thought proper to apply the same method as that adopted by the Lehigh and Wilkesbarre Coal Company at the Empire fire. The closing of every hole and crevice connected with the fire was at once ordered, and in a short time the application of steam was commenced. The thin covering overlying the coal seam at this point gave much trouble, as the roof was caving in at different points daily, for some length of time, thereby allowing the steam and gases to escape to the surface.

The surface having dropped some 10 or 12 feet vertical during the cave, it was so shattered that it was almost impossible to seal up very close a large area of such broken surface, as many of the crevices could not be detected unless by escaping of the steam.

The crevices at the surface show that the carbonic gas generated below escapes with the steam, and in consequence does not fill up inside the enclosure.

It is stated by the officials in charge, that there is no carbonic acid gas to be found lodged at the lower part of the enclosure.

I would here state that the seam at this point does not pitch more than about 15° or 17° on an average. Up to the time of writing this report the fire has not been extinguished.

It is difficult to think how it can be, that if the whole enclosure inside, around the fire, is air tight, or nearly so, that there is no accumulation of carbonic acid gas, notwithstanding that there are some crevices leaking to the surface; but if there are very many of these crevices leaking, and that the steam and gases can be detected escaping in large quantities, then it is very reasonable to suppose that there must be a considerable quantity of atmospheric air entering at some of the lower points of the enclosure. The current formed from the admittance of said air carries with it the heavy gases towards the escape on the surface. In this way the specific gravity of those gases are overcome. How the amount of air necessary to form these currents is admitted is not for me to say; but it is questionable with me, whether a bank of sand, filled or packed into an excavated place on even so light a pitch as 15° can be put in tight enough, and remain so, to keep out a heavy pressure of air, as the same continually settles down. Again, no matter at what point the air is admitted, its specific gravity causes it first to fall to the lowest point, and (as it becomes heated) presses out a similar volume of lighter air at a higher point, that quantity also increasing in volume at a certain rate, as the same is heated, and displacing other air in the same ratio, continuing thus until an equilibrium is found or no air admitted.

The steam used is being generated by the use of thirty-one steam boilers, located at the north end and west side.

The officers in charge of these operations are Messrs. E. W. Weston and A. H. Vandling, general superintendents; Christian Scharar, mining engineer and superintendent; Wm. W. Reese, mining foreman; Ed. Hahn, mining boss; Wm. L. Foot, outside foreman, and Ed. Macken, outside boss.

PROSPECT SHAFT COLLIERY FIRE.

The fire in the Prospect Shaft colliery began on the 24th day of January, 1874. This colliery was comparatively a new one, and not having had its second opening, there were but a few persons working there, and most of them driving in the direction of the proposed second opening.

Prospect Shaft, L. V. C. Co.—This mine has had a second opening by connecting with the Oakwood shaft just sank, which is intended to give a lawful second opening and an additional means for ventilating Prospect shaft, besides that it will be used as a separate and independent hoisting shaft. Depth, 600 feet, nearly.

D. & H. C. Co.'s No. 4 Shaft, Plymouth Mines.—This shaft, having been sank from the **Baltimore** to the Red Ash seam, required a second opening, which was effected through sinking a new shaft west of the hoisting shaft, at the proper distance. The said new shaft is intended to be used for pumping and ventilation.

SHAFTS AT PRESENT WITHOUT SECOND OPENINGS.

- D. & H. C. Co.'s No. 3 Shaft, near Plymouth.*
- L. & W. B. C. Co.'s Hollenback Shaft, located in the city.*
- S. C. Co.'s Nos. 1 and 2 Shafts, East Nanticoke.*

BALTIMORE MINES FIRE.

The fire in the mines above named, which was described in my report for 1874, has not yet been extinguished, although confined within the barricade made of earth and clay, except that occasionally it breaks out, besides that the roof or covering, which is so thin and broken, falls in once in awhile. The force of persons that was required is now reduced to a very few men.

The steam from the boilers, mentioned in my last report as being forced into the fire, has been discontinued for some time.

EMPIRE FIRE.

It is not definitely known whether the fire in the above named mine, which was also described in my last report, is still burning or not. When last that the enclosure was penetrated the heat was so great in some parts, near the surface or crop of the seam, that it was considered advisable to close it up again, although it causes no other inconveniences than the expense of keeping a man or two to watch for fear of surface caves, which they had to guard against from the breaking out of the fire.

The coal that would have been brought to the shaft, being hoisted through No. 5 slope, has been done just as successfully through the new opening made west of the tunnel into No. 4 slope workings, and mining carried on just as extensive as prior to the fire.

STEAM BOILERS UNDER GROUND.

Nearly all the steam boilers located under ground in this district have, within the last few years, taken them out, and especially so since the great fires in the Empire and Baltimore mines. The boilers of Nos. 4 and 5 slopes, at the Empire mines, have been taken out, and a bore-hole 9 inches in diameter was put down with a diamond drill at No. 4, through which steam pipes were taken from boilers on the surface, and steam is conveyed from the surface to the No. 5 engines, the pipes being about fifteen hundred feet in length.

At Sugar Notch a hole has been put down preparatory to taking out boilers from said mine.

Franklin Coal Co.'s Old Slope.—The steam boilers that they have had inside of their mines for many years have this year been taken out.

Jersey Mine.—The steam boilers, located near the head of their inside slope, have been taken out about two or three years ago.

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

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

MINES ON FIRE.

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

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

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

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

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

tios of the different regions; of the said total. It is very evident that Luzerne, in this case, was the loser, and just as evident that the Schuylkill and Lehigh regions were the gainers, as their respective tonnages prove.

During the year, 3,836,164 tons of coal were sent to market, and 244,163 tons sold and consumed about the mines; total of 4,080,327 tons; against a total production of 4,615,384 tons in 1876. This shows that 107,377 tons of coal were produced in 1877 per life lost, against 83,916 tons in 1876; an increase of 23,461 tons per life lost=27.7 per cent.

The collieries only averaged 135.82 days of actual work during the year. This proves that if the district, when working 135.82 days, could produce 4,080,327 tons, then it could have produced 9,012,600 tons, had there been 300 days worked; thus leaving only 13 days for holidays and stoppages from breakages, &c. Besides this, there were a number of collieries idle in the district during the year. Were all those in operation, the capacity of production would be increased considerably, probably a million tons more.

The accidents are arranged in a tabulated form, both fatal and non-fatal. The fatal accidents are described and treated more in detail, under the respective heads under which they are classified, in the descriptive part of the report; also, plans and sectional views are furnished, to assist in their explanation, in two cases.

Considerable attention and space is here given to explain the position of the writer, in his official capacity, in relation to complaints of workmen and of operators, with a sample or *fac-simile* of one of the many anonymous communications received from time to time.

Also, other matters are treated of, which, in the writer's opinion, bear directly or indirectly upon the "health and safety of persons employed in around the coal mines" of the district.

Very respectfully submitted,

T. M. WILLIAMS,
Inspector of Coal Mines.

Mines on Fire.

THE EMPIRE OLD MINE, formerly called the Kidder slope, is still closed in, and a watch of one person is still kept upon it; the fire is near the crop of the seam, in old caves, &c. The inclosure, however, extends to, and is adjoining their present workings. I requested Messrs. John T. Griffiths and L. S. Jones, the company officers, to see to it that the whole periphery of said inclosure be examined daily, except the surface, to the end that every thing may be kept safe from any caves or breakages in the enclosure around said fire, with its poisonous gases, for fear that they escape and mingle with the air entering any portion of the working mine.

BALTIMORE OLD WORKINGS.—These are still burning to some extent, and a small force of men keep watch on the same, fearing it may break out, or that a cave may suddenly take place, causing the carbonic acid gas

therefrom to fall and intermingle with a current of fresh air, and be drawn into their other workings.

ASHLEY COLLIERY FIRE.—This colliery has been the scene of a serious fire this year, necessitating the flooding of that portion of the mine where it occurred, called No. 3 slope, being the deep workings on the Baltimore seam. This fire occurred, it is stated, from the gas igniting from a miner's lamp; he having, a short time previously, fired a blast, and on his return to the face of the gangway, where he worked in company with his laborer, the gas ignited along the roof, and all efforts towards extinguishing it failed, on their part. They then went out of the mine to report and seek assistance. In their excitement they forgot to call upon, and inform another party of men driving a gangway and air-way in an adjoining part of the same mine; and it was with great difficulty that those men made their escape, the gas affecting them so seriously that two of their number were left prostrated on the gangway, while the other two went wending their way, as best they could, to escape its deadly contact, and to send succor to their dying comrades. Fortunately they were met on the way by a fresh gang of men from the surface, and assistance rendered just in the nick of time to save the whole party, thus averting the loss of any human lives in this catastrophe. It was found that the fire had made such headway that the only way to be certain of its speedy extinguishment was in the flooding of the deep slope where the fire existed; an operation requiring some weeks of time, to say nothing of the many months of time to be taken in pumping the same out of the mine to enable them to resume mining operations again.

Mine Improvements.

Improvements in mining, as in other branches of business, have been very limited in 1877.

MALTBY COLLIERY.—C. S. Maltby has not done anything towards completing his circular shaft, but has erected a new breaker near the old shaft. North-easterly from the same, a new shaft is being sunk to be used as a second opening, pumping, and ventilating shaft, in conjunction with the old one. Also, he has driven the tunnel on the mountain side further on, and penetrated the Cooper, Bennett, and Ross seams, some of which, it is said, are in very good condition. It would appear, from the very extensive improvements going on at this colliery, that it is destined to be one of the finest on that side of the river. There is about 600,000 feet of lumber in the said new breaker, and contains, it is claimed, all the modern improvements to be found anywhere in said branch.

No other improvements of importance were done in the district during the year.

Second Openings.

The Conyngham shaft, Delaware and Hudson Canal Company, the Nos. 1 and 2 shafts of the Susquehanna Coal Company, are the only shafts now

Condition of the Collieries.

The condition of the mines in the district, generally is quite satisfactory. There are a few collieries, however, that ought to be mentioned as being below the general standard, to be found in the district, which is caused from the inefficiency or incompetency of those in charge. These parties frequently attribute the deficiencies to their superiors in office, or their employers; but I have seldom, or never found a badly arranged and badly ventilated mine where there was a person in charge who had the necessary qualifications to make things satisfactory, as such persons, generally, have stamina enough to overcome the objections raised to their plans, in a pecuniary point of view, by their employers—unless it be that the said officers, having been but a short time in charge, had not had sufficient time to make the improvements necessary. In fact, employers can mostly be convinced, by their head officers and their assistants, when properly explained, that it is cheaper to have a mine well arranged and well ventilated than otherwise. There are some exceptions to this, like other rules, no doubt. It is not only once, but many times, that the writer has heard the head officers blame those under them with having failed or neglected to carry out their wishes, and, in some instances, their positive instructions to comply with the provisions of the mining law. The following are the mines comprising the class above referred to, to wit: East Boston, Hutchison, Ellenwold, Maltby, Forty Fort tunnel, No. 5 shaft D. and H., Plymouth, Pools, Chauncey, and West Nanticoke collieries. The last named colliery is in a fair way for improvement, I believe. A new fan is about being erected at the Hutchison. Ellenwold shaft has changed ownership, which may cause improvements there. And new mine bosses are to be employed in Maltby, and several others of those mines, which may also be beneficial.

Mines on Fire.

THE EMPIRE, or Kidder slope fire is about the same as when my last report was made; parts of the surface caving in occasionally, which has to be filled up promptly.

BALTIMORE OLD WORKINGS.—These are burning up quite briskly, near the outcrop, for a large area, and but little hopes are entertained of ever extinguishing the fire in them until it exhausts the fuel within its boundaries at least.

Mine Improvements.

Improvements in mining have been very limited again, during 1878, as in 1877.

MALTBY COLLIERY.—Mr. Maltby had the new coal breaker started in the month of August, to prepare the coals from a tunnel on the mountain side, as, also, from a new shaft sunk during this year. The old shaft was not yet ready to do any mining in, as it was being timbered anew, besides some other improvements.

RED ASH COAL COMPANY'S COLLIERY.—This company has been organized to operate a small local opening, partially opened out many years ago

under sixteen years of age, during the period of three months, if necessary, but not longer, except on unanimous request of the committee.

Sixth. In case such injured person shall require medical treatment at the Wilkes-Barre or St. Luke's hospital, Bethlehem, and shall himself desire to be treated there, it shall be the duty of the committee, or any two of them, to make an order for his maintenance and care at said hospital, and deliver the same to the superintendent.

Seventh. None but contributing employes, who, while performing their duty at said collieries shall have been accidentally injured, and the families of contributing employes who have been accidentally killed while engaged in the work of the company, shall be entitled to the benefits of the fund. A list of the contributors shall be kept posted at each colliery.

The foregoing plan will be pursued for the year . . . ; at the end of which time such changes and alterations will be made as experience may prove to be necessary.

Mine Fires.

The old **Baltimore** mine is still burning, and my remarks thereon, in my last years' report, need no modification or addition.

The Empire or Kidder slope fire is also in about the same condition as last reported, the surfaces caving in, in small sections, occasionally, which have to be filled up to prevent the admission of atmospheric air to the smoldering fire.

AUDENRIED COLLIERY.—On the 6th day of May, about midnight, the fire that had been discovered there about noon of the same day, was considered to be too far gone to successfully subdue it, unless by the great risk of doing so when it was known that there were some fifteen or twenty chambers to the west of it, and immediately connecting with it, full of explosive gas, and subject to explode at any moment. Having been notified of the case about eleven, P. M., of this day, I immediately proceeded to the mine, and there met Messrs. F. B. and G. H. Parrish, superintendent and assistant superintendent for Charles Parrish & Co., Mr. J. Harris, engineer for the receivers, and others, at the shaft-head. We soon descended the shaft which is nearly nine hundred feet in depth, and we had just reached the fire-boss's station or room, and were preparing lamps, and looking over the mine tracing preparatory to going to the scene of the fire, when a messenger brought the sad news that a large party of workmen, at the fire, were very seriously burned while applying the water hose. The whole party started, accompanied by this time by Mr. Smith, mine foreman, and we soon met the unfortunate victims being conducted out by their comrades as best they could, eight of whom were seriously burned, so much so, that six of them succumbed to an untimely death after days and some of them weeks of excruciating and indescribable pain and suffering.

As soon as it was ascertained that all the victims of the disaster were brought out, a consultation was held, and all further efforts to put out the fire by the hose was at once abandoned, and the mine ordered to be flooded,

which has improved the ventilation of that colliery greatly. For full description of the fan, see Table No. 1.

At the **Baltimore** tunnel, a new tunnel is now in progress, from the Baltimore to the Red-Ash seam. It is at present about twelve hundred feet in length, and is expected to go about three hundred feet further before striking the coal. It is intended for a mine locomotive to haul the coal out from this tunnel when completed, and is driven large enough for that purpose.

At the Conyngham shaft, the second opening is through, and a breaker is now in course of construction at the top of the shaft. By the time they will be ready to ship coal through the breaker, the gangways will be driven a goodly distance, and will have room to open a number of chambers, and give a good quantity of coal when they start.

Susquehanna Coal Company.

The No. 5 breaker, a large structure capable of shipping over one thousand five hundred tons per day, erected by this company at Nanticoke, was completed ready to ship coal on the first day of April, 1880.

A new fan was erected at No. 1 slope, a description of which is given in table No. 1. The ventilation of this mine was much improved by the erection of this fan, and is now in pretty good order.

At the grand tunnel, West Nanticoke, a new underground slope was driven down to a basin, which was a considerable distance below their workings. The slope is one thousand four hundred feet in length, and has an average grade of seven and a half degrees. It opened a convenient territory of excellent coal.

Delaware, Lackawanna and Western Company.

At the Avondale colliery a new underground slope was opened a distance of one thousand eight hundred and forty-five feet, on an average grade of twelve degrees. A large territory of excellent coal can be worked from this slope, and is convenient to the shaft.

They also drove a new plane, extending above their present workings a distance of one thousand four hundred feet, from which a large amount of coal is expected to be mined. This makes the fourth plane, one extending above the other, on the same pitch.

The Kingston Coal Company.

This company is sinking a new shaft near their present No. 2 shaft. The sectional area of it is twelve by thirty-three feet, and it is down at the time of this writing four hundred and seventy-five feet. They contemplate sinking it through the Ross and into the Red Ash veins, both of which are to be worked from it.

In the No. 2 shaft an underground slope was driven down to a length of one thousand three hundred and fifty feet, on a grade of one in twelve. They also drove a tunnel from the Cooper to work the Bennett vein.

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

new double fan was erected to supersede their old furnace. The fans are seventeen and a half feet in diameter, and fastened on the same axis, about eight feet apart; a plan of which is kindly furnished for this report, which can be seen in connection with the report of tests of the fan.

The breaker formerly at Young's slope was removed and erected at the Conyngham shaft. It was completed by August 13, when they began shipping coal. When the colliery is fully opened they will be able to put out about seven hundred tons of coal per day. About twelve years have elapsed since ground was first broken to sink this shaft.

Susquehanna Coal Company.

A tunnel was driven in No. 1 slope, from the Red Ash seam to the Ross. Its length is four hundred and eighty-seven feet, and size seven by ten feet. The coal is thin, but of good quality. Another tunnel is in progress lower down on the dip, in No. 2 shaft, to cut the same vein. A slope is also in progress of sinking in this shaft, towards the basin. It is down, at this writing, four hundred and eighty feet from the gangway level, near the bottom of the shaft, on a varying grade of from seven to twelve degrees.

Kingston Coal Company.

This company's new shaft, at Kingston, is down to the Red Ash vein, and has cut, in all, five seams of good workable coal. The Red Ash, at the point cut, is six feet thick. A tunnel was driven in No. 1 shaft, from the Cooper to the Bennett seam, which is ten feet thick, and has opened a convenient section of coal of good quality. The tunnel is two hundred feet in length.

Gaylord Coal Company.

The Gaylord shaft is completed to the Red Ash vein, and has cut three veins hitherto not worked in this track, viz: Bennett, Ross, and Red Ash seams. They are now working to effect second openings, which will be accomplished in about three months. The shaft is forty-seven by twelve feet area, and five hundred and seventy-five feet in depth. There are two pairs of hoisting engines and four cages—all of the latest and most approved plans. The coal will be shipped through the old Gaylord breaker, and will eventually be able to ship about twelve hundred tons per day.

Franklin Coal Company.

In the Brown slope a new tunnel was driven from the Baltimore to the Red Ash vein, and a new plane was made in the former to let the coal down from the upper lifts.

W. G. Payne & Co.

In the East Boston mine a new tunnel was driven from the Bennett to the Cooper vein, which is one hundred and fifty feet in length, and fourteen by six feet area. The seam is six feet thick, and the coal of excellent quality.

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 workmen 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 Conyng-ham shaft was deranged and made for a while unavailable as an escape 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

full of fire-damp, and it was explosive. Through the extraordinary care of the managers and workingmen employed to remove the danger no accident occurred, and the usual safe condition of the mines was finally restored.

On the 27th day of June, again, the **Baltimore** and Conyngham mines experienced another trouble which complicated the condition of both to a certain extent. During an unusually heavy rain storm a dam located on surface above the Baltimore mines gave way, and the water broke into the workings through an old cave-hole near the outcrop of the seam. A large stream of water poured into the mine for nearly two days, carrying with it thousands of tons of mud, stone, and sand. Two small houses were also washed in, with all they contained, the inhabitants barely escaping. The water was finally stopped by throwing large trees, stones, and bales of hay into the hole. Fortunately this happened early in the morning, when only a few persons happened to be in the mines, and they all escaped without injury. The lowest point in the workings was at the bottom of the Conyngham shaft, and the water filled this shaft to a height of three hundred and forty feet. The mud and débris of all descriptions filled the airways and gang-ways of the Baltimore slope above the level of the water, and prevented the air from traveling its usual courses; consequently all the workings accumulated fire-damp. The cars and roads were torn up and washed down by the rushing streams of water to a heap of rubbish at the lowest points in the workings, making the work of restoring order very tedious, expensive, and dangerous.

By the end of the year, through strenuous efforts, nearly all the useful passages were cleaned out, and the ventilation circulated so as to clear out the fire-damp. But the second opening of the Conyngham was permanently destroyed, and a new one had to be effected through solid coal to another point in the Baltimore slope workings. This work is in progress, but is not yet completed, and evidently two or three months will elapse before it can be effected. Much praise is due to the bosses of these mines and to the workingmen for the care and intelligence exercised in the trying, dangerous situations encountered while restoring order in these mines and removing the dangerous gases. During a year of extraordinary dangers, no accidents occurred to any of the persons employed at this perilous work.

During the latter part of March the workings of the old slope of Franklin mines caved and filled with fire-damp, and they have not been able to mine much coal from there since. The sump-pillar in the upper lift was somewhat damaged by the crush, letting the water run to the lowest lift, beyond reach of the pumps; but they have succeeded in removing both water and some of the fire-damp, and they are now at work re-opening the lowest lift, where nearly all the unmined coal is left, and from which it can again be mined. By exercising care and watchfulness, they succeeded in accomplishing the work without any accidents to the workingmen, and they are at present comparatively past their peril.

General Condition of the Mines.

Eighty-four openings, including the new shafts and slopes in progress of sinking, were in operation in this district during the year 1884. All of these except eleven produced more or less coal for the market. The underground workings are maintained in about the same condition as they were upon my previous report for the year 1883, excepting that a marked improvement was made in some of the mines in which the ventilation was not then satisfactory. A fan was erected in the West End mine, which improved the ventilation very effectively. The workings are now kept clear of smoke, and are much healthier for the workmen therein. Since the present proprietors began operating the Black Diamond colliery, in Luzerne borough, the colliery has been very effectively improved, and a new shaft is now being sunk upon which a new fan is to be erected to produce a more effective ventilation. I have complained frequently of the ventilation of this mine, but under the old management the required improvements were continually deferred. Now the improvements in progress will shortly bring the mine to a satisfactory condition.

The Conyngham and **Baltimore** Slope mines, both of which were seriously damaged by inundation of water the latter part of 1883, have since been restored to their former order. The second openings, and all matters pertaining to the safety of the men employed therein, are satisfactory.

At the Warrior Run colliery the ventilation, for some time past, was rather small, but they have succeeded in increasing its volume to a small extent by enlarging the outlet air-passages. Now it is in a fair condition; still, the margin is small, and they will have to be watchful, or, as the workings advance, it may soon become inadequate again.

The air-ways in every mine, where practicable, should be made of sufficient area to have the cars follow the miners. The old system of wheeling the coal in a wheelbarrow should be abandoned; it is both laborious and expensive, and the miners very reluctantly drive the air-ways wider than is necessary to pass the wheelbarrow, where such system is in vogue. The inevitable consequences of having small air-ways is a small quantity of air for ventilation.

At the Old Slope Franklin colliery a marked increase of ventilation was effected by making a change in the construction of the outlets of the double fan, and also by enlarging the main air-ways in the mine. This mine is now in much safer and better condition generally than it was at the beginning of the year 1884. Other improvements are contemplated, which, if made, will still enhance the safety and producing capacity of this mine.

The mines of the large companies, those of the Lehigh Valley, Lehigh and Wilkes-Barre, Susquehanna Coal Companies, and Delaware and Hudson Canal Companies, are generally in good condition. I find, though, that even in the mines of these companies the ventilation is conducted through the faces of the workings better in the gaseous mines than in the ones producing no gas. The bosses of some of the mines in which no explosive gases

Lehigh and Wilkes-Barre Coal Company.

At the Empire colliery of this company a new fan was erected on the No. 2 shaft, which is 24 feet diameter, and produces a ventilation of 145,000 cubic feet of air per minute, running 70 revolutions per minute. A tunnel was also driven, for the purpose of ventilation and haulage, from the bottom to the top split of the Baltimore seam. It is 100 feet long and has a sectional area of 84 square feet. The South Wilkes-Barre shaft is continually sinking, and is now at a depth of 500 feet. The arrangement of the head of this shaft is very good; is heated by steam so that no ice forms in winter, and is thus kept in much safer condition than if ice was formed.

Delaware and Hudson Canal Company.

One of the new shafts at the **Baltimore** slope is sunk from the surface to the Red Ash seam, where it is found at a depth of 400 feet. The coal is fair and about 10 feet thick. They are now driving toward the other shaft, which will soon be sunk to the same vein, and by which a second opening will be effected.

Susquehanna Coal Company.

A number of improvements, such as tunnels and planes, were made in the mines of this company. In No. 4 slope two planes were made; one is 500 feet long, and the other 800 feet. These will facilitate the haulage of coal, and also enable them to mine coal which could not be reached otherwise. The slope was also extended a distance of 1,060 feet.

In the No. 1 slope a tunnel was driven from the Red Ash to the Ross and Twin veins. It is 9×14 feet area, and has a length of 1,150 feet.

Kingston Coal Company.

At the No. 4 shaft, this company erected a new breaker, which is nearly completed. It is a very large structure, built with a view of preparing the coal of the Ross and Red Ash seams. It will be heated throughout by steam, a new feature in coal-breakers, and for this purpose seven thousand feet of wrought-iron pipe were used in making the heating apparatus. It will be ready to ship coal early in 1886.

A new fan was erected on the No. 4 shaft. It is 24 feet diameter and running 60 revolutions per minute, gives a water gauge pressure of 1.10 inches and 14,000 cubic feet of air. The engine is horizontal, direct-acting, and the cylinder is 18-inch diameter.

Hillman Vein Coal Company.

At the Hillman shaft of this company a new upcast was made having an area of 150 square feet, and a new 24-foot fan was erected upon it. This fan, running 75 revolutions per minute, produces a pressure equal to 1.75 inches water-gauge and a ventilation of 180,000 cubic feet per minute of air. The engine is 15×24 inches and is direct acting. They are driving

Colliery Improvements During 1886.

The desire for improvement was not very active during the year 1886. The demand for coal and the price received for it were not such as would encourage expensive outlays to obtain it. The improvements, therefore, were confined chiefly to what was necessary to maintain the existing production.

Susquehanna Coal Company.

At the No. 1 deep shaft of this company a new fan was erected, twenty-five feet diameter, and of the Guibal pattern. This was found necessary to ventilate the workings of the red ash seam, which are becoming extensive and require a large volume of air.

In the George seam of the same shaft a slope is being sunk to reach the coal lying below the shaft gangway. The hoisting engine will be located on the surface and the rope passed down through a bore-hole already made for that purpose.

At the Newport shaft a second opening was effected for the upper seam, and another is being driven for the lower seam. *The second openings for the tunnel seams and also for the slope were completed.*

Lehigh and Wilkes-Barre Coal Company.

The new shaft which is being sunk by this company at South Wilkes-Barre, and which is named Tillinghast shaft, was at a depth of eight hundred feet at the close of the year, having passed the Hillman vein a short distance. It is a large shaft, fifty-two by twelve feet, and located a short distance south-west of the old South Wilkes-Barre shaft; was started in 1884, and operations have been going on continually since.

At the Nottingham colliery a new shaft was started for the purpose of improving the ventilation. It will be divided into two compartments, one an upcast and the other a downcast. It will be used chiefly to ventilate the workings of the Ross vein, which are now spreading extensively.

At the Hollenback colliery an underground slope was completed. The hoisting engine is located on the surface and the rope passed down through a bore-hole. It works admirably. Signals are given by electric bells, and conversation between the engineer and inside men effected by telephone.

Delaware and Hudson Canal Company.

Work is continued in the **Baltimore** shaft of this company, driving passages toward the No. 2 Baltimore shaft. The latter was standing idle until the close of the year, having been stopped upon sinking it to the rock. It was walled with a thick, cement-laid stone from the rock to the surface, and was left to stand idle for several months after, but preparations are being made now to complete its sinking.

At the No. 3 colliery, at Plymouth, a new fan, eighteen feet diam-

Delaware and Hudson Canal Company.—A new opening was effected for the Conyngham colliery, connecting with the workings of the **Baltimore** slope, in October, 1887. It provides a convenient escape way for the workmen of both collieries, and makes everybody connected with those mines feel safer in case anything should happen to prevent exit through the main openings.

The No. 2 **Baltimore** shaft is now at a depth of over 500 feet, and is expected to cut the Red Ash seam at a depth of 670 feet. At No. 3, which is to constitute the second opening, gangways are being driven to open work, and to be ready to ship coal when the main shaft shall be completed.

At the Boston mines the fan at No. 3 was applied to ventilate its workings, and it gives fair results. Still the ventilation of this mine is not satisfactory, but when the air-ways are fully prepared, an improvement is confidently expected.

Susquehanna Coal Company.—At the No. 1 shaft of this company two new underground slopes were sunk, one in the Forge seam and the other in the Buck Mountain. To avoid the trouble arising from the heat radiating from the steam pipes, the hoisting engines are located on the surface, and the ropes pass through bore-holes made for the purpose. Telephones and electric bells are used to converse and give signals.

At the No. 6 colliery, Glen Lyon, a new fan twenty-five feet diameter was erected. The engine is 24'x36", connected directly to the shaft of the fan. It is used to ventilate the workings of the shaft. The second openings for the workings of this shaft are now completed to each of the seams.

Kingston Coal Company.—The new breaker erected at the No. 4 shaft of this company was started to prepare and ship coal in October, 1887, and has been running since. It is one of the largest structures in the district. It is heated throughout by steam, and is equipped with the most efficient machinery.

Delaware, Lackawanna and Western Railroad Company.—At the Avondale colliery a new fan was erected on the new air-shaft. It is an open fan sixteen feet diameter, connected with a horizontal engine by belt gearing. Under a ventilating pressure equal eight-tenth inch of water-gauge it is exhausting 137,600 cubic feet of air per minute. A new opening was made from the lower lift of the Red Ash seam to the Ross. It is a rock tunnel 226 feet long on a grade of 18½ degrees and 7x18 feet area. It opens an extensive field of this coal seam.

The new breaker at the Woodward shafts is nearly completed. Four cages are in operation in the main shaft, and workings are being opened in both the Bennett and Red Ash seams. Second openings are being driven in both seams to connect with the air-shaft.

West End Coal Company.—A new fan was erected on this colliery sixteen feet in diameter and connected directly with the engine. It is

which has been idle since 1878. The gangways were retimbered and the tracks relaid, so that the mine is now in shape to produce coal. It is to be hauled to, and shipped through, the No. 18 breaker.

At the Nottingham colliery, in Plymouth, the new air shaft was completed to the Ross seam, and a twenty-four foot Guibal fan was erected thereon to ventilate the workings. A cage and an engine adapted to hoist the workmen was also placed thereon, which proved a relief to both employes and company.

Delaware and Hudson Canal Company.

The new **Baltimore** shaft of this company was completed to the Red Ash seam, which was cut at a depth of 655 feet. It opens an extensive field of this seam, and the other shaft (No. 2), already working that seam, will be connected to effect a second opening.

At the Boston mine a new seventeen and a-half-foot fan was erected, which improved the ventilation of the mine to some extent. It was located at the No. 3 shaft—too far away to be of much effect as a ventilator of the Boston workings; hence, the result is not quite satisfactory.

The No. 2 shaft of this company, at Plymouth, was sunk from the Cooper to the Bennett seam, and opened an extensive field of that seam.

At No. 3 colliery a slope is being sunk underground in the Cooper seam. The hoisting engine is located on the surface, and the rope passes into the mine through a bore-hole made for the purpose.

Susquehanna Coal Company.

A number of minor improvements were effected at the mines of this company, but I shall note only a few. At No. 1 shaft, in both the Forge and Red Ash seams, underground slopes were sunk, extending to lower levels. The hoisting engines of both were located on the surface, and the ropes pass down through bore-holes.

The No. 4 slope was graded and thereby made to work much more satisfactorily. It is now being extended through the rock into the Hillman seam.

Red Ash Coal Company.

The No. 1 slope of this company was extended and a new pair of direct-acting hoisting engines were placed to hoist therefrom. The cylinders are 28x48 inches, and they work admirably.

At the No. 2 colliery a new slope was made to a length of 750 feet, and a pair of direct-acting hoisting engines were furnished, having cylinders 28x48 inches.

A new sixteen-foot fan was also erected on this mine, which has improved the ventilation to an appreciable degree. The collieries of this company are now in good shape for producing coal for a number of years.

MINE IMPROVEMENTS DURING 1889.

No improvements were made during the year 1889, except those which were absolutely necessary to keep up the usual production of coal. The coal business was not active and the market did not demand nearly as much as it did in the previous year, and this, perhaps, was the cause of the inactivity in effecting improvements.

Lehigh and Wilkes-Barre Coal Company.

At the Hollenback colliery the main shaft was extended from the Baltimore to the Red Ash seam, an increased depth of 373'. Its total depth from surface to the Red Ash seam is 950' and its sectional area is 12'x46'.

The new air-shaft mentioned in my last report was sunk to a depth of 743', having a sectional area of 12'x37'. They have not yet struck the Red Ash seam and it is supposed to have pinched out at that point. This shaft is to constitute the required second opening for the Red Ash workings of the Hollenback colliery.

At the Stanton colliery a new rock tunnel was driven on the south-east side of the main shaft from the Baltimore seam workings to the Ross and Red Ash seams. It cut the Ross at a distance of 550' and the inner or lower split of the Red Ash at a distance of 700'. Its sectional area is 7'x12', and its grade is about 1' in 100'.

At the No. 5 shaft, South Wilkes-Barre, the hoisting appliances were put in place on massive stone foundations. The engine cylinders are 32"x60" connected directly to a cone drum having a diameter in center of 14' and 8' at the ends. The shaft is sunk to a depth of 1,068', the depth to the bottom of the Baltimore seam being 1,045'.

At No. 3 shaft, South Wilkes-Barre, a pair of hoisting engines having cylinders 32"x60" were also erected on solid foundations of massive stone work, and it is directly connected to a drum 14' diameter at center and 8' at ends. The shaft is sunk to the Baltimore seam which was penetrated at a depth of 950'. It is to constitute the required second opening for the No. 5 shaft. Both shafts are already connected by openings in the Hillman seam at a depth of 700'. A long gangway is also driven and connected with a rock plane that was driven from the Stanton mine several years ago.

Delaware and Hudson Canal Company.

The second opening to the **Baltimore** shafts Nos. 2 and 3 was effected during the latter months of this year. The workings of both are now connected and available for the workmen of both mines, and each shaft is equipped with hoisting engines and cages. The main shaft, No. 2, is 660' deep to the Red Ash seam and has a sectional area of

Hillman Vein Coal Company.

At the Hillman Vein colliery two tunnels were driven to the Abbott seam. One was an extension from the Kidney to the Abbott, 7'x12' area and 325' in length, driven for the purpose of hauling the coal through; the other was driven to effect a second opening from the Hillman to the Abbott seam and to constitute a return air-way. It is 7'x10' area and 150' long.

NEW VENTILATING MACHINES ERECTED DURING 1889.

At the No. 5 shaft, South Wilkes-Barre, of the Lehigh and Wilkes-Barre Coal Company, a new fan of the Capell double-power type was erected. The inventor G. M. Capell claims that this machine is superior to all well-known fans. This is the first to our knowledge that has been erected in this country and we are not prepared to state how it compares with the fans generally in use in this district, as we have not yet had an opportunity to make the necessary tests for that purpose. It is a peculiarly constructed machine, differing considerably from the pattern of the fans generally used. It is constructed very strongly, and adapted to run at a very high speed. It is 12' wide and 12½' diameter; has an inlet for the air on each side, but it is divided by a disc at the center of the blades, so as to form a partition from the fan shaft to the blade-tips. The air is delivered from the blades into a wide expanding chimney. The accompanying cut will show the construction lines of the machine, and may assist the reader to understand how it is made. If circumstances permit, we shall report its work in the future.

At the Dorrence colliery, Lehigh Valley Coal Company, a new Guibal fan, 30' diameter, was erected in the air shaft. It is 10' wide and has one inlet 15' diameter. This makes a second 30' fan at this colliery. The engine cylinder is 30"x60", connected directly to the crank of the fan.

At the Warrior Run colliery a new fan was erected on the air-shaft. Its diameter is 15', face 7', and running eighty revolutions per minute exhausts 79,000 cubic feet of air. This has improved the ventilation of this mine considerably, and the location of the fan is favorable for circulating the air through the face of the workings.

At the No. 2 **Baltimore** shaft, Delaware and Hudson Canal Company, a 20' fan was erected and enclosed with brick work. This is a new mine and the fan provides ample ventilation without running it at its maximum speed.

At the No. 2 shaft, Plymouth, of the Delaware and Hudson Canal Company, a new fan was erected in place of an old one. It is 17½' feet in diameter, of modified Guibal type, and it is doing very satisfactory work.

NEW BREAKERS IN COURSE OF ERECTION.

At the No. 2 shaft, Wilkes-Barre, the Delaware and Hudson Canal Company is building a new breaker. It is expected to be completed by

June, 1890. The coal production of both the Baltimore shafts Nos. 2 and 3, may be shipped through it, but it will be used chiefly to prepare and ship the coal of No 2 shaft. Its shipping capacity will be 1,000 tons per day.

The Lehigh Valley Coal Company is building a new breaker at the Franklin colliery. This will also be ready to prepare and ship coal early in 1890. Its capacity for cleaning and preparing coal will be about 1,500 tons per day.

SINKING HEAD FRAME WITH AUTOMATIC SAFETY GATES.

Through the kindness of Mr. W. A. Lathrop, superintendent of the Lehigh Valley Coal Company, a plan of the sinking head frame with automatic safety gates used when sinking the Franklin colliery air-shaft is presented in this report. It is the best device yet seen by the writer to protect the sinkers at the bottom of a sinking shaft from material that may fall on tipping the bucket. By reference to the drawing it may be plainly seen that while the bucket is down the shaft the gates or doors which are applied to close the top of the shaft are wide open, but as soon as the guiding appliances on one side of the crosshead enters between the arms of the levers attached to the doors by chains, the doors close and remain closed until the bucket is dumped and lowered again a distance of about four feet. Then the doors open for the bucket to pass down through. The two pulleys placed at the top and bottom crosspieces of the crosshead to prevent it from catching in the rope is also a very good device. In the event of the crosshead twisting it cannot bind on the rope. It has been in use while sinking the air-shaft at the Franklin colliery and has worked admirably.

CAVING OF MINES.

The word cave, or cave-in, is generally used to denote the collapse of an extensive portion of the workings of a mine. It seems to be the fate of most of the mines of this region to have "caves" sometime or other and frequently they are the cause of much annoyance, much danger, and considerable expense. Caves occur because the pillars reserved for the support of the overlying strata are not strong enough to support the weight resting on them. This weight increases with the depth of the workings beneath the surface, so that where the overlying strata is twice the thickness there is twice the weight resting on every square foot of the pillars. If we take the average specific gravity of the rocks intervening the coal-seams of this region to be 2.5, which I think is low enough, the average weight per cubic foot would be 156 pounds, and at a depth of 500' the weight of a column one foot square would be 78,000 pounds. In a mine having a vertical depth of 500' about eight-fifteenths of the coal is taken out from the breasts, leaving the remaining seven-fifteenths as pillars to support the overlying rocks.

prior to the 10th of September, a squeeze was noticed in a few pillars in the eastern workings of the Bennett vein in the No. 5 colliery. It spread with amazing rapidity from pillar to pillar in all directions during a few hours before it caved. Work was in progress in the three mines on that day and no indications of trouble in neither No. 2 nor No. 3 were perceptible until a short time before the day's work was over.

No one expected an extensive cave, and no preparation for that was made, but at about 8 o'clock p. m., September 10th, at least one hundred acres of ground sank a few feet, and an equal area of workings collapsed affecting the workings of the three collieries. Caves of this extent invariably prove damaging, and this proved so to each of the mines.

In No. 3 it extended to the underground barn and killed three of their mules. The others very narrowly escaped uninjured.

An increased quantity of water found its way into each of the mines and in Nos. 2 and 5 extra pumping machinery had to be put in, as the inflow of water proved to be much greater than their pumping engines were able to pump out. The mines were idle for several weeks, and though the coal had nearly all been won, it was a severe loss and a cause of much disadvantage that the workings caved so unexpectedly.

ABANDONMENT OF THE DIAMOND MINE.

Work was permanently suspended at this mine on the 31st day of January, 1889. It had been in operation since the year 1871 when the shaft was completed and the workings connected to those of the Old Mordacai workings. In the year 1872 the inspector reported this as an extensive mine, having a natural ventilation of 19,360 cubic feet at inlet. Then they had steam boilers and a steam engine inside, the heat of which assisted in producing the ventilation. Since then the boilers have been taken out and fans provided to furnish ventilation. The workings caved twice causing the mine to fill with fire-damp; but, with care and good management, it was cleared in both cases without injury to anyone. Once a fire took place and this could not be extinguished without flooding that portion of the workings with water.

Both the Baltimore and Hillman seams were worked out and exhausted, leaving the old workings connected with those of the Empire in both seams, and with those of the Hollenback and Baltimore tunnel in the Baltimore seams. As long as these other collieries are kept at work the workings of the Diamond should also be well ventilated and closely watched.

ECONOMY OF WORK IN THE CONSTRUCTION OF MINE CARS AND CAR WHEELS.

In view of the great improvements that have been made in anthracite preparing, hoisting, pumping, ventilating and general mining ma-

At the Reynold's colliery a new slope was driven through the rock from the Ross seam to the surface. It is 240 feet in length and 84 square feet area, on a grade of 20 degrees. This is to take the place of the old slope and leads to a new breaker now in course of erection. •

Delaware and Hudson Canal Company.

The new breaker at the **Baltimore** No. 2 shaft of this company was completed and began to prepare coal for the market in the month of November, 1890. This is a new colliery. The shaft is sunk from the surface to the Red Ash seam, a depth of 650 feet, and having a sectional area of 11 by 45½ feet. A compartment having an area of 11 by 12 feet is bratticed off for upcast, upon which a fan 20 feet diameter is erected. There are three cages, two for hoisting coal and one to hoist the workmen. The coal is hoisted by a pair of engines 26" by 48" cylinders directly connected to a conic drum 6 and 10 feet diameters. The men will be hoisted by a pair of engines 18 by 36 inches, geared 4 to 1 to a parallel drum 9 feet diameter. The fan is operated by a pair of engines 14 by 24 inches.

At the No. 2 colliery, Plymouth, a new pair of hoisting engines were erected having cylinders 24 by 48 inches, directly connected to a parallel drum 8 feet diameter. A new fan was also erected to take the place of the old one. It is 17½ feet diameter, operated by an engine 14 by 36 inches. They also added ten feet to the length of the breaker-wings in order to enable them to lengthen the screens used to separate the different sizes of coal.

Susquehanna Coal Company.

At the No. 1 shaft an underground shaft was sunk from the Ross to the Red Ash seam, a depth of 180 feet. It is to be used to hoist the coal from the Red Ash to the Ross level. Its size is 12 by 21 feet. A space of this area was driven up a distance of 35 feet to give height to land the cages. The hoisting engines are located on the surface, from which the ropes pass down through bore-holes 950 feet deep and eight inches diameter. Another hole of the same diameter was sunk for the signal wires. The three holes are incased by a pipe 5½ inches diameter. This shaft will enable this company to work all the lower parts of the Red Ash seam in their property which could not be reached without incurring greater expense from their other openings.

In the Forge seam of the same shaft, the underground slope was extended to a depth of 1,150 feet. This slope has an area of 14 by 7 feet, and an average grade of 8½ degrees.

At the No. 2 shaft the underground slope was extended a distance of 600 feet, and the hoisting engine was placed on the surface. The bore-hole for the rope is 500 feet deep.

At the No. 2 slope the timber was removed from the underground engine house and replaced by walls of masonry. Now everything is in-

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 auxiliary 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 pressure 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 $12\frac{1}{2} \times 8\frac{1}{2}$ 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 compressors, with Corliss engines, were located on the surface. Their size is $28 \times 34\frac{1}{4} \times 48$ 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

Delaware and Hudson Canal Company.

No. 2 Baltimore—

A new double fan was erected, $17\frac{1}{2}$ feet diameter, enclosed in brick-work, and an underground slope was driven to a depth of 700 feet, which is still being extended.

Boston—

The new shaft was sunk to a depth of 475 feet, and its sinking is continued. It is 12×33.5 feet, and has passed through three coal seams.

No. 5 Colliery—

The new shaft was sunk to a depth of 725 feet during 1894, and its sinking was continued. Its size is $10\frac{1}{2} \times 33$ feet.

Susquehanna Coal Company.

Five new tunnels were driven in the mines of this company:

One 8×14 feet and 800 feet in length from the Ross to the Twin seam.

One 8×14 feet and 400 feet in length from the Hillman to the Hillman seam.

One 8×12 feet and 200 feet in length from the Forge to the Forge seam.

One 8×14 feet and 800 feet in length, from the Forge and was unfinished at end of year.

One 8×14 feet and 500 feet in length, from the Mills to the Mills seam.

Three of the underground slopes were extended. The No. 10 slope was extended a length of 2,000 feet. No. 12 was extended 500 feet, and No. 13 1,500 feet.

Five new gravity planes were made, varying in length from 200 to 1,500 feet. These improvements open new areas of coal property in each of the seams.

Improvements by the Parrish Coal Company.

The underground slope on the Baltimore seam in the Parrish colliery was extended a distance of 900 feet, making the total length of this slope 2,316 feet.

Improvements by the Alden Coal Company.

A new air shaft was sunk for the Alden colliery from the surface to the Cooper seam, a depth of 612 feet. Its sectional area is 416 square feet. A new fan, 24 feet diameter, is in progress of construction. The engine is 20×36 inches, directly connected. This will be applied to ventilate the north basin workings of the property.

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.

The Delaware and Hudson Canal Company had a hole bored from the surface to the highest point in the workings, so that the confined gases might escape. A second hole is being bored at present lest one might prove insufficient. The water was filled to a height of 394 feet, when it was concluded to be high enough.

A Fire and Narrow Escape of Men at the **Baltimore** No. 2, Delaware and Hudson Canal Company.

Between ten and eleven o'clock Monday morning, December 21, 1897, a blast ignited some strong gas feeders in the gangway leading from the bottom of the inside slope of this mine. The miners and others including the mine foreman and fire bosses did all in their power to extinguish the fire, but the water pipe (a newly laid one), did not deliver the water with sufficient force. The air current conveyed the smoke and gases produced by the fire through extensive old workings, and then through all the working places on the inclined plane, which sickened the men who were working on the planes. At about three o'clock P. M. some of the sick men managed to reach the bottom of the planes and reported that all the men were dying up there. The foreman, John Matthews, and two or three other men went up both planes and found one man lying on the gangway insensible. They picked him up, intending to bring him out, but feeling the effect of the poisonous gases, they had to drop him and make their own escape. The air was heavily charged with smoke and noxious gases and they concluded it to be too dangerous to permit anybody to go up the planes, and they resumed the efforts to extinguish the fire. At five o'clock the writer heard of the accident and repaired to the colliery promptly, and in a brief consultation with the officials he decided to split the air-current at a point between the fire and the plane workings, and send the smoke back over the fire into another air-split and send a fresh current up to the plane workings. The conditions were favorable and it was accomplished in about half an hour. The air on the plane improved in a few minutes, and having plenty of help, the men were all carried out alive, but unconscious. There were a number of physicians on the surface who succeeded in restoring all to consciousness. There were fourteen men carried out. One, Mike Kushinski, was very severely burned by his mining lamp setting his clothes on fire, and he died at the hospital a few days after. They were all found lying along the road between the head of the upper plane and their working places. All had fallen while on their way out.

The air current was restored to its former course immediately after the men were rescued. The following morning, after learning that several explosions of gas had occurred in the vicinity of the fire,

it was determined to flood the slope workings with water as soon as practicable and by this time it has been accomplished, but it will require several weeks to pump the water out and restore that part of the mine to working order again.

Caving-in of Mines in 1896.

Several of the mines of this district were more or less damaged by squeezes and caves-in during 1896. Fortunately no casualties to the workmen occurred, because the officials, being sensible to the uselessness of trying to prevent them, kept themselves and their men out of the affected districts. When a squeeze is fully developed it is useless to try to stay it. The experienced man knows this, and does not risk the lives of his men, nor waste the money of the operator in any useless efforts to prevent what cannot be avoided. The only way of preventing caves-in is to leave enough of coal in the ground, as pillars, to support the superincumbent part of the earth. Where there is not enough it will certainly collapse or cave in. More than three-fourths of the mines of this region have had a cave of more or less extent in some part of its workings.

No one can tell how many pillars are enough and it is doubtful whether the efforts to sustain the overlying strata is as commendable and safe as if the coal was all mined out and the overlying rocks brought down in small areas. Millions of tons of coal have been irretrievably lost that could have been won by the latter method.

It is remarkable and worthy of attention that squeezes seem to begin in the centre of a wide span of old workings that have been abandoned for a long period. Some think the cause is that the pillars become weaker by chips of coal falling off, but it occurs also in seams where the coal does not chip off, and a more acceptable theory is that when the workings spread to an area of sufficient breadth, the weight at the centre becomes greater than the adhesiveness of the rocks at the face lines of the workings, and this weight proving greater than the central pillars can sustain, causes them to crumble and yield. The most effective measures for staying a squeeze is to fill the spaces between the pillars by flushing culm and dirt in and pack it so full that the pillars cannot spread apart and give way.

Many times it has been tried to stay a squeeze by timbering, but it has been successful only in a few instances and only when it is done promptly and vigorously when the squeeze begins.

Timbering has helped to prevent the spreading of the squeeze, when applied for the purpose of assisting large pillars which are some distance away from its centre, with the object of establishing enough resistance to break the overlying rocks and stay its progress. The men should never be allowed to work inside the limits of a squeeze. Their means of retreat should invariably be kept safe, and

The **Baltimore** No. 2, Delaware and Hudson Canal Company.

On Monday, December 21, 1896, a fire ignited by a blast in this mine required the flooding of the Red Ash slope workings. The fire being in a high part of the workings, a bore hole was drilled to let the gases escape so as to permit the water to fill to the highest points. On March 24, 1897, at 1 P. M., the bore hole broke into the mine and the confined gases instantly rushed up and were ignited by the boiler fire of the boring machine. The flame consumed the shanty and boring machine and threatened to destroy several houses in the vicinity. It made a flame eighty feet high, a mighty torch swayed by the wind. The fire department was called out and they had to work incessantly for a day and a half to save the houses. At 4 P. M., March 25, the flame was extinguished but the gas continued to escape for several weeks. Finally it ceased and the water in the mine filled to the hole.

By October, 1897, all the water was pumped out and the workings were found to have been entirely closed in by falls of roof caused by the action of the water. The slope is being remodelled and arranged so that the gangways will be above the old workings and in new ground. When this is completed this part of the mine will be much better arranged than the old one was.

A Squeeze and Serious Inflow of Water at the Avondale Mine.

Towards the middle of March, 1897, a squeeze began in the Red Ash seam workings west of the No. 1 inside slope in the Avondale Mine of the Delaware, Lackawanna and Western Railroad Company.

The seam was 22 feet in thickness and the workings in this part were old and had for years been abandoned but now they had just resumed working a block of coal formerly left as being too poor in quality to mine. The pillars were irregular and at some places the breasts were unusually wide and as usual in this seam the gobs were high.

By March 24th the squeeze affected the workings in the Ross seam directly over the seat of the trouble in the Red Ash seam. The rocks overlying the Ross workings cracked, and crevices were opened through which a stream of water flowed into the mine, which was estimated to be about 14,000 gallons per minute. It ran down into the workings of No. 3 slope which is a slope sunk from the lower lift of the No. 1 slope. It was evident at once that the pumps could not pump the water and they were taken up.

Dams had been already partially constructed across the gangway and airway leading into the workings connected with the Nottingham and these were hastily completed. By March 29th the No. 3 slope and its workings were submerged and it began to fill upon the dams. The next day the dams began to leak and the quantity leaking through

An Extensive Squeeze at the Woodward Mine.

On the morning of March 26 a squeeze began in West gangway of the Red Ash workings of the Woodward mine of the Delaware, Lackawanna and Western Company at Plymouth township. It was first noticed by the fire boss when making the usual morning examination of the mine. The colliery was started to work as usual but the squeeze by this time had rapidly spread and had assumed a dangerous aspect and all the employes were sent out. The squeezing was first noticed at the inner breasts where the seam was unusually thick and shelly. The pillars and breasts were of uniform breadth, the pillars being 30 feet and the breasts 24 feet in width, and it was believed that enough pillars were reserved to make sure of preventing a squeeze. However, it came, and kept crushing and spreading until the latter part of May, so that by that time an area of 35 acres was affected, all above the second lift and west of the shaft. As usual in this district, as soon as the squeeze began, explosive gases appeared in the return airways and the affected workings were also filled with the same kind of gases. A great amount of timbering work was done in the effort to prevent its spreading, and some undoubtedly to good purpose. All work was done with safety lamps and men were kept on the outer side of the squeeze where they could retreat if necessary. The workings of all the seams were affected but there was no coal lost aside from what was in the pillars. The most important parts of the gangways and airways have been reopened and repaired and the work of opening the others is still progressing. Excellent care was taken in the execution of the work for much of it was in perilous situations, but all was well done and without injury to any who took part.

The Destruction of the **Baltimore** Tunnel Breaker.

Saturday morning, February 20, when about to start to work, the Baltimore Tunnel breaker took fire in the oil room, evidently from a boy's lamp, and in one hour was entirely consumed. This was the first breaker erected in the Wyoming Valley. It was erected in 1854 by the Baltimore Coal Company, and the seam they worked is designated as the Baltimore seam throughout the valley and evidently will be known by that name as long as it will be spoken of.

The first shipment of coal was made by the old canal from the boat sheds near East Market street, Wilkes-Barre. The breaker was located about half a mile east of the boat sheds and here the first locomotive in the Wyoming Valley was used to haul the cars back and forth between the breaker and the chutes, and before the breaker was erected, between the mine and the chutes. In 1867 the colliery was purchased by the Delaware and Hudson Canal Company and they are

still its possessors. The breaker was not rebuilt and the coal of the Baltimore tunnel is now hoisted up the new No. 4 shaft and hauled by a locomotive to the Baltimore No. 2 breaker where it is prepared and shipped to market. Therefore the name Baltimore tunnel will be superseded by the name Baltimore Shaft No. 4 in all the reports of the future.

The Burning of the West End Coal Company's Breaker.

At about ten o'clock Monday morning, March 29, the West End Coal Company's breaker at Mocanauqua was discovered to be on fire, and in a short time was completely burned. The colliery was idle and it is not known how the fire originated. On March 14, 1893, a breaker on the same site was burned and this one was erected in its place and commenced to prepare and ship coal on August 15, 1893. A new breaker was erected again on the same site and this was completed and commenced to prepare and ship coal September 2, 1897.

Record of Improvements for the Year 1897.

Improvements by the Lehigh and Wilkes-Barre Coal Company.

At South Wilkes-Barre colliery a rock tunnel has been driven from the Hillman to the Kidney seam for hauling purposes. It is 450 feet in length and 8x12 feet area.

At the Maxwell colliery a new fan has been erected thirty-five feet diameter, Guibal pattern, 12 feet wide. Area of upcast is 192 square feet. Horizontal engine working direct. Cylinder 20x48 inches diameter. Engine horse power, 150.

Improvements by the Delaware and Hudson Canal Company.

At **Baltimore** tunnel a shaft was sunk to save hauling the coal out from the old tunnel. The new shaft is designated as the Baltimore No. 4 shaft and the mine will be known hereafter by that name. The shaft is from the surface to the Baltimore seam. It is 97 feet in depth having an area of 12 by 30 feet. A new gravity plane is being made to take the place of three old planes. When finished it is to be 3,300 feet in length, having grades varying from 7 to 12 degrees. Its sectional area is 8x18 feet.

A rope haulage has been installed to haul the coal from the head of slope and foot of plane in the Red Ash seam to the bottom of the shaft. The engines are located on the surface.

At **Baltimore** No. 3 a new gravity plane has been made 800 feet long having a grade of 15 degrees and a sectional area of 8 by 16 feet.

At **Baltimore** No. 2 the trestle leading from the shaft to the breaker was torn down and a conveyor was constructed to convey

the coal from the shaft to the breaker. Another conveyer line was constructed to convey the coal of the **Baltimore** No. 4 shaft to this breaker.

At the Boston colliery the breaker hoisting tower was torn down and a conveyer was constructed to scrape the coal from the dump at the shaft to the head of the breaker, and in the mine a tunnel has been driven from the bottom to the top split of the Red Ash seam. It is 400 feet in length and 7x12 feet area.

The No. 2 shaft at Plymouth was extended from the Bennett to the Red Ash seam 312 feet, making the total depth of the shaft 898 feet.

A new fan was erected to take the place of the old one. It is 22 feet in diameter, encased by a brick wall. It runs 70 revolutions and is exhausting 97,800 cubic feet of air. The engine is horizontal direct acting, 16x30 inch cylinder.

At the No. 3 colliery, Plymouth, the Hillman seam was opened and a slope was sunk to a length of 620 feet; average grade 12 degrees; 7x12 feet area.

At the No. 4 colliery a new slope has been sunk in the Red Ash seam to a length of 800 and it is still being driven. It is 7x14 feet area and has an average grade of 7 degrees. It opens a large area of excellent coal.

Improvements by the Susquehanna Coal Company.

In the No. 1 shaft, Nanticoke, an extension of tunnel has been driven from the Lee to the Ross seam a length of 960 feet, and 7x14 feet sectional area. A tunnel has been driven from the Forge through troubled ground a length of 1,570 feet, 7x14 feet area and is still being driven. An extension has been made by a tunnel from the Hillman to the Forge seam 650 feet in length, 7x14 feet area. A tunnel has been driven for ventilation purposes from the Hillman to the Hillman 240 feet in length and 7x14 feet area.

In the No. 4 slope, Nanticoke, the main slope has been extended through the rock from the Hillman towards the Forge seam a length of 350 feet and it is still being driven. The No. 21 tunnel was extended a length of 700 feet from the Mills to the Mills and Tunnel No. 23 driven on from the Hillman to the Mills a length of 500 feet. The area of all is 7x12 feet.

In the No. 2 shaft, Nanticoke, No. 5 slope was extended through an anticlinal from the Lee to the Lee a length of 420 feet and the No. 11 slope was driven through the rock from the Ross to the Lee seam an extended length of 850 feet. A new gravity plane 850 feet in length was made in the Ross seam.

At the No. 6 shaft, Glen Lyon, No. 5 tunnel was driven to a length

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.

Conyngnam.—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.

Wanamie Colliery.—Tunnel top to bottom split, Baltimore, 44 yards. Tunnel Red Ash to Ross, 85 yards.

Maxwell Colliery.—Opening Red Ash vein in deep shaft. Two tunnels from bottom to top split Red Ash vein, each 30 yards. Remodelled portion of breaker and installed jigs. Two hundred and fifty horse-power Babcock & Wilcox boilers installed.

Improvements by the Delaware and Hudson Company During the Year 1900.

Baltimore Slope—Sinking No. 5 shaft, which is the old Meadow shaft, enlarged from 9 feet 6 inches x 19 feet to 12x28 feet from surface to Baltimore vein, 385 feet. This shaft will be continued in solid, same size to Red Ash vein.

Baltimore No. 2.—No. 6 slope, in Red Ash vein, sunk 700 feet, operated by 10x12 inch engines, with air, only temporary.

Washery relieving breaker and saving small sizes. Refuse is taken down a new 10-inch bore hole 530 feet deep to Red Ash vein.

Baltimore Tunnel.—No. 6 slope, Red Ash vein, extended 800 feet, with a total depth of 1,400 feet.

No. 10 plane completed 3,300 feet, and is operated by pair of 16x36 inch engines, the rope running through bore hole 132 feet deep. New engine house, brick, 20x40 feet, for No. 10 plane engines.

Conyngham.—No. 6 plane, in Abbott vein, now up 1,450 feet.

No. 2 slope, in Baltimore vein, down 900 feet, completed.

Rope haulage operating No. 6 Abbott and No. 7 Kidney planes and delivering coal to foot of No. 1 Hillman slope. Operated by 14x30 inch engines, located on surface, ropes running through 8-inch bore hole, 477 feet deep, to Hillman vein. Haulage is 4,750 feet long.

Plymouth No. 1.—This shaft is completed to the Bennett vein. Plymouth pumping plant.

Another pump room, 22x54 feet, stone side walls and brick arch, is completed.

A compound pump steam cylinder, one 26-inch and two 38-inch, with three plungers 11x48 inches, built by the Dickson Manufacturing Co., has been set up, and will soon be in running order. This pump has a capacity of 3,000 gallons per minute.

New fan 10x28 feet, brick house 48x48 feet.

Fan driven by two engines, 16x36 inches, to ventilate Plymouth No. 2, Red Ash vein.

Plymouth No. 2.—New set hoisting engines, 26x48 inches, with half cone drums. Engine house brick, 42x38 feet.

Washery, relieving breaker and saving small sizes; refuse is taken down a new 10-inch bore hole, 600 feet long, to Bennett vein. No. 13 tunnel to top split in 200 feet; still driving.

A second opening from the Five Foot to the Stanton seam, for the purpose of ventilation.

Wanamie No. 18.—Erection of ten double blocks of houses for the use of employes.

A return airway from the Red Ash to the Ross seam at No. 19 Slope, for the purpose of ventilation.

Maxwell No. 20.—Erection of a forced fan draft system in shaft boiler house.

Erection of new engine house, and installation of one pair of 24"x48" double drum friction engines for operating No. 6 Baltimore Slope and No. 7 Red Ash Slope.

Improvement by the Lehigh Valley Coal Company During 1902.

Dorrance Colliery.—An 18 degree rock plane, 375 feet in length, for haulage, has been driven from the Baltimore to the Five Foot seam. Also, a 30 degree rock plane, 225 feet long, for a second opening.

A slope has been extended in the Hillman 300 feet from the crown of the Cemetery anticlinal into the North basin.

A battery of six return tubular boilers of 150 horse power each. The boiler house has been equipped with duplicate feed pumps and forced draught fans.

The tower over the main hoisting shaft was rebuilt.

Franklin Colliery.—No. 8 Slope in top split of Red Ash seam was extended 310 feet, and a rope bore hole, 340 feet in length, completed from the surface to the head of the slope.

The bottom lift, Red Ash gangway, has been reopened for the extension of the unfinished tunnel to the Ross seam.

The head frame and fan at Red Ash second opening have been rebuilt.

A washery is under construction for the preparation of coal from the culm banks.

Conyngham.—No. 4 tunnel, 348 feet long, driven from Abbott to Snake Island seam.

No. 5 tunnel, 108 feet long, driven from Abbott to Snake Island seam.

Three-inch drainage bore hole, 314 feet deep, from Hillman sump to Baltimore seam, to drain water to shaft sump.

Baltimore No. 5.—An entirely new colliery plant, known as Baltimore No. 5, including a 2,000-ton breaker, was built during 1901, and began operations January 1, 1902. This plant prepares the coal from Baltimore tunnel and Baltimore No. 2 workings, which latter breaker was burned on January 26, 1901. The coal is transported overland to the breaker, on a surface railroad, also built

during 1901. An 8" bore hole, 749 feet in depth, was sunk from the surface to the Red Ash seam, for operating a new slope in this seam.

Baltimore No. 2.—The hoisting engine house, fans and fan houses and a new steel tower over-shaft were rebuilt. A new plane was constructed from the top of shaft to railroad level for handling the output of this shaft.

Baltimore Tunnel.—No. 6 Slope, Red Ash seam, extended 300 feet; No. 7 Slope extended 400 feet and No. 10 Plane extended 400 feet.

Improvements at the Collieries of the Susquehanna Coal Company During the Year 1902.

No. 5 Colliery.—Outside: Remodelling breaker and rebuilding jig house.

New boiler plant, 2,000 horse power B. & W. boilers, replacing old cylinder boiler plant.

New compressor house, with two-stage Ingersoll-Sergeant compressor, 20" steam, 20½" and 32½" air, 24" stroke.

Inside: No. 2 Shaft, No. 13½ inside slope, opened 400 feet to replace No. 13 Slope closed during strike.

Second opening on head of No. 12 rock plane from Lee to Ross.

No. 4 Shaft: New airway in Ross seam from North tunnel to No. 4 air shaft.

Second opening from South tunnel.

Steel roof supports at lower landing, Shaft No. 4.

No. 4 Slope: Rock plane from Mills to George seams, 434 feet long, 7'x14' on a 20-degree pitch.

No. 6 Colliery.—Outside: New B. & W. boiler plant, 2,000 horse power, with steam lines to No. 6 Shaft, replacing cylinder boilers.

New water hoist tanks in No. 6 North Shaft, which is being made into a water hoist shaft.

No. 7 Colliery.—Outside: New hoisting engines, 32"x48", with 13' cast drum, double air brake, and over-winding device, replacing old 28"x72" engines at No. 1 deep shaft.

Pneumatic haulage plant, No. 1 to No. 3 Shafts, completed with three-stage Norwalk compressor, 22" steam, 16", 5½" and 11½" air, 24" stroke, and Porter pneumatic locomotive, 8"x14", with air line carrying 900 pounds pressure, replacing rope haulage.

Old rope haulage engines repaired and put in place for Slope No. 10.

New lamp house constructed, from old rope haulage engine house.

B. & W. boiler plant, 2,500 horse power, replacing 48 cylinder boilers.

LEHIGH Valley
COAL Co

placed at the head of slope to hoist the coal to breaker. Likewise a pair of engines was erected at the head of Coal Brook slope to hoist the coal.

At the Prospect Shaft a brick addition to the boiler house was made enclosing a 250 horse power B. & W. boiler. A new brick engine house has been completed. In the Midvale slope on different levels. Three rock tunnels were driven from the Hillman to Brookley veins, which will be used for the transportation of coal.

In the Hillman slope a rock tunnel was driven from the Hillman to the Bowkley veins.

At the Henry colliery the hoisting shaft was extended from the Baltimore to Skidmore veins. A rock tunnel was driven through an overlap to the five-foot, 220 feet. The second opening tunnel is being driven at present.

The two new shafts begun in 1902, were sunk to Red Ash vein, a distance of 675 feet from the surface. A brick engine house 34x72 feet was erected for the hoisting engines of these shafts.

The Wyoming shaft, the old wood cribbing from the surface to the rock, was replaced by concrete, which makes a good job at this shaft.

At the Heidelberg No. 1 slope a new rock plane, 18 degree pitch, was driven from the lower split to the upper split of Red Ash vein, a distance of 212 feet. The second opening was driven on a 30 degree pitch. A rock slope is being sunk from the Marcy to Clark vein, also a second opening shaft for same.

A new 12-foot diameter ventilating fan was erected. A new brick boiler house was built, enclosing a 450 horse power return tubular boiler. Dispensing with the old boiler plant.

Improvements by the Delaware and Hudson Company

At the **Baltimore** tunnel the General Electric Company has installed an electrical haulage which handles all the coal from the Red Ash vein to the mouth of tunnel, doing away with the use of a rope haulage plant and hoisting plant at No. 4 shaft. The Stanton vein slope has been extended 250 feet. A new breaker is in course of erection to prepare the coal which is now taken to No. 5 breaker for preparation.

Improvements by the Hudson Coal Company

A new breaker has been completed at Pine Ridge with a new steel head frame erected over the shaft. The foot of the shaft has been remodeled by brick arching and a chain hoist put in for handling the empty cars. To accomplish all of the above work at the foot of

No. 8 slope extended 650 feet Red Ash vein to limit. The haulage road for transportation of No. 2 coal to Baltimore No. 5 shaft has been completed and equipped with electric motor. The haulage is 3,400 feet long. 10x12 inch engines installed on No. 4 slope Baltimore vein.

DELAWARE AND HUDSON COMPANY

Baltimore Tunnel.—No. 6 slope Red Ash vein extended 250 feet. New breaker at Baltimore tunnel equipped with machinery using electricity as power. Began operation December 1.

Baltimore No. 5.—No. 1 slope extended 1,600 feet. No. 2 tunnel driven 175 feet to bore hole for culm flushing. New electric power plant installed to furnish power for the Baltimore tunnel breaker and other uses as required.

HILLSIDE COAL AND IRON COMPANY

Butler Colliery, Outside.—New office was built 30x30x21 and new barn for stock, 32x110x21—6.

Thomas Shaft, Butler Colliery.—Rock plane 250 feet long area 7x12 feet from bottom Red Ash to top split of Red Ash. This plane will be continued in the top split as a steam plane, and will also work the coal in the bottom split as a slope below the shaft level.

The fan at Chapman shaft has been replaced with another and larger fan, 4x16 feet, which is being driven with an electrical motor.

Marcy or Butler Slope, Butler Colliery.—The main slope has been extended a distance of 750 feet further toward the basin in the Marcy vein.

Checker Slope in what is known as the Checker vein, Butler colliery. At a point 950 feet from head of slope, a rock fault was encountered, and after proving ground by bore holes, it was decided to drive through the fault, a distance of 550 feet to strike the coal on the other side. This has been completed and the total depth of the slope is now about 1,800 feet.

Fernwood Colliery, Outside.—Blacksmith, carpenter and machine shop erected, 24x68x20. New supply house, 18x18x16, with fire-proof oil house addition, tanks and pumps for handling the oil. A new barn for stock, 32x112x19-6, has been erected. The fan and fan engine house at No. 1 slope was torn down and rebuilt, and the fan engine changed, and is now in first class condition.

Consolidated Slope.—An additional gravity plane, 7x12x300 long has been driven in Stark vein. A duplex plunger pump, 20x10x36 has been installed for the purpose of furnishing water to the washery.

Consolidated Colliery, Outside.—Boiler house at breaker enlarged and two 150 H. P. return tubular boilers installed.

What is known as the annex to the breaker has been changed and converted into a washery for the purpose of preparing the small sizes from the breaker and also washing out what is known as the "Consolidated culm dump."

Mine Foremen's Examinations

The examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held on the 8th and 9th of May, at Pittston.

DELAWARE AND HUDSON COMPANY

Baltimore Slope.—A washery is being erected to clean the old Baltimore slope bank.

Baltimore No. 2.—Number 7 Slope extended 475 feet and completed in Red Ash vein.

Number 9 Slope extended 1,500 feet in Red Ash vein.

Baltimore Tunnel.—Number 6 Slope in Red Ash vein extended 200 feet.

Baltimore No. 5.—Number 1 Slope Red Ash vein extended 900 feet and finished.

Conyngham.—Number 7 Tunnel from Hillman vein to Main shaft was finished 496 feet long. This is a new landing in shaft. All coal from upper veins will be handled here and the Hillman shaft abandoned.

Number 9 Plane Baltimore vein extended 350 feet.

Number 10 Plane Kidney vein extended 275 feet.

Number 11 Plane Abbott vein extended 250 feet.

Number 12 Plane Abbott vein extended 375 feet and 6 inches.

Rope hole put down a depth of 92 feet for operation of these veins.

New head frame over Main shaft and pair of 26x48 inch first motion engines installed in new brick engine house.

Old frame fan house partially rebuilt of brick.

A rock tunnel has been finished from the foot of shaft to Stanton vein 475 feet total distance, and 423 feet of this was driven in 1906. Size 7x16 inch.

Slope was driven down on Stanton Vein a distance of 600 feet in 1906, 7x12 inch.

Mine Foremen's Examinations

The examination of applicants for certificates of qualification as Mine Foremen and Assistant Mine Foremen was held June 19 and 20.

The board was composed of James Martin, Mine Inspector, Francis H. Kohlbraker, Superintendent, and Thomas Finn and Felix Wisniewski, Miners.

The following applicants were granted certificates:

Mine Foremen

Peter J. McDavitt, Howard F. Reilly, Bernard F. McGrane, Peter McGovern, Thomas R. Gambold, Osborne Morgan, Thomas Holton, Anthony Jones, John J. McAndrew, John B. Corgan, David M. Stanton, George Hopper, Elmer E. McQuown, Jenkin Thomas, Evan W. Bryant, John D. Davis and Jenkin Evans.

Assistant Mine Foremen

Jesse Henson, John J. Cassidy, William Connell, Joseph Dzialowski, Mortimer H. Watson, Henry Smith, Patrick H. Duffy, James Lindsay, Walter A. McGuire, John Donnelly, Lewis Morgan, John H. Williams, Edward Sterling, William H. Evans, John F. McTague, Daniel Howells, Edward Tredinnick, Richard Richards, Stephen Zapka, Caspar Urbanak, William V. Roberts, Harry Adams, William Llwellyn, Thomas George, John F. George, Charles Balcock, William H. Evans and Ambros Griffiths.

Inside.—Rock Plane airway Kidney to Abbott.

No. 19 Tunnel extended to Abbott.

Inman No. 21 Colliery.—Sinking Baltimore and Red Ash shafts.

DELAWARE AND HUDSON COMPANY

Baltimore Slope.—Washery completed and in operation.

Baltimore No. 5.—New breaker erected to take place of one destroyed by fire, February 7, 1907, breaker now in operation.

An 8x6 bore hole driven from surface to Red Ash vein, 950 feet for the conveyance of electric wires.

Baltimore No. 2.—No. 9 Slope Red Ash vein, driven 200 feet and completed.

No. 10 Slope Ross vein opened and driven 600 feet.

No. 11 Slope Ross vein opened and driven 600 feet.

Baltimore Tunnel.—No. 6 Slope, Red Ash vein extended 600 feet. Top split Red Ash vein opened on 5th and 6th.

East.—No. 6 Slope, Bottom Red Ash vein.

Conyngham.—No. 11 plane, Abbott vein, driven 50 feet and completed a 10" bore hole from Baltimore to Red Ash vein, driven 348 feet for water.

WILKES-BARRE AND SCRANTON COAL AND IRON COMPANY

Hillman Mine.—The slope in Stanton vein was extended 579 feet. The Slope airway Stanton was extended 579 feet.

Mine Foremen's Examinations

The examination of applicants for certificates of qualification as Mine Foremen and Assistant Mine Foremen was held on the 14th and 15th of May, at the Y. M. C. A. Building, Wilkes-Barre.

The Board of Examiners was Thomas H. Price, Inspector of Mines; F. H. Kohlbraker, superintendent; Thomas D. Lloyd and Patrick McGrane, miners. The following applicants were recommended for certificates:

Mine Foremen

Andrew Peterson, William Owens, Wilkes-Barre; Alfred B. Taylor, John C. Hermansen, Alden Station; Patrick Shovlin, Plymouth.

Assistant Mine Foremen

Henry Lewis, Morgan P. Harrison, Lewis R. Thomas, William D. Thomas, Plymouth; John R. Owens, Westmoor; Edward W. Davis, Wilkes-Barre; David Lloyd, Plymouth; Benjamin G. Griffiths, Sugar Notch; David H. Walters, James B. Flammery, Nanticoke; William L. Richards, D. J. Edwards, Edwardsville; Daniel Davis, Kingston; James Bryan, Alden Station; Thomas Price, Peely.

New return air course in Baltimore between Hillman and No. 1 levels completed.

Diamond drill provings in Drift level. Silting operations in Rock Slope and Baltimore vein district.

Warrior Run, Outside.—Back switch head on No. 1 or Buck Mountain slope; engine plane and tippie to dump mine cars into railroad cars for transportation to Seneca colliery for preparation.

Boiler fuel conveyor line for washery.

Crusher and conveyor line to reclaim culm bank south of breaker.

Ash and rock bank fire confined to harmless territory. Two shafts and two churn drill bore holes and 2 crushing outfits were necessary to accomplish this. Diamond drill proving for overlying veins.

Inside.—Reopened "D" vein on outcrop.

Reopened "C" No. 1 Lift, east.

Reopened "F" No. 3 Lift, east.

New slope in "C" No. 2 west to north dip.

Telephone communication throughout.

Silting operations in South and North basins.

DELAWARE AND HUDSON COMPANY

Conyngham.—Shaft retimbered and relined.

Baltimore No. 2.—No. 10 Slope, Ross Vein, extended 825 feet to limit and completed.

No. 11 Slope extended to limit of property, a distance of 200 feet.

No. 8 Plane graded and driven 410 feet.

Baltimore No. 5.—Hole for slushing refuse into mines drilled to depth of 739 feet.

MINE FOREMEN'S EXAMINATIONS

The examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held May 19 and 20, at the Y. M. C. A. Building, Wilkes-Barre.

The Board of Examiners was composed of Thomas H. Price, Inspector, F. H. Kohlbraker, Superintendent, Thomas D. Lloyd and Patrick McGrane, Miners.

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

Mine Foremen

Edward W. Davis, Charles Enzian, James Stevens, Wilkes-Barre; James Gallagher, Pittston; Lewis R. Thomas, John B. Magee, Henry R. Kettle, David R. Jones, Plymouth; Henry H. Hughes, Wyoming; James C. Wallace, Dorranceton.

Assistant Mine Foremen

Thomas Beynon, Bernard Conyngham, William R. Davis, Charles Hammonds, William R. Humpleby, Peter Johnson, John N. Jones, David Werner, Wilkes-Barre; Henry Carver, David S. Jones, David

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 Colliery

Baltimore No. 2.—No. 8 Plane Ross vein was extended 400 feet.

Baltimore No. 5.—A 16-inch bore hole 750 feet in depth was drilled to the Red Ash vein for pumping.

Two boilers of 250 horse power were added to the steam plant.

Baltimore Tunnel Colliery

A new boiler plant containing 3 boilers of 375 horse power was built to replace the old cylinder boilers near No. 4 shaft.

Conyngham Colliery

An air shaft 25 feet was sunk from the surface to Abbott vein. The Baltimore hoisting shaft was retimbered.

The Baltimore vein sump was enlarged 600 feet in length and a concrete dam built between it and shaft.

Outside.—A concrete fan house was built in which a 20-foot fan was installed to ventilate the Hillman and Five Foot veins, releasing two old 15 foot fans. A concrete crusher house and conduit to take ashes from the boiler house to two 10 inch bore holes from the surface to Lower Baltimore vein were constructed. An addition to the outside barn, to quarter an additional number of mules, was also completed.

Warrior Run.—Inside: No. 8 tunnel was driven from the C to the D vein a distance of 210 feet. No. 22 tunnel was driven from the Hillman to the Mills vein, a distance of 210 feet to develop a virgin area. No. 5 rock plane on 30 degrees was driven a distance of 105 feet from the Hillman to the Mills vein to serve as a second opening. Built pump house of fireproof material at the foot of the old slope in the B vein.

Outside.—A concrete fan-house was built, in which was installed a 16-foot fan to replace two fans that were in poor condition, one of which was destroyed by fire. A concrete powder house was also constructed.

Dorrance Colliery.—Inside: The Hillman, Baltimore, Red Ash and Rock slope fireproof barns were completed. Two electric motors were placed in the Cooper vein, No. 21 tunnel section, and 2 in the Red Ash vein, No. 24 slope section. A 4-inch hole was drilled from the Hillman to Cooper vein 384 feet deep, and a 4-inch hole was drilled from the Cooper to the Red Ash vein 265 feet deep, to carry electric cables. A 4-inch drainage hole, 62 feet deep, was drilled from the Bowkley to the Hillman vein, to release the pump in the Baltimore vein. A 10-inch hole was drilled from the surface to the Baltimore vein for silting purposes, depth 605 feet. No. 19 rock plane was driven at foot of No. 6 extension slope from Bennett to Bennett vein, through a fault a distance of 90 feet. New guides were placed in the Hillman shaft from the surface to the Hillman vein, and also in the Red Ash shaft from the surface to the Baltimore vein. The construction of a pump room in the Baltimore vein and also in the Hillman vein was started, for the installation of two 1,500-gallon capacity pumps to take care of the large silting operations being carried on.

Outside.—The breaker was practically rebuilt, concrete retaining walls being placed at the foot of the breaker plane to replace wooden posts.

Franklin Colliery.—Inside: No. 18 rock slope was driven from the Brown slope in the Baltimore vein to the Sump vein, a distance of 243 feet. The fireproofing of the rock slope barn was completed. A 4-inch drainage hole was drilled from the Skidmore to the Baltimore vein, a distance of 292 feet, to unwater a large territory.

Outside.—The concrete foundation for the new breaker was completed and a shaft 8 feet square was sunk a depth of 60 feet from the surface to the old workings in the Baltimore vein, with a view of silting the openings under the breaker foundations. Entrance of the rock slope was concreted. Built engine house for No. 9 slope and installed therein a pair of 20 by 30 engines.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 Colliery.—Rock plane air return, Red Ash to Red Ash Top Split in Conyngham shaft, 7 feet by 12 feet by 120 feet, 12 degree pitch.

At Conyngham shaft, concrete partition walls were built in shaft from Red Ash Top Split to 150 feet above Baltimore vein. New car haul in Red Ash vein installed at foot of shaft, and a rock plane 108 feet long driven as return airway, Red Ash vein.

At **Baltimore** No. 2, concreted east side foot of shaft in Red Ash vein, shaft at pump room 7 feet by 10 feet by 60 feet.

Established Mine Rescue Station and lecture room for Wilkes-Barre Division at Conyngham, equipped with Draeger helmets and pulmotors, etc.

Completed the work of concreting barns.

WILKES-BARRE ANTHRACITE COAL COMPANY

Hillman Vein Colliery.—Inside: Built new fire boss shanty and emergency hospital of fireproof material at foot of shaft, also new 16-stall fireproof stable near foot of shaft. Installed 70-horse power engine at top of No 2. East slope driven 300 feet. Baltimore slope extended 940 feet. Baltimore tunnel driven 630 feet toward Stanton vein as the second opening for Baltimore workings. Two tunnels from Hillman vein to Kidney vein, each 220 feet, connected by a gangway. New 40-horse power engine installed in Hillman slope. Hillman slope driven 450 feet. Electric triplex pump installed in Hillman slope. 40-horse power engine installed for placing of refuse, and 20-horse power engine installed in new Seven Foot slope. New Seven Foot slope driven 300 feet. One triplex pump installed in pump lift to supply washery.

Outside.—New fan installed in boiler house for forced draft on boilers. Two bore holes driven from surface to the Seven Foot vein, about 90 feet each, to be used for slushing. Washery completed and in operation.

PITTSTON COAL MINING COMPANY

Hadleigh Colliery.—Outside: A new breaker is being built to replace the old one, which was torn down.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

This Company is sinking two new shafts on the Laurel Run farm near the Parson station of the Delaware and Hudson Company. These shafts will be sunk to a depth of 1,150 feet to the Red Ash vein. The coal will be conveyed in mine cars over the old Wilkes-Barre and Eastern road bed and bridge to the Pettebone breaker. Both shafts have been sunk to the rock and concreted to surface.

The two shafts being sunk by the Delaware, Lackawanna and Western Railroad Company, at Parsons are progressing very successfully, and Pettebone No. 3 has reached a depth of 515 feet and No. 4 shaft 393 feet.

The trestle work connecting these shafts with the Pettebone breaker, on the west side of the Susquehanna river, at Dorranceton in the 8th District, is about completed.

It is the intention to stop sinking operations in the main shaft when the Cooper vein is reached. The work of development will then be proceeded with in this seam and the upper seams, and the shaft sunk later from the Bennett vein to the Red Ash vein by a bore hole connection from the Cooper to the Bennett vein.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 Colliery.—Placed 68 I beams 15 by 24 inches at head of No. 1 slope in the Red Ash vein for roof support.

Installed a triplex 12 by 12 inch single-acting electric pump in the Red Ash vein.

Conyngham.—Completed 6 by 8 inch bore hole 607 feet, from surface to Hillman 8 inch and Hillman to Baltimore 6 inch, to slush culm from Baltimore No. 5 breaker to the Conyngham workings.

Completed 8-inch cast iron pipe slush line 1,375 feet long, Baltimore No. 5 breaker to bore hole; 6-inch bore hole 274 feet long for drainage from Hillman to Baltimore vein, and concrete pump room 15 by 22 feet at foot of Conyngham shaft in Red Ash vein.

Installed electric triplex 12 by 12 inch single acting electric pump in Red Ash vein.

Installed 7 by 20 foot Jeffrey fan in Conyngham main shaft.

Baltimore No. 2.—Completed concrete pump room 20 by 24 feet at foot of Baltimore No. 2 shaft in Red Ash vein.

Installed electric triplex 12 by 12 inch single acting pump in Red Ash vein.

Completed 540 feet partition wall in shaft, 12 inches by 14 feet, from Red Ash to surface cribbing.

WILKES-BARRE ANTHRACITE COAL COMPANY

Hillman Vein Colliery.—Completed tunnel from Kidney to Abbott, and started second opening. Slope driven in Kidney to open coal in upper lifts.

In the Stanton vein a slant slope was driven across pitch from 3-W to 4-W and now is being driven down to Basin.

3-½ West gangway driven to connect Baltimore tunnel to Stanton slope.

In the Baltimore vein a second opening from Baltimore to Stanton vein was completed. Drove straight slope 700 feet to north line of the property.

Commenced driving slant slope east from Straight slope. Installed 100 H. P. 4 stage centrifugal pump in pump lift and 35 H. P. triplex pump at No. 4 west.

Outside: Installed 3 batteries of boilers, 400 H. P. each, on old foundations of boiler house and emergency pump in boiler house.

Sank two bore holes from surface to Hillman vein about 60 feet each, to be used for slushing to bottom of shaft.

to Hillman vein to conduct steam pipes. A 6-inch bore hole from the Abbott to Bowkley and a 6-inch bore hole from Bowkley to Hillman vein were drilled so as to concentrate drainage at Midvale in the Hillman vein. The placing of concrete and steel roof supports at the foot of the Red Ash was started. An electric hoist was installed at foot of slopes Nos. 26, 28 and 29. Installed an air compressor at head of No. 4 plane. A concrete overcast was constructed in Red Ash vein.

Outside: The Midvale Abbott fan house was reconstructed of reinforced concrete. One Gates crusher, two Williams pulverizers and an 18 inch by 30 inch engine were installed under the breaker to crush refuse before flushing into the mine workings. A shaft was sunk from the surface to Hillman. A concrete and terra cotta ditch was constructed from the breaker to the shaft to conduct refuse from the breaker into the mines. A 16-inch bore hole was drilled from the surface to the Hillman vein, a depth of 520 feet, and 12-inch column line installed for discharge from the new pump in the Midvale-Hillman vein. A spray system for fire protection was installed in the breaker and pump placed in the boiler house to pump water from the reservoir to head of breaker. Seven Simplex jigs were installed in the breaker. Installed a 125 K. V. A., Allis-Chalmers, 220 volt engine, which will furnish light for Dorrance, Prospect and Henry collieries, and the new office building of the Company.

Franklin Colliery.—Inside: Completed No. 30 tunnel, Baltimore to Sump vein. Started No. 14 rock plane, Red Ash to Top Red Ash; No. 15 plane, Skidmore to Baltimore vein. Completed concrete fire boss station on No. 9 slope, and one in No. 6 tunnel.

Outside: A new fireproof engine house of concrete and terra cotta tile was constructed for the Rock slope. A mess and wash-house of concrete and hollow tile was also constructed for employes. The tile shop and office were completed. Concrete foundations for installation of a new Multi-vane steel fan and engine house at the Red Ash shaft were completed. The exhaust from the breaker engine was conducted into the feed water heater in the boiler house. Driveways under breaker were paved with brick. A 20-inch bore hole for discharge from the Worthington pump has been drilled.

Warrior Run Colliery.—Inside: No. 30 rock plane was driven from Five Foot to the Hillman vein for ventilation and second opening. An engine was installed in the Mills vein to handle coal from the west side of No. 22 tunnel. A drift was driven from the surface into the "E" vein.

Outside: The "B" slope engine house, inside slope engine house and compressor house were made fireproof with metal lath and plaster. Foundation walls under the boiler house were reinforced. Two new fireproof foremen's offices were erected.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 Colliery.—Completed tunnel, through anticlinal, Baltimore to Baltimore vein; electric locomotive road through fault in Red Ash vein on shaft level; 6-inch bore hole, 267 feet deep, Hillman to Baltimore vein at Conyngham. Installed an 8-inch centrifugal 1,500 gallon Sludge Pump on surface. Washery refuse from Baltimore No. 5 to Conyngham for inside filling.

PA Mine Inspection 1914

Baltimore

Delaware Colliery.—The following tunnels were driven: No. 29, Ross to Red Ash, 1160 feet; No. 30, Red Ash through fault, 850 feet; No. 31, Ross to Checker, 330 feet; No. 32, Ross to Checker, 250 feet; No. 33, Cooper to Five foot, 320 feet. Drove No. 17 plane from Ross to Bennett, 210 feet.

Pine Ridge Colliery.—Extended Laurel Run No. 4 plane 450 feet to the surface for a manway. A second opening connecting No. 19 plane, Red Ash, with Delaware, was extended 160 feet.

The breaker was remodeled and improved.

Baltimore No. 5 Colliery.—Two tunnels, 170 feet long, were driven from the Red Ash to Top Split and one 190 feet from the Abbott to Snake Island.

The Baltimore landings at Conyngham and No. 4 shaft and the Red Ash landing at Baltimore No. 5 shaft were secured by concrete walls and steel beams.

LEHIGH VALLEY COAL COMPANY

Mineral Spring Colliery.—Two concrete fire boss stations were constructed; one in the old slope at Jones lift and the other at the foot of No. 2 shaft, Red Ash vein.

Concrete floor was laid in the carpenter shop, partitions torn out and steel columns substituted for roof support. A substantial concrete platform was constructed in front of the ware-house and minor improvements were made on the inside.

EAST BOSTON COAL COMPANY

East Boston Colliery.—Drove tunnel from Eleven Foot to Bennett, new Bennett slope.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in Kingston, June 6 and 7. The Board of Examiners was composed of John B. Corgan, Inspector; Gilbert Jones, Superintendent, Dorranceton; Thomas Thornton, Miner, Parsons; Charles Semanski, Miner, Swyersville; John J. McNelis, Clerk, Luzerne.

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

MINE FOREMEN

Patrick H. Conway, Old Forge; James Dixon, Hudson; John J. Llewellyn, Wilkes-Barre; Frank Davitt, Miners Mills; Timothy Cronin, Nathaniel Dixon, Parsons; William F. Corgan, Luzerne; John Hosey, Kingston.

ASSISTANT MINE FOREMEN

Ellsworth Austin, Joseph Loscoskie, Con Maloney, Thomas Summerson, Parsons; Thomas Bottoms, Jr., Michael J. Condon, Mark Luksic, Louis Sulzbacher, Luzerne; William Brazill, Miners Mills; Albert Joseph Bevan, Wilkes-Barre; Anthony John Mattick, Anthony M. Sudnick, Benjamin Eckertt, Hudson; Thomas Nankwell, Cecil Ninness, Plains; Martin Shields, Forty Fort.

PA Mine Inspection 1916

Baltimore

Pine Ridge Colliery.—Rock plane to Ross, back basin, 512 feet; air shaft, surface to Ross bed, 66 feet; tunnel, Cooper to 5-foot No. 14 tunnel, 140 feet; tunnel, Cooper to 5-foot, first lift, 84 feet; rock plane, Kidney to Snake Island bed, 530 feet; air shaft, surface to Snake Island bed, 60 feet; replaced cribbing in shaft with concrete; rock plane, Checker, to Five Foot bed, 350 feet.

Baltimore No. 5 Colliery.—Air shaft sunk from surface to Five Foot, 48 feet; Young's slope reopened in Hillman bed.

LEHIGH VALLEY COAL COMPANY

Mineral Spring Colliery.—Outside. Twelve old company houses were repaired and painted and one constructed.

A shaft was sunk from the surface to No. 1 drift workings, in the Skidmore vein, for conveying the hoisting rope and to facilitate ventilation of the drift workings.

A wooden engine house was built and an engine installed for hoisting on the new slope now being driven into the basin in the Skidmore vein, No. 1, drift. Addition to shaft engine house. Electric lighting plant installed.

Inside. A 16 inch by 8 inch by 18 inch pump was installed in No. 8 slope.

No. 1 Skidmore drift was reopened, retimbered and the sinking of a new slope into the basin was begun.

HADDOCK MINING COMPANY

Black Diamond Colliery.—Outside. Installed a compound Ingersoll-Rand 15 inch by 25 inch by 20 inch air compressor driven by a 300 horse power G. E. motor, inclosed in a 25 foot by 52 foot by 12 foot brick building.

Changed breaker drive from steam to one 100 horse power G. E. motor.

Inside. Installed one 1200 gallon centrifugal pump driven by a 150 H. P. motor, Bennett vein to surface.

Installed one 600 gallon centrifugal pump driven by 50 H.P. motor in Bennett vein.

Installed one 600 gallon 10 by 10 triplex Aldrich plunger pump driven by a 100 H.P. motor in Eleven Foot vein.

Installed one 600 gallon centrifugal pump driven by 75 H.P. motor in Red Ash vein.

Changed hoist on Ross slope from steam to 75 H. P. G. E. motor.

Changed hoist on Eleven Foot slope from steam to 75 H. P. G. E. motor.

CENTRAL COAL COMPANY

Wyoming Colliery.—Outside. New locomotive house, new office, new stable. An addition and plane added to breaker so that coal is now hoisted and dumped at the top instead of the bottom as previously.

Installed 40 H. P. Lidgerwood electric hoist at breaker plane. Installed one set of crushers and three sets triple deck shakers. Two new fan houses; new engine house; new wash house; locomotive road relaid with 60 pound rails.

Five Foot veins west of the squeezed area; and No. 31 tunnel from Hillman shaft level to Five Foot vein. Constructed air bridge in Five Foot vein over No. 27 slope. Installed two 8-ton electric motors in Hillman vein and one 8-ton motor in Five Foot vein. Installed electric box-car loader at foot of breaker.

HUDSON COAL COMPANY

Baltimore No. 5 Colliery.—Completed a slope from surface to Five Foot vein, 184 feet long, with a return air shaft 40 feet deep; also tunnel to Five Foot vein, 135 feet long; and two tunnels to Ross vein from No. 1 slope.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in Wilkes-Barre, April 23 and 24. The Board of Examiners was composed of Thomas J. Williams, Mine Inspector, Kingston; Samuel R. Morgan, Superintendent, Wilkes-Barre; David L. Johns and William Harris, Miners, Wilkes-Barre.

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

MINE FOREMEN

Harry Adams, Parsons; William D. Davies, Plains; John Donnelly, Oliver Harding, Charles Wilbur Wagner, Wilkes-Barre.

ASSISTANT MINE FOREMEN

David T. Davis, John Branch Davis, William Deeble, John Joseph Flanagan, Garfield George, Richard Jones, John Lowe, John Richard Edwards, Wilkes-Barre.

haulage road from No. 3 shaft to 8 west gangway. The men who had worked during the night reached the surface Friday at 5:40 A. M. At 6:00 A. M. an explosion occurred which destroyed the concrete fan drift on the surface. Fortunately there were no persons in the mine when this explosion took place. We believe the explosion occurred in the Baltimore vein; however, some are of the opinion that it occurred in the Hillman vein. It was then decided to build seals in the mine and to cover the shaft with a temporary seal. The shaft seal was completed at 2:00 A. M., May 28. On Sunday, May 29, at 1:35 A. M., a terrific explosion occurred which destroyed the shaft seal, lifting the steel tower from its foundation and in a leaning position clear of the shaft. The buildings connected with No. 3 shaft were more or less damaged, as well as the shaft concrete casing.

On May 31, the officials of the Glen Alden Coal Company with the State Mine Inspectors held a consultation at No. 3 shaft and decided to continue sealing, to isolate the workings of No. 1 Baltimore shaft and No. 1 Red Ash shaft from No. 3 shaft. These shafts are connected in several veins over a large territory. Three shifts with a large force of workmen are still engaged in building seals. Work on the returns is done with helmets. Carbon monoxide gas testers are carried on each shift.

On June 5, No. 3 shaft was again temporarily sealed. The seal has been strengthened gradually and has been completed for some time. The pressure is now up the shaft equal to 1.5 W.G.

Everything is being done to place the mine in condition to extinguish the fire which has been causing the explosions. The shaft casing which was cracked in many places allowed the gas to escape to the atmosphere. The rock filling around the shaft is being removed by a compressed air shovel and when a fracture is discovered in the shaft casing, a wood fibre quick plaster is used, which gives very good results.

No explosions have occurred since the explosion of May 29. The mine is now gradually filling with gas which is sufficiently high so that it does not support combustion. The carbon monoxide per cent still keeps high, but shows signs of gradually becoming less.

In conclusion it is my opinion that the squeeze occurred in Old 8 west gangway and finally extended to 9 west. The officials of the mine believe that the trouble was caused by the top coal or top Baltimore vein."

Owing to the conditions existing at this mine and the possibility that all danger had not been passed, the inspector was directed to make weekly inspections and report promptly to the Department. Five bodies of the victims of this disaster still remain in the mine notwithstanding the fact that the work of recovery has been carried on as continuously as possible under rather dangerous conditions ever since the accident occurred.

It is believed now that the last of the falls will soon be cleared away and such repairs made as will enable the officials of the mine to recover the bodies that have been entombed since May 26, 1927.

EXPLOSION OF GAS AT BALTIMORE NO. 5 COLLIERY HUDSON COAL COMPANY

Another catastrophe with very serious results occurred May 25, 1928, when an explosion of gas took place in the Red Ash vein of the Conyng-

ham shaft section, Baltimore No. 5 Colliery, Hudson Coal Company. Ten lives were lost in the explosion.

A report of the Commission appointed by the Secretary of Mines to investigate the cause of the explosion is printed herewith.

June 28, 1928.

Hon. W. H. Glasgow,
Secretary of Mines,
Harrisburg, Penna.

Honored Sir:

Herewith find report of the accident that happened on May 25, 1928 in the Red Ash Vein of the Conyngham Shaft Section of **Baltimore** No. 5 Colliery of the Hudson Coal Company.

The accident occurred in the section known as the second west gangway off No. 1 Slope extension in the Red Ash Vein. This section of the mine was a part of the former Hillman Shaft Colliery, an independent colliery acquired by the Hudson Coal Company a few years ago.

The Hudson Coal Company did not have mining rights in several important areas in this locality, having but a narrow strip that they could mine for a distance of about 300 feet (as shown on the accompanying print).

Owing to the failure to secure mining rights in this territory, it made it quite difficult to conduct the ventilation in the proper manner. The ventilation depended mainly on a door placed on the gangway at miner No. 5110's place and known as Mike Morga's door in the testimony.

There was also another door outside of this on the gangway in the pillar between No. 11 slope and slope airway which deflected the air current through the basin workings east of the slope, and then was brought back up the old No. 11 slope to the airway, from where it continued into the face workings along the barrier pillar where a booster fan was in operation. This second door, or the outside door, (as shown on the map) was not as important as the inside door, and if it was left open only short circuited the air from the dip workings, which, according to the testimony, was not of a gaseous nature, as gas had not been found in these workings.

The line chamber along the barrier above the airway (namely Miner No. 5104's place—George Oko) had been driven up a distance of 50 feet and had struck a roll or fault in the face; they had started to drive a cross cut in the bottom bench at the face and the coal, being of a very shaley nature, had run away up the pitch along the fault to a height of 30 or 40 feet. The place was timbered right to the face and a box brattice, or chute, had been put in to try and keep ventilation up into the cavity along the roll so as to keep it clear of gas.

After this chute had been installed it was found that there was not a sufficient amount of air to keep the cavity clear of gas, so an electric booster fan was put in to create a greater velocity and a vent tube attached to throw the air up into the cavity along the fault. This fan was put in behind a wing of brattice at the face of the airway (see sketch) and had been in use about three weeks.