

in letting down persons or material, whereby the engineer becomes accustomed to the use of his brake. However, Mr. Preedhoe, the master machinist under the Delaware, Lackawanna and Western Company, on this line, is entitled to credit for the manner in which he built his brakes, as they were about the third good brakes built in the district, and the first of this kind.

Ventilation.—The power used to cause a circulation in this mine, since the wood work was rebuilt, is a fan 12 feet in diameter, sheet iron casings, revolving disc and open periphery which exhausts from the mine about 38,000 or 40,000 cubic feet of air per minute. This air is conducted around the mine, in two different splits or currents, one east and one west; number of persons employed inside 138. There has not been much improvement made during last year, except in the building of all the stoppings, between the main air-ways and gangways with stone and mortar, which assists very much in keeping the air to the face of the mine, besides being much cheaper than the old wooden ones.

ELLIOT & Co's COLLIERY.

Hollenback Colliery.—This is a slope located on the plank road, Plainville township, and is sunk on the Hillman vein. It is a small colliery working around and stripping a fault to the dip of the old Hillman mines, besides mining a small tract of coal lying between them, and the mines of the Seneca Lake coal company, south of them.

Condition.—Nothing very important can be pointed out in the shape of improvements since my first visit.

There are but few persons employed inside. Ventilation at inlet, 14,500 cubic feet; at face of mine, 7,000; number of persons employed, 20 inside. No mechanical or artificial means used to assist ventilation.

Robert Pool, general superintendent; Thos. E. Morpeth, mining boss.

FRANKLIN COAL COMPANY'S MINES.

Brown's slope.—This slope is located a short distance south of Wilkesbarre, and is opened on the Baltimore vein.

Condition, &c.—The coal is hoisted to an old water level gangway. It is then brought to the surface through a tunnel. This mine has been idle a long time this year. The men are not allowed to travel the slope, there being a traveling road for that purpose. The mine is tolerably safe. They have some very poor roof, but it is generally well timbered. Otherwise it is about the same as when the last report was made.

Ventilation.—It is produced by having a small furnace, which moves about 13,620 cubic feet of air per minute at outlet; at face of mine, 12,350 cubic feet; number of persons employed inside, 75.

A new tunnel has been driven from the water level gangway into the Red Ash vein, from which they may be able to mine some coal in 1873.

R. R. Morgan, general superintendent; Wm. Thomas, assistant superintendent; Samuel Thomas, mining boss.

Old slope.—This slope is located a short distance east of the Brown's slope, on the same vein and nearly adjoining. There is also an underground slope to this mine. This mine is tolerably safe, there being but a small amount of gas generated, and there is a reasonably good current of fresh air circulated through the whole mine. Power used to create circulation is a fan 12 feet in diameter, which discharges about 30,000 cubic feet of air per minute. Number of persons employed inside, 93.

R. R. Morgan, general superintendent; Wm. Thomas, assistant superintendent; John D. Hughes, mining boss.

given to the officers of the company in regard to the manner in which they endeavor to protect their employees while ascending and descending this shaft. They have the required gates on the shaft head. Besides that they keep a man there from the time the first persons descend in the morning until the same are all hoisted in the evening, and not more than ten persons are ever allowed to descend or ascend at a time. Each person must procure a ticket before getting on the carriage, if there are but ten. There have been some special rules drawn up at this mine in regard to places generating explosive gases which are much needed to become general through the district in addition to these few.

George H. Parrish, general superintendent; John T. Griffith, mining superintendent; Lewis S. Jones, mining boss.

Slope No. 7.—This slope is located west and adjoining the No. 4 slope and sunk down from the old Stanton slope through the western end of the No. 4 gangway. It is at present about seven feet long and below the No. 4 workings, and is intended to connect with the Audenreid shaft for a second opening for the same. There are over 2,000 feet of rope at present on the hoisting drum.

This slope has all the appearance of becoming an extraordinary fiery place. It is being driven by contract by Messrs. John Haycoke, James H. Williams and Morgan R. Morgans. J. T. Griffith, mining superintendent.

Hollanback, No. 3, slope.—This slope is located within the south-east corner of the city limits, opened on the Hillman vein, and is 12 feet deep. This slope has not been worked for several months, except preparing to sink a new lift and further preparing a new road to take the coal from there in future to a new breaker which is being built east of the slope and near the Diamond shaft.

Condition.—This vein is usually very safe; has good bone roof and can easily be timbered, and does not generate much fire-damp. Ventilation is produced by a fan 15 feet in diameter. Amount of air at inlet, 30,000 cubic feet; at face of mines, 18,000 cubic feet per minute; number of persons employed, 60. William Dickie, mining boss.

Hollanback, No. 2, slope.—This slope is located a short distance south-east of the No. 3, but it is opened on the Baltimore vein. It has another slope inside which supplies it with coal from the lower workings.

Condition.—This mine is a safe one; has good roof generally and does not evolve any fire-damp as yet, but no telling how soon it may be met with.

Ventilation is produced by a fan 15 feet in diameter, which is located on the surface near the head of the slope, and has to draw the air through an air-way made along the main slope through the old workings, and being a large vein and an occasional crush on it, it is hard to keep in good order; however, the ventilation is better than it was prior to the fan being put up, but the mine cannot be called a well ventilated mine up to the present time. Usually it has considerable powder smoke along the faces of the chambers. The parties in charge are very sparing in driving cross-cuts from one place to another, and not enough of its air forced through the faces of the chambers, caused by too few cross-cuts and check doors on main gangway. Amount of air at out-let, 30,675 cubic feet; at face of mine, 20,716 cubic feet per minute; number of persons employed inside, 104. M. B. Williams, mining boss.

Diamond shaft.—This shaft is located a short distance east of the city limits, is 300 feet deep, and sunk into the Baltimore vein. This mine has a good roof, with the exception of a few places where the vein pitches rapidly and the coal very full of slips; but has considerable gas in some parts of the mine. It is an extensive mine, has an inside slope, sunk down west of the shaft towards the Hollanback new shaft; a new lift is being opened at the distance of 300 feet below the old gangway; besides this the slope is being continued downward. This slope has symptoms of considerable gas in the coal.

Ventilation is produced by a natural draught, assisted by the heat from steam boilers and steam exhaust from hoisting engines placed inside to hoist from inside slope. The amount of air is sufficient in this mine to do the work, but it is coursed in one single current though the whole mine, which causes a great deal of foul air and smoke to linger along the chambers, the vein being about 18 or 20 feet thick in some parts, and the men having to wheel the coal for long distances, this smoke makes it both unpleasant and unhealthy and in some instances unsafe. In other particulars this is well provided with the necessary safety arrangements, and first class doors, and as many of them, such as check doors, as can be of any advantage. The air-ways are large, and the stoppings are being built at present with stone and mortar instead of wooden ones as heretofore. Amount of air at inlet 19,360 cubic feet, at face of mine 15,000 cubic feet per minute; number of persons employed inside, 220. Leopole Stutz, mining boss.

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

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

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

Lance shaft.—This colliery is located near Plymouth borough. It was sunk last year from the Lance vein to the Bennet vein. Gangways, air-ways, &c., have been started in the Cooper bed or the top bed of the Baltimore vein. There is to be a second opening made between this and the Dodson shaft, by driving gangways from both sides to meet. The old 8 feet fan has been replaced by a 15 feet fan. They are changing some of the hoisting machinery and remodeling the breaker, and expect to be ready to ship coal in 1878.

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

Dodson shaft.—This shaft is located in Plymouth borough and is 290 feet deep. It is sunk into the Bennet vein, in which vein the work has been opened out.

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

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

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

NEW SHAFTS NOT YET COMPLETED.

Wilkes Barre Coal and Iron Company's, No. 14, shaft near Gaylord slope, Plymouth, Pa. This is a large shaft and is intended to work the Red Ash seam, and to be connected to the Nottingham shaft where the seam is being worked.

Hollenback Shaft is located within Wilkes Barre city limits, a short distance east of Market street, near the P. R. R. This shaft will penetrate the Baltimore seam, in the early part of 1874.

South Wilkes Barre Shaft.—This shaft is intended to win the coal of the Baltimore seam, which is thought to lie at a depth of about 500 or 600 feet. It is also intended to commence a second shaft at a distance of 150 or 200 feet west of the present shaft for a second opening to the former.

Audenried Shaft.—This shaft, although the sinking has been completed, will not be ready to hoist coals for some time to come, as it needs timbering and lining beside, that there is no coal breaker yet ready. This shaft is the deepest in the Wyoming valley—the Dundee not excepted—the latter being 810 feet and the former being 892 feet. The plan of the proposed breaker indicates that the coal will be hoisted over one hundred feet above the pit mouth, making a total hoist of over 1,000 feet; the hoisting to be done with first motion engines.

Riverside Coal Company's New Shaft, near Port Bowkley slope, Plainsville.—This shaft was commenced in 1872, but operations since suspended have just been again resumed. It is now in contemplation to continue sinking until it reaches the Baltimore seam, which lies at a depth of several hundred feet below the surface at this point.

Susquehanna Coal Company's Shaft, at East Nanticoke.—Shaft No. 1 is located a short distance south of the village of Nanticoke, and alongside that branch of the Susquehanna railroad connecting Nanticoke, New Port and Wilkes Barre. The said shaft is 42 feet 4 inches by 13 feet 4 inches, to be divided into suitable compartments. It is calculated that this shaft will cut the Baltimore seam at the depth of about 700 feet, and then to continue one part of said shaft still downward until the Red Ash is reached, getting a second opening for the Baltimore seam by connecting with No. 2 slope, and for the lower seam by driving up to No. 1 tunnel workings.

No. 2 Shaft.—This shaft is located a few hundred yards north of the old mill, and close to the pond connecting with the water of the Nanticoke dam. Some dredging has been done, no doubt preparatory to bringing in their canal boats to this point. It is intended that this shaft also be sunk to the Red Ash seam, but it will not require so deep a shaft at the point where No. 2 is located as it will where No. 1 is located, as some of the overlying strata at the latter place is missing at the location of the former.

Luzerne Coal and Iron Company's Oakwood Shaft.—This shaft is intended to be a second opening for the Prospect shaft, and is down at present about 300 feet; will probably reach the Baltimore seam in 400 feet more, or a total depth of 700 feet.

Northern Coal and Iron Company's New Shaft, near No. 3 Shaft.—This shaft is intended to serve for a second opening for No. 3 shaft, and may be completed during 1874.

OLD SHAFTS BEING SUNK DEEPER.

Northern Coal Company's No. 4 Shaft, Swetland.—The company is having things prepared for the purpose of sinking this shaft from their Bennet or Baltimore lower bed to the Red Ash seam, a distance probably of about 300 feet or over.

Mr. William M'Culloch, the contractor, having sunk the Wyoming shaft 216 feet in four months, also received the contract and sunk the second opening shaft to the same depth. The latter is a circular shaft, used for an upcast air-way, and also has a wire rope and bucket, with the necessary hoisting machinery to be used in case of need, as a means of escape, or second opening.

A short distance west of the air-shaft head, is erected a pair of ventilating fans, each 15 feet in diameter. These fans are similarly constructed to those at the Enterprise colliery, belonging to the same company, and described in my last report.

Lehigh and Wilkesbarre Coal Company's Audenried Shaft.—This shaft has been completed, so far as sinking, timbering and lining is concerned, and is now ready to be operated. The tunnels now being driven, and the machinery are not quite finished.

Delaware and Hudson Canal Company's No. 4 Shaft, Plymouth.—This shaft was being sunk deeper from the Bennett or lower bed of the Baltimore seam, down to the Red Ash or Buck Mountain seam, at the time of my last report, and has since been completed. Gangways are being opened out, preparatory to driving at the proper distance, to connect with a new shaft now being sunk, about 200 feet north of the former, to secure a lawful second opening.

SHAFTS NOT YET COMPLETED.

Lehigh and Wilkesbarre Coal Company's No. 14 Shaft.—This shaft is located adjacent to the Gaylord slope, Plymouth, Pa. It is progressing, having been sunk through the Cooper or upper bed of the Baltimore seam. It is intended to win the coals of the Red Ash seam in this locality.

South Wilkesbarre new Shaft, by the Lehigh and Wilkesbarre Coal Company.—This shaft has only been worked a part of the time since my last report, but has reached a depth of 418 feet. It is now thought that it will take 400 feet additional sinking to cut the Baltimore seam.

Hollenback Shaft, also owned by the Lehigh and Wilkesbarre Coal company. This shaft has penetrated the Baltimore seam at a depth of 500 feet from the surface, and was found in good condition. Although the sinking has been finished, the shaft is not quite completed for hoisting, its timbering, lining, &c., not having been finished yet. Neither has it the necessary second opening, but a shaft 12' by 20' is being sunk at a distance of 1,300 feet south-east of it, to which a communication will be made for a second opening; it will also be used as an upcast air-shaft.

The necessary fan or fans will be erected to ventilate the Hollenback and Diamond collieries; besides that, a hoist-way will be in one end of this shaft, through which the workmen will be let up and down for both the mines above mentioned. Also materials, such as timber, machinery, &c., may be handled in the same manner if need be.

Susquehanna Coal Company's Shafts, Nos. 1 and 2.—No. 1 shaft has already reached a depth of 540 feet, having passed through the upper and lower beds of the Baltimore seam. The lower of the two aforementioned beds is called, in that locality, the "forge" vein. The shaft is now being timbered, preparatory to its continuation at some future time, how soon I know not, to the lower or Red Ash seam.

The sinking has been done, for some time, by day's work, under the immediate direction and supervision of the company's mining foreman, Mr. Geo. T. Morgan.

No. 2 shaft has reached a depth of 445 feet. Having been commenced about 540 feet lower in the measures than No. 1 shaft, it has cut through

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. & 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.

MINES THAT HAVE STEAM BOILERS YET UNDER GROUND.

Hartford Colliery.—In this mine there are a few boilers that may remain there for some time, from present indications.

Hollenback, No. 2 Slope.—This mine will soon be abandoned, from exhaustion of the coal in the Baltimore seam within its territory, hence it is presumed that the few boilers remaining there will not be disturbed until the mine is finished.

INSPECTION, NUMBER OF STEAM BOILERS, &c.

In my reports for the years 1872 and 1874 I have called attention to the very unsatisfactory manner in which, it appeared to me, those boilers were being examined, and fearing as I do that at some future time, no telling how soon, a fearful catastrophe may occur, causing death and injury to many human beings; hence I wish to reiterate my former warnings of the utter inadequacy of our present system of inspection, and sincerely hope that some better system may be adopted by our law makers.

There are six hundred and sixty-four boilers in this district, used for generating steam to be used by our stationary engines. In some cases twelve and in a few as many as eighteen boilers are in place at one and the same colliery. These boilers are arranged in nests of two, three, four or six for convenience of cleaning, firing, &c., yet the whole of them are placed, if possible, within one boiler room, so as to reduce the expense of the same to the lowest possible amount.

As a matter of course, if any one of those boilers should happen to burst it is likely to either cause several others to blow up or at least to so disturb them as to cripple them, and make the whole unfit for use for some time at least. The question that will naturally be asked right here is this: What has that to do with more or other kind of inspection? And my answer to the same would be: First, that the cause of danger is very much increased by those sudden changes, and break-downs by bursting of steam boilers, or breaking of ropes or machinery, and especially so when we come to consider that lives of nearly each and every employe about the mine, wherever it may be, is depending more or less upon the safe condition of the steam boilers and the whole hoisting tackle—embracing the wire rope, engines, sheaves and safety-catches.

It is true that those employed outside, in and about the breaker, are not subjected to any serious danger from the imperfection of the hoisting tackle; but it is not so regarding to the steam boilers, when they are day after day and week after week walking by and working within a few yards of the same.

Again each person who is required to descend a slope or shaft by said machinery his life must depend directly upon the condition and careful handling of the same, at least twice each day, while being hoisted and lowered morning and evening. There are over ten thousand persons working inside the mines in this district, and we see by this that the majority of those ten thousand must take this risk twice each day, equal to twenty thousand once per day.

The matter above referred to is not all the bearing this matter has by any means. Suppose that an explosion of the steam boilers take place is it not liable to disarrange the hoisting machinery, cut away the steam supply from the ventilator, and probably be the cause of stagnation in the ventilating current, and thereby cause an explosion of gas, killing and maiming perhaps its scores of human beings? If the same should happen, after that every ordinary precaution has been taken to provide against such accidents, persons interested would undoubtedly feel more satisfied.

by Mr. Charles Parrish. The same is located a short distance south-east from the old No. 2 **Hollenback** colliery, near by the Lehigh and Susquehanna railroad, upon the Red Ash seam. They bought out Mr. Owen Hughes, who only produced coal as local sales. The new parties are now preparing to build a medium sized breaker, with a capacity of three hundred or four hundred tons per day, and to ship by rail in 1879.

Hollenback Shaft.

This shaft is located near the S. R. R., and not far from the basin of the canal, within the city limits. It was sunk by the Lehigh and Wilkes-Barre Coal Company, in 1874, to the Baltimore seam, which was reached at the depth of about five hundred feet vertical from the surface. A large bull pump is now being placed in the said shaft, in one of its six compartments, the same being forty-six feet long by twelve feet wide. The pump is to be put in two lifts. The sinking of the second opening and air shaft, located in a south-easterly direction, about thirteen hundred feet away, is now about being completed to the seam. It is intended to drive in both ways, *i. e.*, from each of the two shafts, to make the connections and complete the second opening.

A large fan, twenty-four feet diameter, of the Guibal pattern, is now being erected at the new air shaft. It is also the intention of the company's officers to ventilate the Diamond colliery from this new air shaft, there being but about two hundred feet of coal to cut through to make the connection. The shaft is to be divided into three compartments, two for air, and one for a traveling way for persons.

The depth of the air shaft will be about three hundred feet, which is twenty feet long, by twelve feet wide. It required ten or twelve thousand cubic feet of fresh air per minute to pass through the shaft to keep it clear of gas, and yet it could be ignited along the sides, at almost any point from the surface down, some jets being very strong. In 1874, when the shaft was only about fifty feet down, and when no lamps were required, an explosion occurred which proved fatal to one person, named Opie.

FANS.—There have been three new fans erected, two of which were of the Murphy ventilator pattern, and put in at the Maltby colliery, one erected at the tunnel, on the mountain side, six feet diameter, and one erected at their new shaft, the latter being eight feet diameter. These are the first of this pattern erected in this district.

GUIBAL FAN.—One fan, twenty-four feet diameter, of this pattern was erected, and put into operation on the 28th day of December, at the Nottingham colliery. This mine was formerly ventilated, in conjunction with the Washington colliery, where two fans were located, one twenty-four feet diameter, and another fifteen feet diameter. In the future, it is intended to use but one split of air from the Washington fan, the balance of the mine to be ventilated by the new fan, which is located on the Wright rock slope, on the western side of their workings. With proper

Number of Employees in the District during 1879.

	Actual miners.	Employés inside.	Employés outside.	Total.
Number of actual miners employed,	3,697			
Number of men employed, including miners,		8,886	2,322	11,208
Number of boys employed,		1,676	2,698	4,374
Total employés,		10,562	5,020	15,582

Conditions of the Collieries generally, and their Management.

The present condition of most of our mines in this district is satisfactory, although there are yet a few lagging behind for various reasons. I am sorry to say that our present system of management is blamable for most of the complaints that now exist in these mines not up to a fair standard. Mining is conducted on a different scale to what it was a dozen years ago, the mines being more difficult to handle, as they are many times more dangerous, being so much deeper and more extensive. More work is being done in a month now than was done in six months a few years ago. The present vetical depth of workings is from five hundred to nine hundred feet, when there were only a few workings below water-level say ten years ago. Then they employed fifty or one hundred hands; now many have as high as three hundred to six hundred and fifty hands employed inside the mines, exclusive of about twenty to fifty per cent employed as outside hands, employing as high as eight hundred and fifty hands at a colliery. Then no fire damp was met with in our mines, except it be a very rare case; now it is a rare thing to find a colliery without having it in large quantities. Then natural ventilation, small furnaces, steam jets, or exhausts were the principal measures employed as ventilation, with a few fans of very small dimensions; now each colliery is provided with from one to three or four fan ventilators, varying in diameters from fifteen to thirty-five feet respectively—the Prospect colliery having three fans, one twenty feet and two thirty feet each in diameter. Exeter colliery has two fans, one twenty feet and one twenty-one feet diameter. The Diamond colliery has two fans, one twenty feet and one twenty-four feet diameter, and an arrangement whereby to connect the fan erected to ventilate the Hollenback shafts, which is thirty-five feet diameter. The Empire colliery has four fans, one fifteen feet diameter at the No. 5 slope; one fifteen feet diameter at the old No. 1 slope, connected to Nos. 4 and 5 slopes; and two on the Hillman seam, one fifteen feet and one twenty feet diameter. Mill Creek colliery has two fans connected or running on the same shaft, ten feet diameter each, and one fan twenty feet diameter; the latter assists in ventilating one

am in hopes that the condition of this mine will soon be fully satisfactory from what improvements have been done and are now in progress. I should have said in addition to the erection of the said fan, that a mine locomotive engine was placed on the track inside to run between the shaft foot and the head of their new slope, a distance of over three thousand feet. Also, that the tunnel started several years ago in the No. 1 Baltimore colliery, from the Baltimore seam to the red ash seam, has been started again after having been lying idle for some time. This tunnel will open up a very large field of the red ash seam, which, if it proves good, will be very convenient to the said colliery, as they are fast working out the big vein in the old front and back slopes.

LEHIGH VALLEY COAL COMPANY.—The principal improvement made by this company in this district has been the erection of another large fan, thirty feet diameter, at the Prospect colliery, which is intended to take the place of the first one built there. The old one will still be kept in its former position, and retained for an emergency, to be used, should occasion require, in case of breakage or repairs to the new one. This is almost as good as the principle of the duplicate system adopted in machinery, and is certainly worthy of commendation wherever it may be done in the ventilation matter. We have only one or two others such in the district, Wyoming being one. The old fan was twenty feet diameter, and was also located at the head of the shaft, and built on about the same principle as the new one, except in the matter of the space, which is usually left between the tips of the vanes and the end of the casing, and which increases in depth from a given point, say about five eighths of the circumference, that is to say that the expansion takes place for about three eighths of the circumference. But in this last built fan at Prospect, the said space has been increased from a point—the distance between any two of the said vanes—from the point of cut off, or discharge, into the chimney or outlet, making the said increasing space continuous for about seven eighths the circumference, in a scroll-like form, thereby having a continuously and uninterrupted channel filled with dense air from the periphery of fan or tips of the vanes. This fan, when running forty revolutions, moves about one hundred and forty-six thousand cubic feet per minute, having a water gauge of 1.25 inches at shaft head. Depth of shaft, six hundred feet.

This company has started up the Midvale and Mineral Spring collieries during the year.

LEHIGH AND WILKES-BARRE COAL COMPANY.—The mines of the above named company, have been operated for the last several years by Messrs. Charles Parrish & Co. During the year 1879, a great deal of improvements have been made.

Hollenback Colliery.—As mentioned in my report of 1878, the second opening shaft was finished, and a fan of the Guibal pattern erected on the same. Since that time, a connection was made to said air-shaft from the Diamond colliery, and the fan put in motion to help ventilate the same. In

the meantime, the second opening from the main **Hollenback** shaft was being driven to connect the aforementioned air-shaft. The matter of driving to the dip from the air-shaft was abandoned on account of the very strong gas feeders met there within a few yards of the shaft, as well as for the safety and reliability of ventilation for the Diamond colliery. In due time, the said connection was made to the said air-shaft, and by that time another large fan of the same pattern, was erected at the head of the same shaft, being thirty-five feet diameter, and being the largest fan built in the district, and so far as I am aware, in the United States. Yet it is only small, comparing it with those erected of later years in England, some being forty-five, and one fifty feet in diameter. Yet we are inclined to look at our fans as monstrously large.

In addition to the aforesaid improvements, and the long distance of about fourteen hundred feet driven for a second opening, a very fine coal breaker has been erected at the shaft head. It is claimed that this structure has many valuable changes in its arrangements and construction, that must be great improvements in the cleaning and preparation of coal, besides great economy in not destroying so much coal in accomplishing the same, which should be appreciated as much, if not more, by the land-owner as any one. The capacity of the breaker is also to be very large, and will be ready to put into operation within a very short time.

Audenried Colliery.—A new coal breaker is now being built, to re-place the one burnt down at this mine last spring, but it will not be ready for some time to come, neither will it be needed soon, as the mine will not be prepared to produce coal for many months, if at all, during the next year.

A new air shaft is being sunk for this mine, located northwest from the main shaft, at a point near the corner of Stanton and Hazle streets. This shaft will be about six hundred feet in depth, more or less, and is expected to penetrate the seam near the first anticlinal axis, north of the one through which the Looney tunnel was driven. This being new territory, and having no convenient out-crop or other outlet, it is to be expected that large quantities of carbureted hydrogen gas will be encountered there, and very likely strong feeders cut in the sinking of the said air shaft. A large fan, thirty-five or forty feet diameter, is to be placed on this shaft. The Audenried colliery shaft was sunk on top, and right down into an anticlinal, being a very small but abrupt one, almost forming into a fold, which it did a short distance further east. The measures have been subjected to great disturbances hereabouts, being uptilted in almost every direction, and assuming nearly all degrees of pitch from zero to ninety degrees.

In a large seam of such pure coal as the Baltimore is usually found, with its great slips and other cleavages, with scarcely any bands of slate or bone, or other impurities running through, it is difficult to keep gangways, cross-cuts, or other air-passages open. Add to this the fact, that seldom do our new mines receive the attention they should in opening the same, being almost a common error. Then when it is too late, it is found neces-

about the level of the bottom part of the synclinal axis beyond the same, whereby the second opening may be continued to the point of destination in the Baltimore No. 3 slope. There is nothing else being done in the said shaft at this time.

HOLLENBACK SHAFT.—This shaft is operated by Charles Parrish & Co. A second opening to the above shaft was had by driving to the air shaft sunk on the anticlinal axis between it and the Diamond shaft workings, at a distance of about fourteen hundred feet from the main or hoisting shaft. A law suit grew out of work done in the said colliery while the second opening was going on, as follows: The company commenced to drive more places than those requisite to make or facilitate the making of a lawful second opening, such as driving a gangway and air-way to the westward, while others were being driven eastward, from which the second opening proper was to be driven to the air-shaft; and finally, after remonstrating with the company's officers, and their continuance of the same, I instituted proceedings against them, by applying for an injunction to restrain them from working more than the actual number of persons required to make or facilitate the making of the said second opening, as decided by His Honor Judge Harding, in the cases of the Commonwealth *vs.* The Seneca Lake Coal Company, and Lance or Bonnell. The said decisions had been rendered, giving a construction to that part of the law, hence I had no other course to pursue. Another case bearing also on the matter of a second opening, regarding a shaft at Nanticoke, owned by the Susquehanna Coal Company, was brought up the same time, and, after a postponement or two the cases were tried, and were decided in favor of defendants in both cases, which will be found mentioned elsewhere in this report.

No. 1 SHAFT, SUSQUEHANNA COAL COMPANY, NANTICOKE.—A second opening was secured in the upper seam operated in this shaft last year, but the one in the lower seam is not yet completed, but may be so before the time arrives to make another annual report. As mentioned above, the case of this second opening was taken into court the same time as that of the Hollenback shaft, operated by Charles Parrish & Co., and the case was decided in favor of the defendant, of which further particulars will be found under the heading of legal proceedings.

Legal Proceedings.

The only cases taken into the courts this year by the writer were two, and both regarding the matter of second openings.

The one was that against Messrs. Charles Parrish & Co., operating mines of the Lehigh and Wilkes-Barre Coal Company, and the one here referred to, called Hollenback shaft. The courts having decided the points involved in this case, as I thought, several years ago, in the case of the Commonwealth, *ex. relatione*, Thomas M. Williams, inspector of mines for the Middle district of Luzerne and Carbon counties, *vs.* Samuel Bonnell, junior, William L. Lance, senior, Walter W. Lance, and De Haven Lance.—No. 6, October term, 1871. In equity.

The Gaylord Coal Company.

This company is sinking a very large shaft near their present colliery in Plymouth. It is twelve by forty-eight feet, and is to cut all the veins from the surface to the Red-Ash. They are down now a depth of four hundred and twelve feet, and have gone through the Cooper, Bennett, and Ross veins

J. H. Swoyer.

At the Forty Fort colliery the shaft was extended down from the Bennett to the Ross vein, a distance of two hundred feet, and is now beginning to open on that vein. At the Wyoming colliery an underground slope was driven down one lift.

W. G. Payne.

At the East Boston colliery a new tunnel was driven a distance of one hundred and fifty feet, from the Bennett, to work the Cooper vein.

Plymouth Coal Company.

The Dodson shaft, of this company, was extended down a depth of one hundred and eighty feet and struck an excellent vein of coal, which is believed to be the Baltimore. This mine is about finishing to work in the Bennett vein, which was thought to be a split of the Baltimore, and the discovery of the vein just struck was a very agreeable surprise. It is sixteen feet thick, and the coal is of excellent quality. The second opening, at this writing, is down ninety feet, and will soon be sunk into the new vein, when communication will immediately be made with the workings from the shaft.

NEW FANS ERECTED DURING 1880.

The importance of furnishing the means for supplying good ventilation is more fully realized every year, and it is very gratifying to see the increased efforts made towards improvements in the construction of the ventilators.

Ten new fans have been erected in this district during the last year, and they are all giving excellent results, which amply compensate the expenditure made in their construction. Two of them are thirty-five feet in diameter, viz: The one erected at the **Hollenback** shaft by the Lehigh and Wilkes-Barre Coal Company, and the other at Mill Creek slope by the Delaware and Hudson Canal Company.

A plan of the Hollenback fan is kindly furnished for this report by Mr. Thomas R. Griffith, one of the company's mining engineers, and it gives a very full description of it, to which the reader is referred. It is erected upon a massive foundation of mason-work, and has a brick-house covered with sheet iron roof. It is running at a speed of twenty-five revolutions per minute, and is exhausting one hundred and twenty-five thousand cubic feet of air per minute with a half inch of water-gauge. Another fan of the same dimensions was previously erected upon this colliery, but was not built on so substantial a foundation. Both are kept running at low speed,

dred to one hundred and seventy-five square feet. An outlet of the size stipulated by the mine law would now be considered ridiculously small, and insufficient for the smallest and most insignificant colliery in this district. During later years the laws governing the science of mine ventilation are more generally studied by the officers and foremen of the mines, and this, accompanied by practical demonstrations of the large increase in the aggregate quantity of air obtained by having large inlets and outlets, has resulted in adopting them at nearly all the new mines lately opened.

In conducting the air-currents through the workings, the approved system of splitting them into separate streams is not done to the extent to which it could be done with good effect, only in a few of the collieries; and I am positively convinced, that the ventilation of many of the mines would be yet much improved if the air-currents were more extensively divided into separate splits than they are at present. Less number of doors would be needed, and a more reliable system of ventilation established, which would result in giving a purer and healthier atmosphere for the men to work in.

In some of the mines which, perhaps, I better not name, the mining bosses are not particular, and seem to be heedless of the importance of conducting the ventilation through the face of the chambers. The check-doors are too far apart and frequently left standing open, having no attendants to watch them and keep them properly closed. In going around these mines I have seen the faces of chambers full of powder smoke, the poisonous products of burning lamps, and other noxious gases wherein the miners had to work, while plenty of pure air was flowing outward upon the gangway and could easily be directed to sweep the face of the chambers, provided the boss had any inclination to do so. After taking pains to bring the air-currents on to the face of the gangways, it is sheer carelessness and a shameful disregard for the comfort and health of their fellow-beings who have to work all day in the chambers, to allow the air to return again without giving them the full benefit of it. Yet it is difficult to convince the bosses who are practicing this glaring neglect to see it in its proper light and adopt better measures.

The Advantages of Splitting the Air-Currents Demonstrated.

During the afternoon of May 27th, 1882, while the mines were not in operation, a series of interesting tests were made with the **Hollenback** and Diamond fans of the Lehigh and Wilkes-Barre Coal Company, the result of which, indeed, proved marvelous. They were made by W. T. Smyth, inside superintendent of Charles Parrish & Co., Joseph Weir and David Jonathan, mine bosses of the Hollenback and Diamond mines, assisted by the fire-bosses of these mines, and witnessed by the writer. The fans are both located upon a large shaft, midway between the collieries. The shaft is divided into two compartments by an air-tight wooden partition, and is virtually two separate air shafts. At the bottom of one compartment the return air-way of the Hollenback mine is connected, over which, on the top

of the shaft, a fan thirty-five feet diameter is located to ventilate a part of the Hollenback workings.

At the bottom of the other compartment the return air-way of the Diamond mine is connected, over which a fan twenty-four feet diameter is located to ventilate the Diamond workings. By a very convenient arrangement, specially provided for that purpose, either of the fans can be applied to ventilate both collieries at once. A large slide-door is adjusted in the partition separating the two shafts, which can be opened in two or three minutes by crank attachments, and thereby throw both shafts open to either fan. Both fans can also be shut off, by doors placed between them and the shaft, so, that if one should become crippled, it could be shut off, and the other applied to exhaust the air from both mines. In both these mines explosive gases are evolved in enormously large quantities, requiring large quantities of air to dilute them so as to ensure perfect safety. Owing to this the fan could not be stopped, only for short intervals; and the measurements had to be taken in the faint light of safely-lamps. The Diamond fan, twenty-five feet diameter, running at a velocity of sixty-one revolutions, raising the water-gauge to one and six tenths inches, was exhausting a volume of air equal to 165,300 cubic feet per minute; while having the Diamond mine alone to ventilate from. But when this fan was applied to ventilate both mines at once, and the other fan shut off, a velocity of sixty-five revolutions, and a water-gauge equal to one and five tenths inches exhausted 308,800 cubic feet per minute. In other words, while having only one colliery to ventilate, a pressure of 8.32 pounds per square foot propelled a current of air equal to 165,300 cubic feet per minute; while a pressure of 7.80 pounds propelled 308,800 cubic feet per minute, by having the airways of both mines free for its approach to the fan.

This was a marvelous showing, surprising all who were witnesses of the fact; and, to verify the case, similar trials were effected with the other fan. This fan, being thirty-five feet diameter, and ventilating the Hollenback mine alone, running forty-two revolutions per minute, raising the water-gauge to one and seven-tenths inches, exhausted 138,125 cubic feet per minute of air; but, when applied to ventilate both mines at once, running forty-four revolutions, and a water-gauge of one and eight tenths inches, the quantity of air exhausted was 325,000 cubic feet per minute; proving that a pressure of 8.84 lbs. per square foot would propel only 138,125 cubic feet of air through the airways of only one colliery, while a pressure of 9.36 lbs. would propel 325,000 cubic feet, by throwing the airways of both collieries open for its approach to the fan. These remarkable results were truly amazing; but, nevertheless, they were indisputable facts, and proves, beyond a doubt, the great advantage gained in the quantity of air circulated through a mine by splitting the air currents. It would have been more satisfactory if the velocities of the fans could have been rated, so as to indicate the same water-gauge at each trial; but it was very difficult to effect this in the limited time at our command, where we were threatened

by accumulating fire-damp. However, the comparative pressures were close enough to answer our purpose in proving the advantage gained by splitting the air currents and providing large air-ways. The reader will observe that, with a fixed pressure or water-gauge, more air would be circulated through the Diamond than through the Hollenback workings, showing that the resistance to its passage through the workings was greater in the latter. If both fans were set to run at a speed indicating a certain height of water-gauge, while ventilating their respective mines, the quantity of air exhausted would be no more than when only one fan was running, having both mines open to ventilate from, provided this fan was running so as to raise the same water-gauge. The difference would be in the quantity circulated through each mine, owing to the difference in the resistance met with. In the Hollenback the current would be least, while it would be most in the Diamond, having freer passage in the latter. This was conclusively proved in these tests, and valuable lessons can be learned from them, which might be serviceable to interested persons in the future.

Another suggestive fact was proven in these tests, viz: that the fan indicated nearly the same pressure on the water-gauge while running at a certain velocity, whether it had the one or the two collieries to ventilate from, but it required more steam to run it at this velocity, when both mines were connected, owing to the increased volume of air it had to throw out. In order to place the result of these tests in a clear manner for the reader, they are presented in the following tabulated form:

The Diamond fan.—Diameter, twenty-four feet.

VENTILATING THE	Revolutions of fan.	Water gauge— inches.	Quantity of air exhausted.	Quantity of air exhausted per revolution of fan.	Horse-power.
Diamond mine only, . . .	61	1.6	165,300	2,709.8	41.67
Diamond and Hollenback,	55	1.5	308,800	4,750.7	72.08

The Hollenback fan.—Diameter, thirty-five feet.

VENTILATING THE	Revolutions of fan.	Water gauge— inches.	Quantity of air exhausted.	Quantity of air exhausted per revolution of fan.	Horse-power.
Hollenback mine only,	42	1.7	138,125	8,288.6	37.00
Hollenback and Diamond,	44	1.8	325,000	7,386	92.18

At the Prospect Colliery, Lehigh Valley Coal Company, another gaseous mine where large volumes of air must be supplied in order to dilute the fire-damp to a non-explosive condition, the benefit deriving from splitting the air currents has been amply demonstrated. There are two shafts at this colliery, viz: the Prospect and Oakwood, the latter constituting the second opening to the former, and both are used to hoist coal. They are

Owing to the general destruction, enormous expense, and great loss caused by flooding mines with water, it should be the last method adopted for extinguishing fires. And even by flooding mines, there are many instances where, upon taking the water out and admitting air, the fire again ignited and burned as briskly as ever. This occurs where fires are located upon elevated grounds, having no escape for the air and gases, which as the water rises, are compressed and pent up, so that the water cannot approach the fire nor cool the surrounding strata; consequently, this space is converted into a magazine of heat, retaining a combustible temperature; and upon taking out the water and admitting fresh air, the fire instantly rekindles. This has repeatedly happened in all countries where fires occur in coal mines; therefore, in cases where a mine must be flooded, and the locality of the fire being such as to have no passages for the escape of the pent air and gases, the precaution of providing such should invariably be taken before the water is admitted. As stated before, many instances could be cited where, after flooding mines, and upon taking the water out again, the fires were found burning, and an escape for the pent gases had to be afterwards made before the fires could be effectually extinguished.

RECORD OF COLLIERY IMPROVEMENTS FOR 1882.

The Lehigh Valley Coal Company.

This company bought the Maltby colliery from Mr. C. S. Maltby, and took possession June 14, 1882. Prior to this, the sand and surface-water had broken into the No. 1 shaft, filling it up to the upper seam, causing it to be of no further practical value; and the coal seam, then opened into, in the No. 2 shaft, was exhausted. This company concluded to abandon all this, and erect substantial dams around the No. 2 shaft, and sink it to the next lower vein. By erecting these dams the large expense of pumping the water of the No. 1 shaft and all its adjoining workings was obviated. A plan of the dams was furnished by the mining boss, Mr. Thomas Lawther, which is found in this report. The perpendicular height of water which has to be sustained is about eighty feet. The No. 2 shaft is now extended to the eleven-foot seam, where they are working to effect a second opening.

Lehigh and Wilkes-Barre Coal Company.

In the Hollenback colliery a tunnel was driven from the Baltimore to the Hillman seam, where they found good coal, seven feet thick. The tunnel was 8x16 feet area, on a grade of 18 degrees, and is 700 feet long. They are now working to effect a second opening by connecting with the main shaft. They also sank a slope from the west gangway on the shaft level to the bottom of the synclinal, a length of 700 feet, on a grade of 10 degrees, which opens room for a convenient range of chambers.

At the Empire shaft a tunnel was driven on the level of No. 5 slope, from the Baltimore to the Red Ash seam, which was 7x12 feet area, and

end of Wilkes-Barre, within the limits of the city. The size of the hoisting shaft is 16'×11', and the area of the air-shaft is ninety-one square feet. Both are sunk to the three-foot seam, a depth of two hundred and eighty-two feet. The breaker was completed and started to work on the 25th of September, 1883. Both shafts are connected to the workings, and the ventilation is produced by a Guibal fan, sixteen feet diameter. They are working both the three-foot and Hillman seams, and both are emitting carbureted hydrogen gas very freely, which caused considerable trouble while sinking the shafts.

The Lehigh Valley Coal Company.

The Dorrance shaft is completed to the Hillman seam, a depth of six hundred and two feet. Two cages are already in operation to hoist from this seam, and the second opening is now being driven to connect with the air-shaft. The air-shaft is sunk to the same seam, and reached it at a depth of three hundred and thirty-four feet. Its size is twenty-five by ten feet. A new thirty-five feet Guibal fan is being erected at the top of the hoisting-shaft, a part of which shaft is to be used as an upcast. The breaker is in course of construction, and will be ready to work in a few months. It is evident from the extensive preparations that this is intended to be a large producing colliery, and will be actively at work during the latter part of 1884.

The Maltby shaft was sunk to the eleven-foot seam, an extension of one hundred and twenty feet, and its depth at present is two hundred and eighty-seven feet. A second opening to this seam was made by driving a passage out to the outcrop of the vein. A slope is being driven down the dip of the vein, which had reached a distance of five hundred feet at the close of the year. They intend to drive a tunnel from the bottom of this slope to the six-foot vein, to work that seam under the flats, beyond the point where the old river-wash exists. The dams erected around the shaft in the six-foot seam, described in last year's report, hold the water perfectly well, and no trouble from that source is apprehended.

The Lehigh and Wilkes-Barre Coal Company.

The collieries of this company have been operated under contract by Charles Parrish and Company for a number of years, but they all passed into the management of the Lehigh and Wilkes-Barre Coal Company on the first day of August, 1883. This change was regretted by a large number of people who were employed at various branches of work in those mines, and the excellent condition in which the mines were left speaks well of Mr. Parrish's management.

At the **Hollenback** mine, a tunnel was driven through the anticlinal existing between this and the Diamond mines. This tunnel was made for the purpose of leaving the water run from the Diamond into the Hollenback mine. The lowest portion of the Diamond workings was filled with water to extinguish a fire, as reported in my last report, and it was tapped

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

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

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

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

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

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

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

The Susquehanna Coal Company.

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

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

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

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-

Handwritten mark

Mine Improvements during 1888.

During this year the spirit of improvement was active, and a number of important movements were made towards improving the condition and the producing capacity of the collieries. Among the number the following were perhaps the most important:

Lehigh and Wilkes-Barre Coal Company.

At the **Hollenback** colliery movements are in progress towards working the Red Ash seam. A new air shaft is being sunk from the surface and has, at this writing, passed below the Baltimore seam. Its size is 12x37 feet, and it is expected to cut the Red Ash seam at a depth of about 650 feet. Preparations are in progress also to have the main shaft extended from the Baltimore seam, where it now is, to the Red Ash.

At the Stanton colliery a new fan was erected on the air shaft to duplicate their other thirty-five foot fan. The mine gives off such an enormous quantity of fire-damp that it was very hazardous to suspend the course of the air currents for any length of time. To avoid this a new thirty-five foot fan was erected adjacent to the other, and doors were so adjusted that, in case one fan stops running, the other can be operated in a few minutes to ventilate the mine. This mine now has one pair of seventeen-foot double fans and two thirty-five feet fans for the purpose of producing ventilation.

At the South Wilkes-Barre shafts, Nos 3 and 5, extensive preparations are in progress for the completion of the colliery. The main shaft is 1,064 feet deep to the Baltimore seam, where the coal was found in its usual thickness of sixteen feet and of excellent quality. The shaft is divided into four hoisting compartments and an up-cast air shaft. This work is now completed, and a large force is at work erecting foundations for the massive hoisting engines which are to be placed thereon.

The other shaft (No. 3) was sunk to the Baltimore seam also, and cut the latter at a depth of 250 feet below the old terminal or Hillman seam. One of these shafts will constitute a second opening to the other, and coal will be mined from both. A new pair of first-motion hoisting engines were placed on this shaft, and a solid wall of mason work was erected to support the earth from the rock to a point several feet above the surface around the shaft, greatly enhancing its safety. It is expected that a considerable amount of coal will be mined during 1889 from this colliery, which will be shipped from the Diamond breaker.

At the Sugar Notch shaft, No. 9, a new twenty-four foot fan was erected chiefly to ventilate the workings of two seams opened at the bottom of the shaft; *i. e.*, splits of the Baltimore seam. This makes the third fan used in ventilating this colliery, which is quite effective.

At Wanamie the water was pumped out of the old No. 19 slope,

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

falls off lessens its strength to withstand the pressure. Finally it gives way so that the weight of the unyielding overlying strata is thrown on the adjacent pillars. This additional weight proving too much, they again begin to crumble and give way. Thus the squeezing and crushing continues and spreads from pillar to pillar until a point is encountered of sufficient strength to withstand the pressure and cause the overlying rocks to break when the workings within the radius of the "squeeze" collapse and cave in. This is about the history of the origin, progress and end of nearly all caves which occur in coal mines.

Occurrences of this nature invariably bring on new perils. During the progress of a "squeeze" it is impossible to divine when, or at what point, the air may be converted into an explosive condition by the presence of fire-damp.

The fire-damp occluded in the pillars is released by their crushing. Crevices may be opened in the top rocks into a gaseous seam above and the pent-up gas released from there. Wherever it issues from, we know that it is liable to appear in any mine and convert the air into an explosive state at any moment during the progress of a squeeze, and immediately after the occurrence of a cave-in. Therefore, it should make no difference whether fire-damp has ever been seen in the mine or not, no one should take, or be permitted to take, or carry a naked light into a region affected by a squeeze; nor into the air-currents returning from such regions, lest explosive gas may unexpectedly appear and be ignited, causing an explosion.

Before permitting naked lights to be used at any point between a region that is squeezing and the outlet, the affected workings should be thoroughly examined, tested with a safety lamp and ascertained to be safe. And during the whole time that naked lights would be permitted in the return air-currents, there should be a constant watch kept in the vicinity of the squeeze, prepared to ensure safety by apprising the workmen of any approaching danger.

This simple precaution is now necessary in every case where a mine is affected by a squeeze in this district, and in no case should it be neglected.

*Cave in the **Hollenback** Colliery.*

At about 12 o'clock noon on the 12th day of June, a section of the workings east of the No. 2 slope in the Baltimore seam caved in, breaking clear up to the surface, a thickness of strata of about 700'. It broke down in about six days after the squeeze was first noticed.

The pillars were large and the breasts were narrow, but the seam is sixteen feet thick and the coal in some of the benches was very free and fractured readily under an excess of pressure. At about mid-day on the 10th, two days before it collapsed, fire-damp appeared in the air-currents in such quantities as to make them explosive, and though the air-currents circulating through this section amounted to more than

100,000 cubic feet per minute, the quantity of gas issuing was sufficient to make the whole current explosive, and it was maintained in that condition during a period of from three to four weeks. During this time the mine was kept idle, and no one was permitted to enter with any light but that of a safety lamp.

Cave at the Hillman Vein Colliery.

In this mine the Hillman seam is worked right over the section which caved in the **Hollenback** mine. The distance between the Baltimore and Hillman seam is about 300'. At about 8 o'clock A. M., June 12, the officials of the colliery having already been apprised of the existence of a "squeeze" in Hollenback mine beneath them, were on the alert, watching for its effects, they noticed the pillars suddenly beginning to crack and crumble and at once sent the workingmen out. At about 12 o'clock it fell in, closing the most of their workings. A large quantity of explosive gas simultaneously appeared, and mixed with the air, charging it so that the whole became explosive and continued so for several days. Explosive gases escaped from crevices on the surface at several points and caused some alarm among the inhabitants lest accumulations would take place in the cellars of their houses, but care was taken to caution them against taking lights into the cellars until it was ascertained that no danger existed.

No naked lights were used in this mine until the workings and airways were re-opened and the ventilation restored so that no dangerous bodies of fire-damp existed therein.

Cave at the Boston Mine.

In the month of April a small section of the workings of this mine in both the Bennett and Cooper seams caved very suddenly at a point where the pillars were large and regular in thickness. It did not damage the mine-workings much except that it permitted a large volume of water to flow in and flood a large portion of the workings. The surface over this point consisted of a depth of coarse, sandy gravel, but no body of water was known to exist there. However, the large volume which found its way into the mine through this cave, proved that an accumulation existed somewhere beneath the gravel, and it is supposed that the hydrostatic pressure developed by this water was the originator of the squeeze and the cave-in. No fire-damp appeared in this case.

Cave at Nos. 2, 3 and 5 Collieries at Plymouth.

These three mines worked different seams, over or above each other. In No. 5 colliery, the Bennett and Cooper seams were mined. In No. 2, the Five-foot and Hillman were mined, and in the No. 3 the Five-foot and Cooper seams were mined. The three were old collieries having very extensive workings, all nearly exhausted of coal. For a few days

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-

combustible and fire is not likely to occur. This was a desirable improvement, and has added much to the security of the property in that part of the mine.

Lehigh Valley Coal Company.

At the Franklin colliery a new breaker which had been in course of erection during the last year, has been completed and was started to prepare coal for market in June, 1890. It is located at a more convenient point to the slopes than the old one, and is a much better structure, being equipped with what is now considered the best machinery for preparing and cleaning the coal. The old one was abandoned, having given good service for a long period, but it was now in such a dilapidated state that it could not be further repaired.

The air shaft mentioned in my last report has been completed, having penetrated the Red Ash seam at a depth of 425 feet, and is now connected to make a second opening for the Rock Slope workings. A new fan, 20 feet in diameter, was also erected on this shaft which is furnishing a ventilation of 65,000 cubic feet of air per minute when running 50 revolutions per minute. This is considered ample for the present.

COLLIERIES DAMAGED BY A CYCLONE.

A terrible cyclone passed over the city of Wilkes-Barre, at about 5.45 p. m., August 19, 1890, and wrecked two hundred buildings and two coal breakers. Seventeen persons were killed or died in a short time from injuries received, and two hundred other persons were more less injured. The entire loss was estimated to be about half a million dollars.

Two breakers were in the path of the cyclone and were badly damaged, but, fortunately, although several persons were imperilled, all escaped without injury. The **Hollenback** breaker was struck and the tower over the shaft was driven fully six feet out of line. The roof was taken off the fan engine; all the breaker windows were broken, and the building was twisted out of place at several points. They had considerable trouble to bring the workmen up from the Red Ash seam as they had to be hoisted up the shaft as far as the Baltimore seam. The second opening to the former was not driven yet. And, notwithstanding they were in a perilous situation, they were brought out safely and without injury.

The Hillman Vein Colliery fared worse than the Hollenback. The tower supporting the sheaves or pulleys over the shaft was blown to the ground, leaving the cages fall down the shaft. The steam pipes of the fan were broken, causing the fan to stop, and, to make matters still worse, it happened that a fire was burning in one of the most gaseous gangways of the mine at the time. Although the fan had stopped, efforts were made to extinguish the fire until the danger became too

It needs no more than a statement of the facts to show that Fire-boss Allen made a serious and inexcusable blunder, and thereby caused the death of himself and twenty-five of his companions. He had made another error a few months before which proved his unfitness for the important position he held, and the officials were informed of that, because the company paid a sum of money to settle the claims of the man who was burned through that act, and the writer told the superintendent that it was evident that Allen lacked the experience and knowledge necessary to fill his position properly. I have learned also that he was promoted to this position and held there against the will and judgment of the mine foreman.

I noticed several men who were not employes of the company helping, willingly and bravely, to carry the bodies out. Among them were two or three old officials of the company who had shortly before resigned their positions.

It is unusual to suspend efforts to rescue or recover the bodies of persons from mines after accidents, and it was exceedingly humiliating and disgraceful for a company which employs thousands of men and dozens of officials to depend on a few persons, and have to suspend operations for a whole night because these few failed from fatigue. There should have been men to relieve them, and the work should have been continued incessantly until all that remained of the lost had been restored to their friends. Such a state of things was unheard of in this region prior to this time, and let us trust that it will never occur again. The names of the victims of this disaster may be seen in the list of fatal accidents.

DISASTER AT THE **HOLLENBACK** COLLIERY.

As explained in another part of this report, the breaker of this colliery was damaged by a cyclone on the 19th day of August, 1890, and the colliery had not worked any from that date until this disaster occurred. They were making preparations to begin work on Monday, September 22, and on Saturday, the 20th, Larry Casey and James Sullivan, two young men, were sent to bail water at the bottom of the No. 2 underground slope. The water had to be hoisted to the head of the slope, and the hoisting engine is located on the surface. Edward Button was sent in to be headman of the slope. The No. 2 slope is at a distance of 2,000 feet east of the shaft on a north dip of about fifteen degrees. It had thirteen lifts, seven on the west and six on the east. These men went to work at 7 o'clock. It appears that no examination had been made of the place or of any of the workings of this slope since the cyclone. The fire-bosses and boss had been employed at the colliery all the time, and one examination of the other parts of the mine had been made. It has invariably been an exceedingly gaseous mine, and it has never been considered safe to enter any part of it at any time

without first making an examination with a safety-lamp. On this morning the two water bailers were permitted to go to their work at the bottom of the slope without examination, and they worked there safely until 9 o'clock. At this time James Boswell, fire-boss, and Anthony Jennings, who was on this day starting to work as fire-boss, went in together, carrying naked lights together with their safety-lamps. They passed Charles Wiggins, who had been repairing the electric signals a short distance out from the head of the slope, passed Buttson again at the slope. The latter watched them going down until they turned into the first lift west, and in a few seconds after a terrific explosion occurred. Buttson was severely injured and rendered unconscious and did not know what followed.

Mr. Joseph Ford, the mine foreman, was on the surface and saw a dense volume of dust blown up from the shaft. He immediately ran up to the head of the Hillman vein slope and spoke down by telephone, and, finding nothing wrong there, he returned and descended the shaft and on his way to the No. 2 slope he met Wiggins feeling his way out in the dark, the explosion having extinguished his light. Mr. Ford conducted him back to the shaft and after sending him up, he went in again and at the head of the slope found Buttson painfully injured and unable to move. Ford, finding that he could not take him out without help, had to leave him there while he went outside again to call assistance from the Hillman slope. Then a party of several men went in and brought Buttson out. They passed the bodies of the two fire-bosses, who had been blown from the first lift over the apex of the slope and out a distance of 150 feet farther, and were driven under the end of a car. Of course they were instantly killed, the rescuers were unable to bring any of these bodies out when they brought Buttson, and believing that the explosion had left something on fire down the slope, they concluded to wait awhile lest another explosion would take place.

The writer was informed of the explosion shortly after 12 o'clock and immediately repaired to the mine which was not far from his residence.

Three hours had now elapsed since the explosion occurred, and it was not probable that any of the men could have lived this length of time in the after-damp of such an awful explosion.

Experienced men know that it is safer practice to enter a mine immediately after an explosion than in an hour or two after. The bosses as a rule make haste to go in and ascertain whether or not the explosion has set anything on fire and when he finds that no fire exists, he knows that the gases accumulating in consequence of the derangement of the airways cannot be exploded, unless ignited by the lamps of the men, and this can be guarded against. This opportunity was lost in this case. At 12 o'clock, when the writer was informed of the accident, no effort had been made to go down the slope farther than to rescue Buttson and bring him out. At about 1 o'clock the officials of the mine, led by the superintendents, descended the shaft and went

in and brought the bodies of the two fire-bosses out. Although there were about two dozen safety-lamps at the mine, the writer failed to find one that would be safe to carry into gas. The officials had nothing but an idle mine to take care of for a month and yet the lamps had been so neglected that only two or three were fit to use. Before entering to look for the bodies of Sullivan and Casey, new lamps and a number of new gauzes had to be obtained. At about 5 o'clock the party entered again and by this time the after-damp had cleared so as to enable them to go down the slope and recover the bodies of the missing young men. They were found lying on their faces one a few feet in advance of the other, near the fourth lift. They evidently had made an effort to walk up the slope and fell from the asphyxiating effects of the after-damp. In this struggle for life they had walked up a distance of about 800 feet. From this point up, the slope track was covered with a thickness of *débris* consisting of props, rocks and materials blown from the several lifts and stoppings. All the doors and stoppings were destroyed. Double timber was blown out and large falls of coal and roof was brought down. The workings of the three upper lifts west of slope were entirely transformed into a complete wreck, showing that the explosions had been unusually powerful and destructive.

Mr. Boswell's staff was found at the branch of the first lift. His body and that of Mr. Jennings were found 150 feet over the apex of the slope, having been blown a distance of about 500 feet. Evidently they entered the first lift with their naked lamps trusting that the air-current was pursuing its proper course and that no fire-damp could exist out on the gangway at any distance from the faces of the workings, and they walked into an explosive air unexpectedly at an unguarded moment.

When we consider that this part of the mine had not been examined for over a month and that it was the part that exuded the largest volume of gas, it is difficult to conceive any reason for omitting the usual common precaution of using only safety lamps until it was ascertained that the air-currents were circulating properly and that no accumulation of fire-damp existed. But the fact that they did this, and that they and the mine foreman had permitted the water bailers to go down that slope on this and on the previous morning without previous examination or knowledge of the condition of these workings, showed clearly that neither thought of nor realized the probability of something having occurred to obstruct or divert the course of the air currents during the cessation of work at the mine, and that a large body of fire-damp might have accumulated.

If all the mine officials were as inconsiderate as these were we would have disastrous explosions weekly, but fortunately such deficiency is seldom disclosed in the practice of experienced mine foremen.

The foreman of this gaseous mine was comparatively a stranger to this mine and to this region. Mr. Boswell had been employed in this

colliery for years as a mechanic, putting in water pipe, keeping pumps in repair, and splicing wire ropes, etc. For this work he was a very excellent man, he was a valuable and reliable workmen and had opportunity to see fire-damp in the safety lamp frequently but had not been entrusted to fill the important duties of a fire-boss till recently. His mind was trained for other work, and I am reliably informed that he, himself did not feel that he was fit, but his work on pipe, etc., had lessened, owing to the partial exhaustion of the mine, and he was directed to do the duties of fire-boss in the early morning and of a mechanic the remaining portion of the day to save employing another man. An economy akin to that of a miner, who, on finding his keg full of powder dampened, took it home and placed it in the stove oven to dry. It exploded and injured his family and destroyed his property. Such I regret to state was the nature and consequences of much of the economical practice introduced in the management of the collieries of this company during the year 1890.

DISASTER AT THE NO. 4 SLOPE, SUSQUEHANNA COAL COMPANY.

This colliery is located at Nanticoke and is operated by a slope. At about 9 o'clock a. m., April 2, an explosion of fire-damp occurred causing the death of William A. James, James Adams, John Gubovage, Morgan Price and Joseph Beranski, and severely injuring John J. Griffiths, John Ruddick, George Elmy and Michael Barinski.

Robert Pratt, the fire boss who examined that section on the morning of the explosion, reported that a body of gas was found in the breast where William A. James was going to work and told James of it, and told him, also, to stay on the gangway until the bratticemen should go in and extend the brattice to clear the gas. He also reported the presence of the gas to Morgan Price who worked the next breast on the return side, and told him not to go up his breast with naked light and offered him a safety lamp. Price refused to take the safety lamp, saying that he was not going to work there, that the breast was finished, and that he was going to work in another place. Pratt gave safety lamps to each of the miners working in the other three breasts, viz: William A. James, James Adams and John Ruddick.

The four breasts in which these four miners were working were driven parallel up a pitch of about 35 degrees and were all approaching a roll where the coal turned right up to a pitch of about 50 degrees. Price's breast was up to the roll and was stopped, but he had a few car loads of loose coal in and along the chute, and he and his laborer went to work loading this out.

There were two headings (cross cuts) open between James and Price's breasts, and the air-current passed first up James' breast, then through Price's, Adams' and Ruddick's.

1843, the completion of the Lehigh and Susquehanna railroad from Wilkesbarre to White Haven opened a new avenue for taking the Wyoming Valley coal to market. The application of steam for propelling boats and the use of anthracite coal in the manufacture of iron, caused a rapid increase in the demand for anthracite. From this time on, the history of the coal trade of this region is familiar, and the great increase of production is seen at a glance in the published tables for each year.

The stereotyped tables of production in the commencement should be revised in justice to the history of this region, which was on record as a producer of coal several years earlier than these tables represent.

RECORD OF IMPROVEMENTS DURING 1891.

Important improvements were made at a number of the collieries during 1891 which are described in detail in the following:

Improvements by the Lehigh and Wilkesbarre Coal Company.

As stated in my report for 1890, the collieries of this company had been allowed to deteriorate, making it necessary that important improvements should be instituted in order to restore their former good condition and to maintain their capacity for producing coal. The management was again entirely changed, and the necessary steps to effect improvements were at once taken, and it gives pleasure to state that the collieries have been brought into good condition.

At the **Hollenback** colliery the new air shaft 12' × 37' area and 856' deep was completed and this was connected to the main shaft by outlets driven a distance of 1,050'. This had to be driven part of distance in rock. A tunnel having an area of 12' × 7' was driven from the level gangway to the top split of Red Ash and to the Ross seams, a distance of 603'.

The main shaft having been sunk from the Baltimore to the Red Ash was largely retimbered and a new traveling way was made. The turn-outs at the foot were also completed.

New drums $9\frac{1}{2}' \times 13\frac{1}{2}'$ were placed at the hoisting engines in lieu of the old ones which were too small to carry the additional length of rope; and a new fan 35' × 12', having an engine 18' × 48', is in progress of construction at the new air-shaft to ventilate the newly opened seams. The breaker was also remodeled and equipped with new elevators, rollers and conveyors.

A hole 8" diameter and 458' was bored for the purpose of filling the passages along the eastern boundary pillar with culm. It became necessary to do this because the adjacent mine was being filled with water to extinguish a fire, and the pillar had shown unmistakable signs of weakness under the pressure, and the culm was put in to add strength to it.

proved that a volume of 1,800 cubic feet of carbonic acid gas, per minute was generated, and that there must be a brisk fire existing somewhere in the mine to produce such a large quantity. Shortly after the temperature rose so as to verify our apprehensions. At the South Wilkes-Barre colliery, and also at the Nanticoke collieries, the instrument is used to ascertain the percentage of fire-damp in the air of each split, and it enables them to regulate the air so that the gas can be diluted evenly in the different air currents.

AN AUTOMATIC CAR TRANSFER SYSTEM.

A drawing is here presented showing an automatic system for transferring cars from the shaft-head to the breaker dump at the Baltimore No. 2 shaft of the Delaware and Hudson Canal Company. It has been in operation for about one year, and works satisfactorily. This was designed by Mr. C. H. Scharar, chief engineer of the coal department, who kindly consented to have it appear in this report. It explains itself, and can be easily understood from the drawing.

THREE NEW COAL BREAKERS.

Three new breakers were erected in this district during the year 1892. The first one completed was that of the Susquehanna Coal Company, a short distance north of their No. 1 shaft at Nanticoke. It is to prepare the coal previously shipped through the old No. 2 breaker, now abandoned, and is known as the No. 7 breaker.

The second was the No. 5 breaker at the South Wilkes-Barre colliery of the Lehigh and Wilkes-Barre Coal Company. This breaker was completed in the latter part of September, and has been operating successfully since.

The third is the No. 4 breaker of the Kingston Coal Company, erected to replace and do the work of the two breakers burned May 5, 1891. This new breaker started to prepare coal for the market in December, 1892.

The three breakers are large structures, equipped with the latest and most efficient machinery, and on the most approved plans for the purpose of cleaning and preparing a large production of coal. They are safe for the employes, and heated comfortably by steam. The stairs and machinery are well guarded, so that no one can be hurt inadvertently.

RECORD OF COLLIERY IMPROVEMENTS DURING 1892.

The spirit of improvement was active during the year 1892 in this district, and a detailed account of its work is shown in the following:

Improvements by the Lehigh and Wilkes-Barre Coal Company.

At the **Hollenback** No. 2 colliery a new fan was erected to ventilate the new Red Ash seam workings. It is 35 feet diameter, and in run-

ning 45 revolutions per minute produces a ventilating pressure of 10.4 pounds per square foot, and is exhausting 250,000 cubic feet of air per minute. A self-recording pressure meter and automatic alarm is also attached to it. The fan engine is 16×48 inches direct acting. A tunnel was driven from the Hillman to the Kidney seam; also a second opening for the same. The main tunnel is 7×12 feet and 300 feet in length; and the second opening for the ventilation is 7×12 feet area and 90 feet in length. This is the first opening to the "Kidney seam," and it will enable them to work a large area of it.

Second openings were driven through the rock from the Red Ash, one to the top split and the other to the Ross seam. The first is 43 feet in length and the second 80 feet, and each has an area of 7×12 feet, which make roomy return airways. Another tunnel is being driven south from the West Red Ash gangway to cut the Diamond basin, which will open an extensive field of coal.

At the Empire colliery three new rock tunnels were driven, the first through a fault in the Red Ash seam a distance of 180 feet, the second from the top split of Red Ash to the Ross seam, a distance of 60 feet, and the third from the Red Ash to the top split, a distance of 130 feet. Each of these have an area of 7×12 feet.

At the South Wilkes-Barre colliery besides the new breaker already noticed, a new 35-foot Guibal fan has been erected which, running at a speed of 45 revolutions per minute, exhausts 240,000 cubic feet of air under a water gauge pressure of 1.9 inches. This fan was erected to supersede the old Capell fan, which was not of sufficient capacity for this gaseous mine. The new fan is supplied with a self recording pressure meter and automatic alarm.

Three new tunnels were driven through the rock, one from the Hillman to the Kidney seam in the No. 3 shaft, a length of 228 feet, and an area of 7×12 feet. This will enable them to work the Kidney seam, which is 4 feet 3 inches in thickness. The second was driven from the Baltimore to the next seam above, called there the "Stanton" seam. This tunnel is 300 feet long and 8×12 feet area. A second opening was driven for ventilation a distance of 84 feet, having an area of 9×12 feet.

An underground slope was sunk in the Hillman seam from the east gangway of the No. 3 shaft. It reached the basin at a length of 425 feet, which opens a productive lift of coal.

At the Stanton colliery a new fan has been erected to ventilate the old Hillman seam workings near the main shaft. Fire-damp would occasionally accumulate in these workings, making it dangerous to pass through the main shaft, and the erection of this fan has removed every vestige of the danger. It is a Sturdevant fan, 8 feet diameter, running 80 revolutions, and exhausting 3,000 cubic feet of air per minute—run by a horizontal direct-acting engine 10×14 inches.

A new gravity plane 1,000 feet long was made in the Hillman seam to work the coal to the rise. It has an average grade of 10 degrees.

of compressed air or electricity will in time banish the steam pipes from the mines. The Kingston Coal Company, at their Edwardsville collieries, the Plymouth Coal Company at their Dodson colliery, and the Lehigh and Wilkes-Barre at their Nottingham colliery, are running their underground pumps with compressed air, and the Delaware, Lackawanna and Western Railroad Company at their Woodward colliery, run the underground pump with electricity. Thus, it will be seen that the condition of the underground workings of the mines is progressing continually toward a safer and better condition of things.

RECORD OF IMPROVEMENTS FOR 1893.

Some important improvements were made at several of the collieries during the year 1893, which are described in detail in the following statement:

Improvements by the Lehigh and Wilkes-Barre Coal Company.

In the **Hollenback** No. 2 colliery, a tunnel was driven through a fault in the red ash seam. It is 200 feet long and 7x12 feet in size. At the No. 5 South Wilkes-Barre colliery a tunnel was driven from the Baltimore to what is designated as the Stanton seam. It is a horizontal tunnel, 700 feet long and 7x14 feet area. A second opening was driven for this seam also, rising on a grade of 7 degrees. It cut the seam at a length of 500 feet and it has a sectional area of 165 feet.

Another tunnel was driven from the Kidney to the Hillman seam, a length of 475 feet, and 7x12 feet area. These tunnels have opened a large area of coal for this colliery. The sinking of a new air shaft for this mine was completed to a depth of 90 feet by the end of the year. Its size is 12x37 feet and was sunk for the sole purpose of increasing their already large volume of ventilation.

At the Maxwell colliery, preparations are made to have work ready by the time the new shaft is sunk to the Baltimore seam. This work is done from the lower lifts in the Jersey No. 8 colliery. Tunnels were driven from the two lower lifts of the Baltimore seam to the red ash. Each of these tunnels will open the Ross and the red ash seams, so that when the shaft is completed to the Baltimore seam enough workings will be ready opened to furnish a considerable quantity of coal.

The sinking of the Maxwell shaft was commenced in the year 1892, and at the close of that year it was down to a depth of 134 feet. During the year 1893 the sinking was suspended for several months, but at the close of the year it was down a depth of 400 feet. Its size is 12x54 feet.

A new slope was sunk a short distance west of the shaft from the surface to open work on the Hillman seam. Its size is 6½x12 feet,

Lehigh and Wilkes-Barre Coal Company.

Hellenback No. 2 Colliery—

Return airway in rock from the Diamond basin; 12x8x400 feet.

No. 2 Red Ash slope being sunk in coal in the bottom split vein.

Annex on east and west side of breaker for the preparation of stove and chestnut coal.

South Wilkes-Barre No. 5 Colliery—

No. 1 airshaft has reached the vein; 37x12x650 feet.

Tunnel has been driven from Stanton to Hillman vein.

Rock slope finished from Hillman to Baltimore veins and second openings in rock finished to same.

New fan, 35 feet diameter, has been erected at No. 5 shaft.

Erected 250 horse power Stirling boilers.

Erected 500 horse power National boilers.

Erected 470 feet of 8-inch steam line to fans.

Sugar Notch No. 9 Colliery—

Main airway enlarged to 90 square feet; 1,050 feet in length.

Ross slope extended in rock 120 yards.

Tunnel, Twin to Ross veins.

Lance No. 11 Colliery—

Rock slope to Ross veins finished; sunk a distance of 400 feet this year.

No. 2 airshaft completed to Ross vein, and second openings are now being driven to connect with the rock slope workings.

No. 12 plane partly in coal and partly in rock has been finished.

No. 2 slope in coal has been finished.

Erected 250 horse power National boilers.

Erected 430 feet extra steam line to fans.

Nottingham No. 15 Colliery—

The Ross slope is being extended in rock through the anticlinal.

The Red Ash No. 3 slope is being extended in coal.

Erected one 24 feet by 8 feet Guibal fan on No. 1 airshaft.

Erected 300 horse power Stirling boilers.

Erected 4,000 feet 8-inch steam lines to fans.

Wanamie No. 18 Colliery—

No. 5 slope is being sunk in coal in the Ross vein.

Two bore holes, 200 feet deep each, have been put down for hoisting and pumping purposes.

No. 19 slope has been sunk in coal almost to the basin.

Erected one pair geared engines, 18x30-inch, with 8x10-foot drums.

The north outcrop of the seam at that point was covered by about sixty feet of sand. That part of the mine has not been worked since, and the gangways have not been cleared, and it is premised that no work will be done in that lift until some time in the future.

This occurred in a locality where there was no stream or body of water anywhere in sight on the surface, and where it was believed that no danger existed.

Annual Examination of Mine Foremen.

The annual examination of applicants for certificates of qualification for mine foreman and assistant mine foreman was held in the common council room, city hall, Wilkes-Barre, May 23, 24 and 25, 1899.

The board of examiners was G. M. Williams, Mine Inspector; H. H. Ashley, Edward Mackin and Andrew McGeehan.

The following named applicants passed a satisfactory examination and were recommended to have certificates of qualification as mine foremen, viz: Maurice Williams, Robert Johnson, William N. Thomas and Evan Thomas, of Wilkes-Barre; Richard L. Evans, of Edwardsdale; Lewis Richards, John T. Cartwright and Richard R. Jones, of Nanticoke; David Edwards, of Ashley; William H. Harrison and Richard T. Morgan, of Plymouth.

The following named persons were recommended to have certificates of qualification for assistant mine foremen, viz: Alexander Lawrence, Timothy Cronan and Frank Mills, Alden; Thomas Saunders, Mark Lloyd, William E. Thomas, Robert Richards, John Griffiths, Robert M. Smith, Edward D. Williams and Evan R. Jones, Nanticoke; David B. Morgan, Charles Price, Isaac Greenaway, Reuben Hoffman, William Morgan, Lewis Keen and Lawrence Keen, Glen Lyon; William Dedalis, Ashley; William E. Jones, Sugar Notch; Lewis R. Thomas and Alfred Gibbs, Wilkes-Barre; William Duffy, Thomas Bellamy, Joseph Harrison, Morgan W. Griffith, Morgan Williams and E. P. Evans, Plymouth; William J. Evans, Parsons, and Charles Johnson, Christopher.

Improvements made at Lehigh and Wilkes-Barre Collieries During 1899.

Hollenback Colliery.—Tunnel from bottom to top split Red Ash, 40 yards; duplicate steam line from breaker boilers to fans at airshaft.

South Wilkes-Barre Colliery.—Tunnel from Hillman to Kidney, 110 yards. Rock airway, Stanton to Hillman vein, 55 yards. Rock airway, Hillman to Kidney vein, 30 yards. Five hundred horsepower Babcock & Wilcox boilers to replace cylinder boilers.

Stanton Colliery.—Tunnel from Baltimore to Five Foot, 55 yards.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

to bar it back to the loading chute. At the same time the car runner was running three more cars on the same track. The rails were wet and muddy and he could not bring the cars to a stop before they slightly bumped the half-loaded car, causing it to start and run over the victim. The car runner called loudly to the victim to look out but he evidently did not hear him.

By Machinery

Theodore Tucker, slatepicker, at the Red Ash No. 2, was sent by the screen boss to start the coal running in the chute leading from the elevator to the rolls. There is a hole in the side of the chute to allow a person to go into the chute to start the coal running when it blocks. The hole is 25 feet from the elevator. He was next seen on the floor of the screen room at the foot of the elevator, the supposition being that he had come through the elevator. He was injured about 4 P. M. and died at 11 P. M. at the Wilkes-Barre City Hospital.

Thomas McDonald, laborer, at the Hadleigh colliery, outside, was shoveling coal into the scrapper line along with six other men when a rush of the bank started. He became confused and instead of standing still, he ran into the conveyor line. The other men who were much nearer the line than he was, when the rush occurred, stood still and escaped injury.

IMPROVEMENTS DURING THE YEAR LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery

Outside.—Five hundred horse power battery B. & W. boilers completing plant of 2,000 horse power.

Inside.—No. 11 tunnel, bottom split Red Ash to top split Red Ash, 50 yards.

No. 12 tunnel, bottom split Red Ash to top split Red Ash, 50 yards.

Empire No. 4 Colliery

Outside.—Machine, smith and car shops to replace shops destroyed by fire April 18, 1903.

Inside.—No. 24 tunnel, extended from top split Red Ash to Ross, 70 yards. Hoisting shaft enlarged to standard size.

South Wilkes-Barre No. 5 Colliery

Outside.—Duplicate 35 foot Guibal fan, No. 1 air shaft. Barn and carriage house. Inside and outside foreman's office.

Inside.—No. 8 tunnel, Kidney to Abbot, 160 yards. No. 10 tunnel, top split Baltimore to top split Baltimore, 140 yards. No. 11 tunnel, Kidney to Abbot, 90 yards. Tunnel airway, across basin

the fire entering the mine, to stop the fan so that the smoke would not be drawn into the mine and smother the workmen.

Second: That the company build two hanging doors, one at each landing in the shaft that could be closed in the event of fire in the breaker, and that the proper persons in charge, both on day and night shift, be fully instructed how and when to close them.

Third: That the manways leading to the two small shafts on second outlets be put and kept in good order at all times and fit for men to travel in, and that large painted signs be put up at different points along the manways for the purpose of showing the workmen the proper route to take to get out quickly.

Fourth: That the company build two iron doors at the mouth of the shaft that could be closed in the event of fire in the breaker. These doors to be so arranged as to prevent any material from falling down the shaft in the event of fire in the breaker.

I am pleased to state that the company has completely followed the recommendations made, and I believe the workmen at this mine are protected as fully against fire as is possible under the existing circumstances.

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery

Outside.—Supply store, barn and carriage house and railroad No. 3 slope to breaker.

Inside.—No. 9 tunnel extended to the Ross, 70 yards; No. 13 tunnel Hillman to Kidney, 82 yards; No. 14 tunnel Hillman to Kidney, 93 yards; No. 15 tunnel Hillman to Kidney, 97 yards; No. 16 tunnel Hillman to Stanton, 52 yards; No. 17 tunnel Red Ash to Top Red Ash 49 yards.

South Wilkes-Barre No. 5 Colliery

Outside.—1,000 H. P. water tube boiler; Duplex air compressor, simple steam, compound air.

Inside.—Compound condensing pump and pump room; No. 1 air shaft extended to Baltimore 107 yards; Rock plane airway Kidney to Abbott for No. 11 tunnel, return 44 yards; No. 12 tunnel Baltimore to Five Foot, 62 yards; three-inch drainage bore hole No. 8 slope to No. 9 slope.

Stanton No. 7 Colliery

Outside.—500 H. P. water tube boiler; colliery supply store; railroad No. 4 slope to breaker; 24x48 inch hoisting engine No. 4 slope.

Inside.—Air shaft surface to Abbott; No. 10 tunnel Skidmore to Ross, 80 yards; 3 inch drainage bore hole No. 4 slope to No. 8 plane.

kes-Barre, of the Delaware and Hudson Coal Company, on April 26, 1905, owing to the breaking of the rope and the dogs not working while the cage was descending. We are unable to determine from the evidence the cause of the breaking of the rope. We further find from the evidence given at the various hearings that the company had incompetent men to inspect this rope. We, the undersigned jurors, recommend that the company adopt some other method than the one now in use for testing the dogs, as the present method has proved inadequate. We further recommend that engineers, where men are to be lowered or hoisted, be required to be on duty but eight hours at one time, and we heartily approve of the method of employing engineers as recommended by Mine Inspector Martin in the Wilkes-Barre Record of February 28, 1905.

D. W. DODSON, Coroner.
 JACOB EVANS,
 JOHN CRAWFORD,
 FRANK CASTERLINE,
 THOMAS P. WILLIAMS,
 CHARLES CUNNINGHAM,
 JAMES HALL,

Jurors.

CONDITION OF COLLIERIES

The condition of the collieries in this district is good in regard to ventilation, except in a few instances.

It seems as if some foremen do not consider that it is necessary that all parts of a mine should be kept in good condition, especially as to ventilation. I have often found fault with the ventilation, but of course the foremen always have some excuse to offer, such as: "We expect to get a certain heading through so that the air will be better;" or, "The doors have been left standing open somewhere, which affects the ventilation badly. They know, however, that they have no one to attend to the doors properly. Numerous other excuses are also offered.

In my opinion it should not be necessary for any foreman to make excuses for the proper ventilation of any part of a mine, as required in Article 12, Rule 3, of the Anthracite mine law.

The mine foreman under this rule has charge of all matters pertaining to ventilation, and the speed of the ventilator is particularly under his charge and direction; and any superintendent who shall cause him to disregard the provision of the law shall be amenable in the same manner as the mine foreman.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery

Outside—Brick oil house; brick power house.

Inside—No. 18 Tunnel Red Ash to Top Red Ash; No. 19 Tunnel Red Ash to Top Red Ash.

PA Mine Inspection 1905

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2.—Outside: Brick locomotive house, new engines, Hillman slope.

Inside: Number 20 Tunnel Hillman to Stanton, No. 21 Tunnel Hillman to Stanton, No. 22 Tunnel Kidney to Stanton, No. 23 Tunnel Hillman to Stanton. Compressed air haulage plant.

South Wilkes-Barre No. 5.—Inside: No. 16 Tunnel Hillman to Kidney, No. 17 Tunnel Kidney to Hillman. Compressed air haulage plant.

Stanton No. 7.—Outside: 488 H. P. water tube boilers, steel head frame Empire No. 4 shaft, extension railroad to Empire shaft, brick engine house Empire shaft, brick locomotive house, brick oil house.

Inside: Compressed air locomotive. No. 11 Tunnel Red Ash to Ross.

Maxwell No. 20.—Outside: Supply house.

Inside: No. 7 Rock slope. Compressed air haulage plant.

No. 21 Tunnel Red Ash to Red Ash. Tunnel Hillman to Hillman.

LEHIGH VALLEY COAL COMPANY

Henry Colliery.—A series of safe cover test holes was drilled to determine the working limits in the 5 foot Hillman and Bowkley Veins.

A permanent concrete steel overcast was completed in Red Ash Vein.

New empty car plane and turnout were completed in Red Ash Shaft.

Numbers 21, 23, 27 and 28 sub-slopes have been started in Red Ash Shaft and are being extended.

A new 28x10x36 inch Goyne pump with 12 inch column and 8 inch exhaust pipe from the foot of shaft to the surface has been installed in the Red Ash Vein.

Numbers 51, 53, 54 and 56 tunnels have been finished through the Red Ash anticlinal.

A new permanent concrete steel overcast was completed in Wyoming Marcy Vein.

Preparations have been made and plans outlined and work commenced unwatering the Enterprise workings lying to the east of Henry.

Additional pumps have been placed in the 5 foot vein at the counter level of the Henry Shaft and a series of Diamond drill holes put through the pillar. These holes are being reamed out, so that it is expected by the close of the coming year the Enterprise workings will be unwatered and the coal in that property reclaimed.

Additional steam lines and column pipe lines and emergency pumps incidental to this work have been set in place. The new permanent plant to follow.

The Henry Washery has reclaimed all of the old Wyoming banks on the north side of the L. V. R. R. and the shovel and locomotive outfit has been transferred to the Enterprise banks to reclaim the coal through the Henry Washery.

A new bridge was constructed across the C. R. R. of N. J. and public road for the culm dump.

Outside barn remodeled to Lehigh Valley Standard; concrete floor and mangers. New 18x30 mule hospital.

Enterprise bank west of Plank road exhausted and Henry bank being reclaimed.

Preparations are under way to reclaim old Prospect bank. This is to be taken to Henry Washery by means of locomotive.

Prospect Colliery.—Stables for 75 mules in Red Ash completed. New electric hoist in operation on new slope west workings.

No. 10 Slope regraded through fault. A new concrete steel overcast has been put in this vein over No. 10 Slope. Second opening for Rock slope, Skidmore workings.

New mule stable in Midvale Hillman slope. New 500-ton washery completed and in operation.

Extensive repairs have been made to breaker and jig foundation.

Colliery office remodeled and new loaded scales installed.

Dorrance Colliery.—Red Ash tunnel and plane completed. Second opening to No. 6 Extension Tunnel completed. 5 concrete steel overcasts in Baltimore vein completed. 1 Undercast and direct return at head of Slant slope completed.

Vein connection made through Mill Creek anticlinal from No. 18 Tunnel Upper Baltimore to Plank road, Upper Baltimore workings.

2-10 ton electric locomotives installed in Hillman vein.

New slope is being driven in Hillman to connect with No. 15 and No. 17 tunnels from 5 Foot vein.

Extension was made to new Hillman vein stable.

Outside

New 350 K. W. 250 volt generator installed. Work is now being done on new 25x14 upcast shaft, from surface to Baltimore vein.

Franklin Colliery.—Central pumping plant in Red Ash vein completed. No. 8 Plane equipped with engine, steam from surface through bore hole. Nos. 23 and 24 tunnels Top Red Ash to Bottom Red Ash. No. 9 Slope district completed.

10 inch Water line from Column bore hole to reservoir completed. New steam line from boiler house to Red Ash Central pumping plant completed.

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery, Inside.—No. 18 Tunnel extended to Ross.

No. 19 Tunnel extended to Ross.

Rock Plane airway Stanton to Hillman.

No. 5 Slope graded through rock.

South Wilkes-Barre No. 5 Colliery, Inside.—No. 7 Slope extended from Abbott to Hillman. Pumping plant No. 2 Slope.

Stanton No. 7 Colliery, Outside.—Slush hole, Surface to Hillman. Slush hole, Surface to Stanton.

Inside.—Mule barn Red Ash Shaft Level. Pumping plant No. 4 Shaft Level.

Maxwell No. 20 Colliery, Outside.—Breaker remodeled. Timber saw mill. 500 H. P. water tube boilers. Engines and rope holes for Nos. 8 and 10 Slopes.

PITTSTON COAL MINING COMPANY .

Hadleigh Colliery.—Ventilation good; roads and drainage fair; condition as to safety good.

WILKES-BARRE AND SCRANTON COAL AND IRON COMPANY

Hillman Vein Colliery.—Ventilation good; drainage good; condition as to safety good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery, Inside.—No. 23 Tunnel-Bottom Red Ash to Top Red Ash.

Rock plane airway Bottom Red Ash to Top Red Ash.

New pumping plant Baltimore Shaft level.

Outside.—New shaft hoisting engines for Baltimore level.

Remodeling breaker and annex.

Steel head frame.

South Wilkes-Barre No. 5 Colliery, Inside.—No. 19 Tunnel, Hillman to Kidney.

No. 21 Tunnel, Baltimore to Five Foot.

No. 22 Tunnel, Baltimore to Five Foot.

No. 20 Tunnel, Hillman to Kidney.

No. 23 Tunnel, Top Baltimore to Bottom Baltimore.

Rock plane airway, Bottom Baltimore to Top Baltimore.

Outside.—Paving retail wagon road, and new scales.

Stanton No. 7 Colliery, Inside.—No. 13 Tunnel, Hillman to Hillman.

No. 14 Tunnel, Baltimore to Five Foot.

Slush Hole, Surface to Baltimore.

No. 12 Tunnel, Skidmore to Hillman.

No. 29 Tunnel, Stanton to Hillman.

Sugar Notch No. 9 Colliery, Inside.—No. 21 Tunnel, Twin to Cooper.

No. 9 Tunnel, Extended to Five Foot.

No. 20 Tunnel, Ross to Baltimore.

No. 15 Tunnel, Extended to Hillman.

Maxwell No. 20 Colliery, Inside.—Tunnel, Top Red Ash to Bottom Red Ash.

Tunnel, Top Red Ash to Bottom Red Ash.

No. 22 Tunnel, Baltimore to Five Foot.

No. 24 Tunnel, Baltimore to Five Foot.

New pumping plant, 4th Lift.

Outside.—Dust system installed in breaker.

LEHIGH VALLEY COAL COMPANY

Prospect, Outside.—Repairs to breaker. New refuse conveyor line.

Inside.—Air shaft from Lower to Upper Baltimore in Klondyke Slope district. Motor haulage in Red Ash and Baltimore veins extended.

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2.—Ventilation, roads and drainage good; condition as to safety, good.

South Wilkes-Barre No. 5.—Ventilation, roads and drainage good; condition as to safety, good.

Stanton No. 7.—Ventilation, roads and drainage good; condition as to safety, good.

Sugar Notch No. 9.—Ventilation good, roads and drainage fair; condition as to safety, good.

Maxwell No. 20.—Ventilation, roads and drainage good; condition as to safety, good.

LEHIGH VALLEY COAL COMPANY

Prospect.—Ventilation good; roads and drainage fair; condition as to safety, good.

Dorrance.—Ventilation good; roads and drainage fair; condition as to safety, good.

Franklin.—Ventilation good; roads and drainage fair; condition as to safety, good.

Warrior Run.—Ventilation good; roads and drainage poor owing to robbing of pillars; condition as to safety, good.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5.—General condition as to safety, good.

Baltimore Tunnel.—General condition as to safety, good.

Conyngham.—Ventilation good; general condition as to safety, good.

RED ASH COAL COMPANY

Red Ash No. 2.—Ventilation only fair, owing to robbing of pillars; general condition as to safety, good.

PITTSTON COAL MINING COMPANY

Hadleigh.—Ventilation and drainage fair; general condition as to safety, good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery

Inside: No. 27 tunnel, Hillman to Kidney, No. 3 slope.

No. 23 tunnel, Hillman to Stanton.

Extension of No. 12 tunnel, Top Red Ash to Ross vein.

Outside: Hoisting engines, Baltimore shaft.
Remodeling breaker.*
Steel head frame.
Dust system.

South Wilkes-Barre No. 5 Colliery

Inside: Extension No. 10 tunnel, Top to Bottom Baltimore.
No. 24 tunnel, Abbott to Hillman vein.

Stanton No. 7 Colliery

Inside: Rock plane airway, No. 12 tunnel west to No. 29 tunnel.
Extension of No. 13 tunnel to Hillman vein.
No. 15 tunnel, Hillman to Kidney, No. 6 plane counter.
Rock manway, No. 4 slope, Abbott vein.
No. 16 tunnel, Hillman to Kidney, No. 8 plane west.

Sugar Notch No. 9 Colliery

Inside: Extension No. 13 tunnel, Stanton to Hillman vein.
Extension No. 20 tunnel, Baltimore to Five Foot.
Tunnel, Twin to Cooper, No. 9 tunnel west.

Maxwell No. 20 Colliery

Inside: Tunnel, Ross to Twin, No. 18 tunnel west.
No. 23 tunnel, Baltimore to Five Foot.
Outside: Engines, etc., for No. 8 slope.

LEHIGH VALLEY COAL COMPANY

Prospect Colliery

Outside: Extensive repairs to breaker. Extension of the conveyor line to the washery. Changes to engine and drive for Prospect conveyor line and the construction of two overflow catch basins.

Inside: Midvale Hillman mule stable completed. The electric motor haulage, Red Ash vein, was extended to the extreme east. A concrete steel overcast constructed on the shaft level west district. Changes of head of No. 8 rock slope and installation of automatic head block.

Henry—Outside: A series of rock cover test holes for the Hillman vein were completed. An 8-inch Churn drill bore hole from the surface to the Red Ash vein for the changes in high pressure air line was completed. The Enterprise culm bank east of plank road is being hauled to the Henry Washery. A new Lehigh Valley Coal Company standard wooden head frame completed for No. 2 Red Ash shaft. The water course at Prospect was concrete lined with "I" beam reinforcement for the roof from the mouth to the rock. The coal road between the Henry and Prospect was renewed throughout and the old rails replaced with 56 pound rails. A concrete steel bridge was constructed for the Prospect Hillman slope, Plank road crossing.

Inside: An engine and pump were installed in No. 28 slope north of the fault for the extension of operation in No. 28 slope and airway. Preparations were made to construct an intermediate landing in the Red Ash shaft at the Marcy vein level for the haulage concentration

RED ASH COAL COMPANY

Red Ash No. 2.—Ventilation, roads and drainage fair. They are robbing pillars. Condition as to safety good.

PITTSTON COAL MINING COMPANY

Hadleigh.—Ventilation, roads and drainage fair. They are robbing pillars. Condition as to safety good.

WILKES-BARRE ANTHRACITE COAL COMPANY

Hillman Vein.—Ventilation, roads and drainage good; condition as to safety good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery.—Inside: No. 28 tunnel—Red Ash to Ross.

South Wilkes-Barre No. 5 Colliery.—Outside: Remodeled forced draft system. Inside: Rock plane airway—Kidney to Abbott.

Stanton No. 7 Colliery.—Outside: Installed forced draft fan system at Empire shaft boiler house. Erected outside stable. Inside: Extended No. 3 air shaft—Abbott to Five Foot.

Sugar Notch No. 9 Colliery.—Inside: No. 9 tunnel extended to Hillman. No. 23 tunnel Twin to Cooper. No. 16 tunnel Cooper to Five Foot.

Maxwell No. 20 Colliery.—Inside: No. 25 tunnel—Baltimore to Five Foot.

LEHIGH VALLEY COAL COMPANY

Prospect Colliery.—Outside: A new machine shop for repairing cars from Dorrance, Prospect and Henry collieries and for general machine work in the division, was completed and the narrow gauge tracks to same installed. The handling of timber, which previously was done at the respective collieries and sawed by hand, is now done at the Prospect yard in connection with the new machine shop. The timber is taken from the railroad cars by an overhead traveling timber trolley, which carries it to the saw house where it is cut with a steam saw and loaded on mine cars for the various collieries. The washery has been abandoned and removed. During the erection of the new steel breaker, Mineral Spring coal was prepared at this place. Repairs to the breaker were made and a complete fire alarm system installed.

An extra pump was placed in the river pump house, which has been remodeled and enlarged. A series of test holes for proving the rock cover in the river district was drilled. Inside: The driving of No. 22 slope from the Midvale pump lift to the surface at the machine shop was started. In the Five Foot vein a new slope was also started and two new slopes in the Baltimore vein were driven. In the Red Ash vein a new electric hoist on No. 18 slope was installed, and also an electric haulage on the second lift east off No. 11 slope. In the lower Baltimore shaft level east, electric haulage was installed with one new motor. Extensive improvement of the Baltimore vein mule barn were carried on. The securing of the foot of the Oakwood shaft with reinforced concrete and "I" beams was started.

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2, South Wilkes-Barre No. 5, Stanton No. 7, Sugar Notch No. 9, and Maxwell No. 20.—Ventilation, roads, drainage and condition as to safety, good.

LEHIGH VALLEY COAL COMPANY

Prospect and Dorrance.—Ventilation, roads, drainage and condition as to safety, good.

Franklin.—Ventilation and condition as to safety, good; roads and drainage fair.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 and Baltimore Tunnel.—Ventilation, roads, drainage and condition as to safety, good.

RED ASH COAL COMPANY

Red Ash No. 2.—Ventilation, roads and drainage fair; condition as to safety, good.

PITTSTON COAL MINING COMPANY

Hadleigh.—Ventilation, roads and drainage fair; condition as to safety, good.

WILKES-BARRE ANTHRACITE COAL COMPANY

Hillman Vein.—Ventilation, roads, drainage and condition as to safety, good.

MINERS MILLS COAL MINING COMPANY

Healey.—Ventilation, roads and drainage fair; condition as to safety, good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery:

Outside.—Red Ash shaft hoisting engines and house, electric light plant, feed water heater system.

Inside.—Extended No. 5 tunnel to Ross No. 30 tunnel, Hillman to Kidney.

South Wilkes-Barre No. 5 Colliery:

Outside.—Wash house.

Inside.—12x16-inch hoisting engines provided for Nos. 12 and 13 slopes. Installed two compressed air locomotives. Extended No. 23 tunnel to Five Foot; No. 27 tunnel, Kidney to Abbott; No. 26 tunnel, Stanton to Five Foot.

Stanton No. 7 Colliery:

Outside.—New breaker; steel head frame for breaker hoist. Concrete fuel bin for boiler house. Steam heat in breaker. Dust-collecting system in breaker. Hopper and pocket to receive coal from No. 21. 240 H. P. boilers at Empire Shaft. Fuel conveyor and slush trough. Feed water system. Tower hoisting engine and house. Power house. Yard grading, tracks and car hoist. New steam lines in colliery yards and to Stanton air shaft.

Outside.—Installed breaker fire lines and remodeled mule barn on No. 4 slope.

South Wilkes-Barre No. 5 Colliery.—Inside: Completed fireproof mule barns on Nos. 3 and 5 shaft levels; No. 8 tunnel extended to Baltimore, and drove tunnel from Abbott to Abbótt, 1st east No. 7 slope.

Outside.—Completed addition to power plant.

Hollenback No. 2 Colliery.—Inside: Installed concrete and steel timbering on Baltimore and Red Ash landings to shaft, also in small engine and pump rooms. Completed fireproof mule barn; also No. 31 tunnel, Top Red Ash to Ross; No. 32 tunnel, Kidney to Abbott, and No. 17 tunnel extended to Ross.

Outside.—Completed saw mill and timber yard.

Sugar Notch No. 9 Colliery.—Inside: Completed fireproof mule barn; No. 9 plane Ross to Red Ash; also No. 25 tunnel Hillman to Kidney; No. 26 tunnel, Hillman to Kidney; tunnel, Twin to Ross, 3rd east, No. 5 plane; tunnel, Five Foot to Five Foot, No. 20 tunnel west.

Outside.—Completed fire pump and breaker fire lines, and made addition to mule barn.

LEHIGH VALLEY COAL COMPANY

Prospect Colliery.—Inside: The work of completing fireproof additions to the Red Ash and Baltimore barns was carried out. Man cars were placed on No. 8 rock slope to hoist men from the Red Ash vein to the Oakwood level. No. 57 rock tunnel, 500 feet long, from the Baltimore to the Skidmore vein, Prospect Shaft level, was driven and electric haulage installed therein. No. 58 rock tunnel was driven from the Abbott to the Bowkley vein a distance of 280 feet, for the purpose of mining a virgin area in the vicinity of Oakwood shaft.

Outside.—An addition was built to the breaker to house the box car loader. Three new sets of Compound rolls were placed in the breaker. A concrete engine house for No. 8 slope was completed, in which were installed a pair of second motion engines to replace the old hook engine operating the slope. A mess house, equipped with all improvements and conveniences for the outside employes was started. Work was started on the remodeling of the old car repair shop to accommodate the blacksmith and carpenter shops. A 10 inch rope hole was driven from the surface to the Red Ash vein, a distance of 760 feet, to avoid carrying the rope that operates No. 10 slope over the Laurel Line tracks. A 6 inch hole from the surface to the Abbott vein, for sewage from the mess house, was drilled a distance of 126 feet.

Henry.—Inside: The installation of pumps for water concentration to the Red Ash vein, mentioned in report of 1911, was completed. The fireproofing of the Red Ash, Baltimore and Henry Five Foot barns was also completed. Rope haulage was installed in No. 2 level from No. 11 slope to No. 6 plane and placed in operation. The second opening rock plane from Skidmore to Lower Baltimore vein for No. 36 rock slope was completed. No. 17 plane from Lower Baltimore vein to the Skidmore landing in Red Ash shaft was driven to serve as a manway. Test drilling to prove Hillman and Bowkley veins was also carried on.

Hollenback No. 2 Colliery.—Inside: Completed tunnel Stanton to Stanton; Rock plane airway Kidney to Abbott; Nos. 33 and 34 tunnels Stanton to Stanton; No. 35 tunnel top to bottom Red Ash; tunnel, bottom to top, Red Ash, 3rd east, No. 1 plane; No. 36 tunnel, bottom to top, Red Ash and No. 37 tunnel, bottom to top, Red Ash.

Outside: Completed wash house.

Sugar Notch No. 9 Colliery.—Completed No. 24 tunnel Baltimore to Five Foot; Rock plane airway Kidney to surface; No. 28 tunnel Hillman to Hillman; No. 29 tunnel Twin to Ross and installed 10 by 36-inch compound pump on shaft level.

Outside: Completed wash house.

LEHIGH VALLEY COAL COMPANY

Henry Colliery.—In the Wyoming Five Foot slope a tunnel 145 feet long was driven through a fault to the Five Foot vein. The manway in this vein was also extended to the bottom of the slope. A concrete barn to accommodate 30 mules was constructed in the Hillman vein. In the Henry Five Foot vein a new concrete hospital and a fire boss station were erected. A manway from the second life west to the head of No. 14 slope in the Five Foot vein was started. A concrete waiting room was built in the Skidmore Landing in the tender shaft to accommodate the men waiting for the cage. A tunnel 675 feet long was driven from the Baltimore vein from which one 3-inch and two 6-inch holes were drilled to tap the water at the Maltby colliery. A new manway parallel to No. 28 slope in the Red Ash vein was driven.

Outside: The old boiler house was converted into a locomotive house. A new engine house was built for the Wyoming Five Foot slope and the engines from the Prospect-Hillman slope were transferred to this house. A new outside hospital was also erected. A 20-inch terra cotta line was installed to take care of the discharge of the Henry pumps and also the surface water, conveying it to a ditch at the Port Bowkley station. A 28 by 17½ by 20 by 30-inch Norwalk compressor was added to the power plant. Drilling operations for determination of rock cover were carried on in the Susquehanna river. A manway was driven from the surface to the Five Foot vein, and the Henry Shaft was abandoned for hoisting. The head frame at the old Wyoming shaft was torn down and a concrete wall placed around the shaft. The landing at the Red Ash Tender shaft was raised and the yard in the vicinity was filled in and the tracks rearranged.

Dorrance Colliery.—Fireproof hospitals were built in the Hillman and Red Ash veins. A concrete fire boss station was also built in the Hillman vein. Three concrete overcasts were started in the Red Ash vein, two in No. 24 slope district and one in No. 23 slope district. Completed reinforced concrete pump rooms in the Hillman and Baltimore veins and installed two 1,500-gallon pumps. A 15-degree rock plane 45 feet long was driven through a fault from the Cooper to Cooper vein. Second opening on 30 degrees was also driven. A tunnel from the Cooper to the Bennett vein was started. A small pump was placed at the foot of No. 24 slope, Red Ash vein. Removed two 16 by 20-inch engines on No. 20 slope, Baltimore vein.

Outside: An extension to the River pump house was made and a larger pump installed. The loading of refuse into cars was discon-

Maxwell No. 20 Colliery.—Completed No. 29 tunnel, Hillman to Kidney; tunnel, Hillman to Hillman, 2nd South, No. 10 slope; tunnel Red Ash to Red Ash, No. 21 tunnel west; tunnel, Five Foot to Baltimore, No. 27 tunnel east; tunnel, Hillman to Hillman, 1st South, No. 10 slope; two tunnels, Bottom to Top Red Ash, No. 20 tunnel east. Remodeled the Red Ash shaft level barn and built a new barn in No. 5 slope.

Hollenback No. 2 Colliery.—Completed No. 38 tunnel, Top Red Ash to Ross. Installed 16 inch by 8 inch by 18 inch pump in No. 2 slope extension. Outside: Installed an air compressor.

Sugar Notch No. 9 Colliery.—Completed Nos. 27 and 30 tunnels, Bottom to Top Red Ash. Outside: Remodeled the breaker.

LEHIGH VALLEY COAL COMPANY

Dorrance Colliery.—No 23 tunnel, 200 feet long, was driven from the Cooper to the Bennet vein through the fault. No. 24 tunnel from the Cooper to the Lance vein was started and driven about 20 feet. Three concrete overcasts in No. 24 slope district, Red Ash vein, were completed. A new Jeanesville pump in the Baltimore vein was placed in operation. An engine was installed at head of No. 21 plane. The engine at the head of No. 21 slope, Hillman vein, was relocated and a fireproof room is being constructed. An engine was installed at the head of No. 25 slope, Red Ash vein, and a fireproof engine room was constructed. The Red Ash barn was extended by the addition of five concrete stalls. The motor from West plane was transferred to the head of the Five Foot plane.

Outside: A new steel fuel line is being constructed from the breaker to the boiler house. Work has been started on the installation of an additional 300 H. P. boiler plant. A concrete driveway was laid through the colliery yard. A powder house was constructed of metal lath and plastered on the inside as also on the outside. A concrete and terra cotta tile office was built. A new crusher, elevator and engine and fireproof engine house were installed on the ash line from the boiler house to the bore hole. Concrete retaining walls were built along the tail tracks. A fireproof engine house was erected over the conveyor engine under breaker. The shaft tower was braced and concrete pillars placed under the columns.

Henry Colliery.—Inside: No. 74 tunnel, from the Hillman to the Bowkley driven 370 feet. A new concrete hospital is in course of construction. A concrete roof was placed over pumpway in Red Ash vein. Completed manway to No. 28 slope. Started slope in Red Ash vein west to the shaft.

Outside: Mine tracks were regraded from hoisting shaft to colliery fence and a concrete retaining wall built alongside of the tracks. A new brick blacksmith shop was erected. The Henry Five Foot, Baltimore and Wyoming Baltimore fan houses were made fireproof. The reservoir was fenced in. A new road was laid through colliery yard. Feed water regulators and Watts pump governors were installed in the boiler house. A 10-inch bore hole was drilled from the surface to the Five Foot vein and the old culm bank is being flushed into the workings.

Prospect Colliery.—Inside: Installed a Scranton pump in Hillman vein. All refuse from the breaker and boilers is now silted into the mine workings. An 8-inch bore hole was drilled from the Abbott

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2, South Wilkes-Barre No. 5, Stanton No. 7, Sugar Notch No. 9 and Maxwell No. 20 Collieries.—Ventilation, roads, drainage and condition as to safety, good.

LEHIGH VALLEY COAL COMPANY

Franklin, Dorrance, Prospect, Henry and Warrior Run Collieries.—Ventilation, roads, drainage and condition as to safety, good.

DELAWARE AND HUDSON COMPANY

Baltimore No. 5 and Baltimore Tunnel Collieries.—Ventilation, roads, drainage and condition as to safety, good.

WILKES-BARRE ANTHRACITE COAL COMPANY

Hillman Vein Colliery.—Ventilation, roads, drainage and condition as to safety, good.

RED ASH COAL COMPANY

Red Ash Nos. 1 and 2 Collieries.—Ventilation, roads and drainage, fair. Condition as to safety, good.

PITTSTON COAL MINING COMPANY

Hadleigh Colliery.—Ventilation, roads and drainage, fair. Condition as to safety, good.

CAMPBELL AND JOHNS

Miners Mills Colliery.—Ventilation, roads and drainage, fair. Condition as to safety, good.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Pettebone Nos. 3 and 4 Collieries.—Ventilation, roads, drainage and condition as to safety, good.

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery.—Inside: Completed No. 39 tunnel, Baltimore to five foot; tunnel. Ross to Red Ash, 5th East. No. 6 plane; No. 41 tunnel, Hillman to Kidney; and No. 42 tunnel, Stanton to Five Foot vein.

Outside: Installed a 24 by 48 inch hoisting engine for No. 3 plane.

South Wilkes-Barre No. 5 Colliery.—Completed No. 32 tunnel, Abbott to Hillman; rock plane, Hillman to Kidney; and No. 33 tunnel, Stanton to Baltimore vein.

Stanton No. 7 Colliery.—Completed No. 20 tunnel, Abbott to No. 1 vein; rock plane, Abbott to No. 1 vein; No. 21 tunnel, Top Red

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

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

Verdict of the Coroner's Jury

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

EXPLOSION AT HOLLENBACK COLLIERY

REPORT OF INSPECTOR T. J. WILLIAMS, ELEVENTH DISTRICT

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

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

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

We then went to the surface for the purpose of consultation with the company officials in reference to adopting a safe plan to extinguish the fire. However, it was first unanimously agreed that the lives of the entombed men were extinct, and it was further agreed by all present that any further attempt to rescue them under existing conditions would probably cause a further sacrifice of human life, and that the only safe and practicable method to obtain the bodies of the entombed was to first extinguish the fire by sealing off the affected section of the mine.

Work on the seals was commenced immediately. The points selected for the erection of the first seals were the intake airways, namely, the slope and slope manway, indicated by "A" and "B" on the map. Several minor intakes were then closed and lastly the return.

The erection of the stoppings was commenced on March 10, and they were all completed March 19 and remained sealed until May 14, when the first seals were opened and an effort was made on May 18 to explore the 1st East gangway. This was found impossible on account of a large accumulation of gas. After the removal of this gas on May 19 we explored the section and found the bodies of Edwin Jones, door tender, John Miskin, driver, William Kurzinski, miner, and George Kamconka, laborer, inside of chamber No. 5. The body of Leo Kazenski, miner, was found in chamber No. 8, about 25 feet from the gangway on August 29.

REPORT OF COMMISSION OF INSPECTORS

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

Dear Sir: The commission appointed by you to investigate and report the cause leading up to the explosion of gas that caused the death of six persons, in the Hollenback mine of the Lehigh and Wilkes-Barre Coal Company, on March 9, 1916, begs to make the following report:

After a thorough inspection of the mine and the examination of several witnesses we are enabled by the knowledge obtained in this manner to arrive at two conclusions, either of which may have been the true cause of the accident.

Our first conclusion is, that the miner in chamber No. 8 ignited a body of gas by a blast. We are supported in this conclusion by the discovery of the electric battery used by this miner, so placed and adjusted with the wires attached and in such position as to indicate that he had just fired a blast.

We are further supported in this theory by the fact that the coal at the face of chamber No. 8 was of a shelly or laminated character. A coal of this kind would readily permit the miner to over-charge the blast, notwithstanding the fact that monobel (permissible) powder was used in this case. We can readily assume that the hole was probably over-charged and that only a small part of the energy stored up in the powder was consumed in breaking down the coal, and the remaining energy was spent in flame in the open atmosphere, which was no doubt heavily charged with methane.

Our second conclusion is, that the miner in chamber No. 8 fired the blast herebefore mentioned, the firing of which possibly liberated a volume of methane.

The place in which the body of Leo Kazenski, miner, of chamber No. 8 was found, namely, twenty-five feet up his chamber from the gangway road, at the inside of a car that stood in the chamber, would indicate that he was on his way back to the face of the chamber or was probably working at this point when the gas was ignited in some manner unknown to us.

That the volume of gas was large and its mixture with air was such as to permit the propagation of flame only, is manifested by the following facts.

First. That several doors in the vicinity of the explosion, some of which were not more than 150 feet from the initial point of said explosion, were left intact and very little damage was done to any part of the mine.

Second. That the volume of methane was large is again indicated by the discovery of burning timber 600 feet from the initial point of the explosion and the burning of the clothing on Horney's body at about the same distance.

The section of the mine in which the explosion occurred was a locked-safety lamp district. Monobel powder was used for blasting and all blasts were fired by electric batteries.

The type of lamps used in this section by the miners, namely, the "Davy" is not the lamp commonly used by other coal companies in mines of this character. We are informed, however, that the president of this company, Mr. C. F. Huber, has been considering for some time the adoption of an improved safety lamp for use in his mines.

We further note that the safety lamps used in this mine are cleaned, examined and filled in a poorly lighted room in the mine, which practice is peculiar to this company.

We feel that rooms in which safety lamps are examined, cleaned and stored, should be located on the surface and kept clean and well lighted, so that any defects or the improper assembling can be readily detected.

Respectfully submitted,

THOMAS J. WILLIAMS,
11th Anthracite District.
JOHN B. CORGAN,
10th Anthracite District.
D. T. DAVIS,
12th Anthracite District.
FRANK KETTLE,
13th Anthracite District.
JOSEPH J. WALSH,
14th Anthracite District.

Report of Coroner's Jury

An inquest was held by Deputy Coroner Stanley Kuryloski, September 8, 1916, and the following verdict given: "After hearing the following witnesses, William Irvin, George Roberts, John Williams, Michael Williams, James Buttson, Anthony Matuzza, Peter P. Jones and David Thomas, it was found that the decedent, Leo Kazenski, with five others, was burned to death through an explosion of gas caused in an unknown manner. It being an unavoidable mine accident."

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2, South Wilkes-Barre No. 5 and Stanton No. 7 Collieries.—Ventilation, drainage and condition as to safety, good.

LEHIGH VALLEY COAL COMPANY

Dorrance, Prospect and Henry Collieries.—Ventilation, drainage and condition as to safety, good.

RED ASH COAL COMPANY

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

WILKES-BARRE ANTHRACITE COAL COMPANY

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

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

Hollenback No. 2 Colliery.—Completed rock plane airway from Hillman to Kidney veins.

Outside. Installed one 250 H.P. electric hoist at No. 5 slope; one 500 K. W. turbo generating plant. Completed electric transmission line, bore hole, etc., from Hollenback No. 2 colliery to Stanton No. 7 colliery.

Stanton No. 7 Colliery.—Completed No. 25 tunnel, Skidmore to Skidmore vein; No. 28 tunnel, Stanton to Stanton vein; No. 11 tunnel, extension to Bottom Red Ash; No. 34 tunnel, Bottom to Top Red Ash (Empire) and No. 35 tunnel, Top Red Ash to Ross, Empire section.

Outside. Installed a 500 K. W. turbo generating plant.

LEHIGH VALLEY COAL COMPANY

Dorrance Colliery.—Completed No. 28 tunnel, Baltimore to Lance and Five Foot veins; No. 29 tunnel and second opening from Hillman to Bowkley vein; extension of West Hillman plane; 4 inch bore hole from Hillman to the Five Foot vein; 6 inch bore hole from No. 21 slope basin in the Hillman vein to the Five Foot vein, and a new foreman's office of concrete at foot of the Red Ash shaft. Started No. 28 slope for development purposes.

Installed an Exter engine on No. 27 slope and an 8 ton gathering motor was put into service at the foot of No. 24 slope in the Red Ash vein.

Outside. A fire proof engine house was constructed near the pump house for hoisting on the Hillman west plane. An 8 inch rope hole for this purpose was drilled from the surface to the Hillman vein.

Installed a 175 K. W. 250 volt engine and generator for emergency purposes and three additional fire hydrants in the vicinity of the breaker. Diamond drilling was conducted on the river flats for proving the rock cover over the upper veins.