

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

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

**The Alden Coal Company.**

The Alden colliery is situated near the east end of Newport township, and is a new establishment. The shaft is 11×24 feet area and 225 feet deep to the Bennett vein, which is five feet thick of good coal. They have a tunnel driven from the surface into the Bennett and Baltimore veins; this is 800 feet long, having an area of 7×9 feet. The breaker was nearly completed and ready for occupation at the end of the year.

**The Clear Spring Coal Company.**

This again is a new coal firm and have opened a colliery in West Pittston which will be ready for operation the beginning of 1883. The shaft is 12½×28 feet and 160 deep, cutting the Seven-foot and Pittston veins. An air-shaft has been sunk also, to which connections are made in both veins. The breaker is ready to commence shipping coal in the beginning of the following year.

**The Fuller Coal Company.**

This company is sinking two shafts, one for hoisting and the other to comply with the law requiring second opening. The main shaft is 10×34 feet, and will have a probable depth of 250 feet, the air-shaft is located 185 feet from the main one, and has an area of 10×14 feet, is expected to be the same depth as the main one. The breaker, which is now in course of erection, will have a capacity of 1000 tons per day. The hoisting engines will have direct motion, cylinders 34×40 inches, and a conical drum. A fan 14 feet diameter, open periphery, will be erected at once upon the completion of the shafts, and the colliery is expected to be in operation by next June.

**The Delaware, Lackawanna and Western Company.**

The **Woodward** shaft, reported in last year's report was down at the close of this year a depth of 300 feet, and has employed about 60 persons. Its size is 10×53 feet, and will have probably a depth of 800 feet when completed. Another shaft has been commenced to constitute a second opening for the Woodward. This is 12×35 feet, and was just begun at the close of this year. I am informed that this shaft will also be utilized to work some of the upper veins. This company has also began preparations to sink a shaft on the Pettibone property, in the center of the valley, a little north of Wilkes-Barre, which is to be 10×35 feet area.

**The Hanover Coal Company.**

This new colliery is located in Hanover township, south of Sugar Notch, and is leased by this company from Mr. W. Maffitt, of Wilkes-Barre. A breaker is already nearly completed, and a tunnel driven into the Red Ash vein, where the coal is found seven feet thick. They will also work the Ross Seam from a temporary slope, made out of an old chamber driven up from old workings which had crossed the boundary line into this property.

Ross and Twin veins, its total length being one thousand two hundred and seventy feet. This opens a large territory of coal.

The No. 4 slope was extended, reaching a point two hundred and eighteen feet below the old level, and opens a new lift of excellent coal.

A new colliery is to be opened at Morgantown, four miles west of Nanticoke. The shaft is  $33' \times 12\frac{1}{2}'$  area, and will have a probable depth of eight hundred feet to the Ross seam. A horizontal tunnel is being driven also to cut the same seam, which is seven feet high by sixteen feet wide, and is expected to cut the coal at a length of about one thousand two hundred feet. The shaft was down at the end of the year to a depth of fifty-six feet, and the tunnel was in from the opening a distance of seventy-five feet.

At the Grand Tunnel the water was pumped from the old No. 3 slope, and a new slope is being driven down from a point near the bottom of the old McFarlane shaft, which was, at the end of the year, down a distance of eight hundred and twelve feet below the line of the old workings. This will open an extensive area of coal of the Red Ash seam and of good quality.

#### **The Wyoming Valley Coal Company.**

At the Forty-Fort shaft an underground slope is in progress of being driven to work the coal lying below the shaft level. It was down, at the close of the year, a distance of nine hundred feet, on an average grade of seven degrees, and is still continued.

At the Harry E. colliery a new tunnel was driven from the surface to the Bennett vein, a distance of two hundred and twenty-five feet. Its size is  $9' \times 7'$ , and it has cut the vein nine feet thick of excellent coal.

#### **The Delaware, Lackawanna and Western Railroad Company.**

At the Avondale colliery this company is sinking a new air-shaft, with a view of putting a fan on it to increase the ventilation of the underground slope. The shaft is  $16' \times 12'$  area, and was sunk to a depth of one hundred sixty-five feet at the close of the year. The underground slope has opened a large extent of workings, and the new fan will prove an effective addition to the ventilating power.

The **Woodward** shafts have not yet been completed, and it may take another year to complete their sinking. No. 1 was at a depth of five hundred and thirteen feet and No. 2 four hundred and eleven feet at the close of the year 1883. They are beginning to prepare for the erection of a breaker, and have partly graded the railroad beds leading to that structure.

The Pettibone shaft was started to sink on April 18, 1883, and after encountering great difficulties in passing through clay and sand, they have successfully reached the rock at a depth of eighty feet. The progress of this enterprise has been watched with unusual interest, because it was generally supposed that a shaft could not be sunk on the sandy flats, owing to its great depth of sand. This company contemplates sinking another shaft to constitute the second opening required by law, and it will be started in the course of a few months.

8 MINE INS.

At the Pine Ridge colliery a new double fan was erected to ventilate the workings of the Hillman and the Baltimore seams. The old fan was removed and the new one was placed at a distance from the shaft, so as to insure its safety in case the breaker takes fire. A passage is made, underneath the surface of the ground, leading from the shaft to the fan, through which the return air passes. This is arched by mason work, and is of sufficient area to pass a large quantity of air.

**The Susquehanna Coal Company.**

This company is making preparations to mine a large quantity of coal at the Newport colliery. A brief note was made of it in my previous report. The shaft is now at a depth of four hundred and ninety-five feet, having passed through four seams of workable coal, aggregating a thickness of twenty-six feet. A tunnel is also being driven which has reached a length of nine hundred and forty-two feet, having cut through three seams of coal in the first five hundred and eight feet; at which length it also cuts a fourth seam on the anticlinal axis, the thickness of which is not yet determined. The tunnel is continued across a small basin where more seams of coal are expected to be found.

Preparations are in progress also to sink a slope to work the upper seams. The open cut and a short tunnel to an eight-foot seam is driven, and the slope will now be sunk in that seam, which promises to produce good coal. The coal from all these openings will be shipped from one breaker, which is now being erected, and bids fair to be the largest structure for the purpose ever erected in the anthracite coal region.

The No. 1 shaft, at Nanticoke, was extended from the Hillman to the Red Ash seam, and they are now driving a second opening, which is to be effected by holing into the workings of the No. 2 shaft.

A new fan was erected to ventilate a part of the workings of Nos. 1 and 2 shafts; the details relative to this may be seen in the table of new fans presented in this report.

**The Delaware, Lackawanna and Western Railroad Company.**

A new air shaft was sunk at the Avondale colliery of this company with the view of placing a new fan upon it to improve the ventilation. Its size is 12'×26" and its depth to the workings of the Red Ash seam is two hundred and forty-one feet.

The No. 1 Woodward shaft is now at a depth of eight hundred and fifty-one feet, and is still being sunk. The No. 2 was sunk to a depth of one thousand and three feet, where it cut the lowest seam of coal supposed to be in the property. These shafts pass through several excellent seams of coal, and the capacity of these openings, when ready for mining coal, promises to be very large.

The Pettibone shaft is still in progress of sinking and has reached a depth of three hundred feet.

eter, was erected to ventilate the Boston mine, and it proved a very satisfactory appliance by increasing the ventilation to the desired extent.

#### Kingston Coal Company.

At the No. 1 shaft the endless-rope system of haulage was introduced, and it works well. I am informed also that the same system is contemplated to supersede a locomotive at the Gaylord mine, and that it will be adopted at each of this company's collieries at Edwardsville.

The new breaker at the No. 4 shaft laid idle throughout the year, but the main openings of the mine were driven and have opened a large territory ready for breast-work.

#### Delaware, Lackawanna and Western Company.

The **Woodward** shaft of this company is in progress of preparation for mining coal. Pumps are being put in place, and also the shaft cages. The breaker is also in course of erection, and it promises to be one of the largest producers in this region. At the Avondale mine a new fan, sixteen feet diameter, was placed on the new air-shaft. It works well, and is reported to exhaust 105,000 cubic feet of air per minute, under a ventilating pressure of eight tenths of an inch water gauge. To produce this pressure, it is running at a speed of eighty-five revolutions per minute.

#### Accidents in 1886.

The number of accidents causing injuries to workmen are still very frequent, but the number was less in 1886 than it was in each of the past five years, and we have good reasons to hope that the number will still be reduced in the future.

If the workmen, and especially the boys who are employed to drive and run cars, could be induced to exercise more care, the number of accidents could be greatly reduced. The rigid requirements of the new mine law were, no doubt, instrumental in bringing the number of accidents for 1886 down below its usual figure, and a more stringent enforcement of the rules laid down in that law would perhaps result in a further improvement.

There are serious disadvantages to a reduction in the list of accidents. The number of persons employed and the amount of coal produced increase every year, and if the number of accidents does not increase in the same proportion, a decided improvement is effected. And when we consider that the dangers of coal mining increase daily with the extension of the workings and the increase of depth in each mine, a non-increase in the list of accidents would be very gratifying, as well as an indication of improvement in the system of mining. The total number of serious accidents during the year 1886 was three hun-

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

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

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

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

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

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

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

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

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

**Alden Coal Company.**

The shaft-tunnel of this company was extended to the Red Ash seam. A new fifteen foot Guibal fan was also erected on the mine, making the second fan in use for the purpose of producing ventilation. While running at lower speed than it is capable of it is exhausting 50,000 cubic feet of air per minute, which, at present, is found sufficient.

**Delaware, Lackawanna and Western Railroad Company.**

The **Woodward** colliery of this company was completed and began to prepare coal for shipment in July, 1888. The breaker is a large double structure, capable of preparing 2,000 tons of coal per day for the market. It is well lighted and is heated throughout by steam. Everything in the breaker and around the colliery is finished in an exceedingly satisfactory shape. No expense has been spared to make everything as safe as possible. The main shaft is a double one; *i. e.*, it has four cages for hoisting coal—two working for the Red Ash seam and two for the Bennett. The hoisting engines are powerful and are directly connected with the drums. From each of these seams conversation with the engineers can be had by telephones, and signals are given by pneumatic gongs.

The main shaft is 53x12 feet area, and is over 1,000 feet deep to the Red Ash seam.

The No. 2 shaft is 35x12 feet area, and is also sunk to the Red Ash seam, a depth of 1,013 feet, and both are connected by openings in the Bennett and Red Ash seams. This shaft is being fitted with cages and machinery to work the Cooper seam. Two fans were erected, one on each shaft, and one is twelve and the other sixteen feet diameter, exhausting respectively 55,000 and 59,700 cubic feet of air per minute.

**Lehigh Valley Coal Company.**

The Dorrance shaft having been extended to the Baltimore seam a second opening was effected by a slope sunk from the Hillman to the latter on a grade of 30 degrees. This was 7x12 feet area and 400 feet long, all in rock.

**Plymouth Coal Company.**

At the Dodson colliery a new Guibal fan, 15 feet diameter, was erected to replace the old one. By running 70 revolutions it produces a ventilating pressure of one and two-tenths inches of water gauge, and 108,000 cubic feet of air per minute. The driving engine is 16x13 inches, connected directly to the fan.

**Hanover Coal Company.**

The Maffet shaft of this company was sunk from the Ross to the Red Ash seam, and is now at a depth of 385 feet below surface. This opens a new lift of good coal extending up to the level of the old Ross tunnel.

*Delaware, Lackawanna and Western Railroad Company.*

At the **Woodward** colliery in the Bennet seam an underground slope was driven to a distance of 1,228', and its sinking is still continued. Its grade is about 10°, and its sectional area 7'x16'. It was started east of the shaft from the level gangway in a southeasterly direction and it opens a wide extent of excellent coal.

At the Avondale colliery a new underground slope was completed and a new pair of hoisting engines were erected on the surface to hoist the mine cars from the slope. The cylinders are 30"x60", connected directly to the crank of a parallel drum 9' diameter by 14' in length. The foundation of the engines and drum is built of concrete, consisting of broken stone one part, sand three parts and cement two parts. The rope passes down into the mine through a bore-hole 12" in diameter and 238' deep. Communication between the engineer and slope men is maintained by electric signals and conversation may be held by telephone. Everything is finished in good order and equipped for convenience and dispatch in doing the work.

*Lehigh Valley Coal Company.*

The Franklin colliery was leased by this company in March, 1889. Since then they have made many improvements which tend to make the mine safer and more productive. New pumps were put in the Old slope, and new steam pipes were put in from the surface leading through a bore-hole which effected a great improvement.

An air-shaft is being sunk from the surface to the workings of the Red Ash seam in the Rock slope. This shaft has a sectional area of 11'x15' feet and is at a depth of 230'. In the meantime the necessary openings for connecting with the air-shaft are being driven, and will be ready when the shaft is finished.

*Alden Coal Company.*

In the Alden colliery a rock tunnel was driven from the Ross to the Red Ash seam from the shaft level. This tunnel is 1,035' long and has a sectional area of 84 square feet. The Red Ash seam was found to be 7' in thickness. The water level tunnel was also extended from the Ross to the Red Ash, and penetrated the latter at a distance of 195'. This tunnel also has 84 square feet of sectional area and found the seam 6' in thickness. The workings of these tunnels are connected by a passage driven up from the lower tunnel.

An underground slope was made in the Ross seam 700' long, on a grade of 20°. With the aid of this most of the coal between the lower and upper tunnels can be mined from the Ross seam.



SUSQ Coal

At the No. 6 shaft, Glen Lyon, another opening was effected by driving to connect with the No. 6 tunnel, and a part of this is utilized as a gravity plane, which has a grade of  $30^{\circ}$ . This was driven through disturbed faulty strata from the Ross seam and connects to the side of No. 6 tunnel.

*Improvements by the Delaware, Lackawanna and Western Railroad Company.*

At the Avondale colliery the new underground slope on the Red Ash seam is being sunk. It extended below the lower level gangway a distance of 750' on an average grade of  $12^{\circ}$ .

At the Woodward colliery a new slope was sunk on the Red Ash seam, from the east level gangway, a distance of 700' on a grade of about  $5^{\circ}$ . A tunnel was driven from the same seam, west of the shaft, to the Ross seam a distance of 500' and having an area of  $7' \times 14'$ . Important improvements were also made in the ventilation of this colliery by erecting new air bridges of substantial brick work. This colliery is opened in excellent shape, and the officials spare no pains in having everything arranged in the best order.

*Improvements by the Lehigh Valley Coal Company.*

At the Franklin colliery a new air shaft,  $8' \times 10'$ , was sunk near the outcrop of the Abbott seam and connecting with the workings of that seam. This effected a very desirable improvement in the ventilation of the thin upper seams of this mine.

*Improvements by the Alden Coal Company.*

The main shaft of this company was extended from the Twin to the Red Ash seam and has now a total depth of 586'. An underground slope has also been sunk in the Red Ash seam to a length of 1,741' on a grade of  $14^{\circ}$ , the average dip of the seam. This work is chiefly in the Ross and Red Ash seams.

*Improvements by the Plymouth Coal Company.*

At the Dodson colliery a new slope was sunk through the rock across the strata from the Bennett to the Ross seam. Its area is  $7' \times 15'$  and its length 382' on a grade of  $21^{\circ}$ . A second opening is now being driven and will be completed in a few weeks. The hoisting engine is located underground near the head of the slope and the engines are worked by compressed air taken down from compressors on surface.

*Improvements by the Parrish Coal Company.*

The Baltimore seam slope of this company was extended a distance of 700' and opened a productive extent of excellent coal. They leased also the old Buttonwood shaft property and are at work enlarging the old shaft and making preparations to reopen the mine on a large scale.

the year. The hoisting engines for both these slopes are located on the surface, the ropes passing down through bore holes.

At the Boston colliery, several hundred feet east of the old shaft, a new shaft has been started. It is intended to sink it from the surface to the red ash seam. Its size is 12x33½ feet and it was sunk to a depth of 110 feet by the end of the year 1893.

The sinking of another shaft is in progress by this company about a quarter of a mile east of the No. 5 shaft. It was sunk at the close of the year to a depth of 115 feet. Its size is 10½x33½ feet.

#### Improvements by the Susquehanna Coal Company.

At the No. 1 shaft a slope was made through old workings a length of 1,400 feet on a dip of 8½ degrees; size 8x16 feet.

Another slope is being sunk in the George seam. Its size is 8x16 feet and it was at a length of 1,000 on an average dip of 8½ degrees at the end of the year.

A new tunnel was driven from the Forge to the Mills seam a length of 800 feet, and a size of 8x14 feet.

At the No. 4 slope, a tunnel 300 feet long was driven from the Mills seam and a rock plane was driven from the Mills to the George seam. Its length is 300 feet; grade, 20 degrees, and size, 8x14 feet.

#### Improvements by the Delaware, Lackawanna and Western Railroad Company.

At the Avondale colliery a horizontal tunnel was driven through the rock from the red ash to the Ross seam. Its size is 7x10 feet and its length 300 feet. This opens a large area of the Ross seam.

At the Woodward colliery both underground slopes were extended, the one in the red ash seam a length of 306 feet to a total length of 2,019 feet and the slope on the Baltimore seam was extended a length of 372 feet, thus opening in each a new lift. The tunnel mentioned in last year's report, which is being driven from the red ash to cut the Baltimore seam was driven a distance of 486 feet. Its total length now is 1,686 feet. When this tunnel is completed it is intended to haul the coal of the Baltimore seam below a certain line in the slope out through it to the foot of the red ash shaft, where it will be hoisted to the surface.

The three new shafts in progress of sinking by this company in Hanover township are not yet completed. The Bliss shaft was at a depth of 669 feet. The Auchincloss No. 1 at a depth of 661 feet, and the Auchincloss No. 2 at a depth of 659 feet. The size of each shaft is 12x43 feet 3 inches.

#### Improvements by the Parrish Coal Company.

At the Parrish colliery a new air shaft was sunk to a depth of 60 feet, having a sectional area of 216 square feet. For the purpose of

road (chartered December 4, 1850), and name changed to 'Delaware, Lackawanna and Western Railroad Company.' The road was opened from Scranton to Great Bend October 20, 1851, and from Scranton to the Delaware river May 27, 1857. In 1856 a lease was taken of the Warren Railroad, extending from the Delaware river to a junction with the Central Railroad of New Jersey, the latter line being used prior to 1875 as an outlet to the Hudson river.

In 1868 a lease was taken of the Morris and Essex Railroad, which now, with the Warren Railroad, forms this company's line to the Hudson.

In 1855 a perpetual lease was taken of the Cayuga and Susquehanna Railroad. In 1869 a lease was taken of the Oswego and Syracuse Railroad. In 1869 control was obtained of the Syracuse, Binghamton and New York Railroad by the purchase of the major part of its stock. In 1871 the Valley Railroad, extending from Great Bend to Binghamton, was built in order to form a connection with the Syracuse, Binghamton and New York Railroad, the Greene, and the Utica, Chenango and Susquehanna Valley Railroad's leased lines.

In 1873 the Delaware, Lackawanna and Western, and the Lackawanna and Bloomsburg Railroad companies were consolidated. In September, 1881, the company obtained control of the Sussex Railroad of New Jersey by the purchase of a major part of its stock. In October, 1882, a lease was taken of the New York, Lackawanna and Western Railway, which extended the line to Buffalo. Total mileage now operated, 898 miles."

The coal lands of the company are located in Lackawanna and Luzerne counties, Pa. In 1894 it operated 24 collieries, two of which are located in the Fourth district, viz: Avondale and Woodward. The production of these two collieries for the year 1894 was 470,379 tons. Shipments 427,377 tons in a work of 169.15 days. Production per day, 2,780 tons. The number of fatal accidents was one, and of non-fatal, 21. In the Avondale mine both the Red Ash and Ross seams are mined. In the Red Ash seam the workings to the rise from the shaft are nearly exhausted. More or less explosive gas is found in the workings of both seams, but none standing. The roof is generally good and so is the general condition of the mine. In the No. 2 slope the ventilation is hardly adequate for the future workings, but a new air shaft is in process of sinking for the purpose of improving it, and this will be completed during 1895.

The Woodward Colliery began to ship coal in 1888, but it is now a large colliery with extensive working in the Red Ash, Ross, Bennett and Cooper seams. The shafts are over 1,000 feet deep, and, in the Bennett and Red Ash there are deep underground slopes extending from the shaft levels. A large quantity of fire damp is evolved in each seam. The roof is generally fair, except in the Red Ash seam, in

which, at some places it is very bad. At the deepest points of the workings the floor or bottom rock heaves, causing much labor and expense to keep the passages safe and in order. Hundreds of props are broken merely by the upheaval of the bottom rock.

The ventilation is good throughout, and a large, new fan is in course of construction to ensure its efficiency in the future.

The coal department of this company is located at Scranton under the direction of the following officers:

W. R. Storrs, general coal agent.

W. H. Storrs, assistant general coal agent.

A. H. Storrs, superintendent.

John F. Snyder, chief mining engineer.

Benjamin Hughes, general mine superintendent.

Thomas D. Davies, assistant general mine superintendent.

Thomas Phillips, assistant general mine superintendent.

The foremen of the collieries are as follows:

Avondale, Evan J. Evans, inside foreman; T. D. Kingsley, outside foreman.

Woodward, William O. Williams, inside foreman; Wm. Beacham, outside foreman.

Bliss (new colliery), Edwin Rees, inside foreman; Thomas H. Carey, outside foreman.

The officers of the company are as follows:

President, Samuel Sloan, New York.

First Vice President, E. R. Holden, New York.

Second Vice President, W. S. Sloan, New York.

Secretary and Auditor, Fred. F. Chambers, New York.

Treasurer, Fred. H. Gibbons, New York.

Managers, John I. Blair, George Bliss, Eugene Higgins, William W. Astor, William Rockefeller, Henry A. C. Taylor, J. Rogers Maxwell, George F. Baker, James Stillman, Alex. T. Van Nest, Frank Worth, Hamilton McK. Twombly, Harris C. Fahnestock, F. W. Vanderbilt.

Officers of transportation department:

W. H. Hallstead, general manager, Scranton, Pa.

G. Bogart, superintendent Delaware, Lackawanna and Western main line, Scranton, Pa.

James Archbald, chief engineer, Scranton, Pa.

#### Collieries of the Lehigh Valley Coal Company.

The Lehigh Valley Coal Company was organized January 11, 1881, to mine and sell coal. In 1884 the property of the Spring Mountain Coal Company was purchased, and on June 1st, 1884, 45,000 acres of land in Centre county, Pa., known as the Snow Shoe property, was also purchased. Since then, various additions have been made to the

July and the new one worked ten days in November, 1895. A new twenty foot fan has been also erected instead of the old one at the air shaft. It is operated by a vertical engine. Running 62 revolutions per minute it exhausts 88,000 cubic feet of air with a water gauge of 1.8 inches.

#### The Lee Coal Company.

The Lee colliery passed out of the hands of the Newport Coal Company and into the hands of the Lee Coal Company. They sunk a shaft a depth of 200 feet and erected a fan seventeen feet in diameter, operated by a vertical engine. It was ready at the close of the year but had not been started. The colliery worked only twelve days in 1895.

#### IMPROVEMENT BY THE DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY.

##### Avondale.

A new air shaft 12x21 feet has been sunk, striking the Red Ash vein near the head of No. 2 slope workings to give it more effective ventilation and a sixteen foot fan was erected which, running 65 revolutions is exhausting 67,350 cubic feet of air per minute.

A compressed air pumping plant is being installed, consisting of a 14 and 23½x24 cross compound condensing Corliss engine with 17 and 28x24 Riedler air cylinders which is to furnish air at 150 pounds pressure to operate a cross compound Riedler pump, having plungers 5½ and 7¾x18.

This pump is to operate on a lift of 780 feet, taking the place of three steam pumps. It is expected also to reduce the temperature of the air and improve the effects of the ventilation.

##### Woodward.

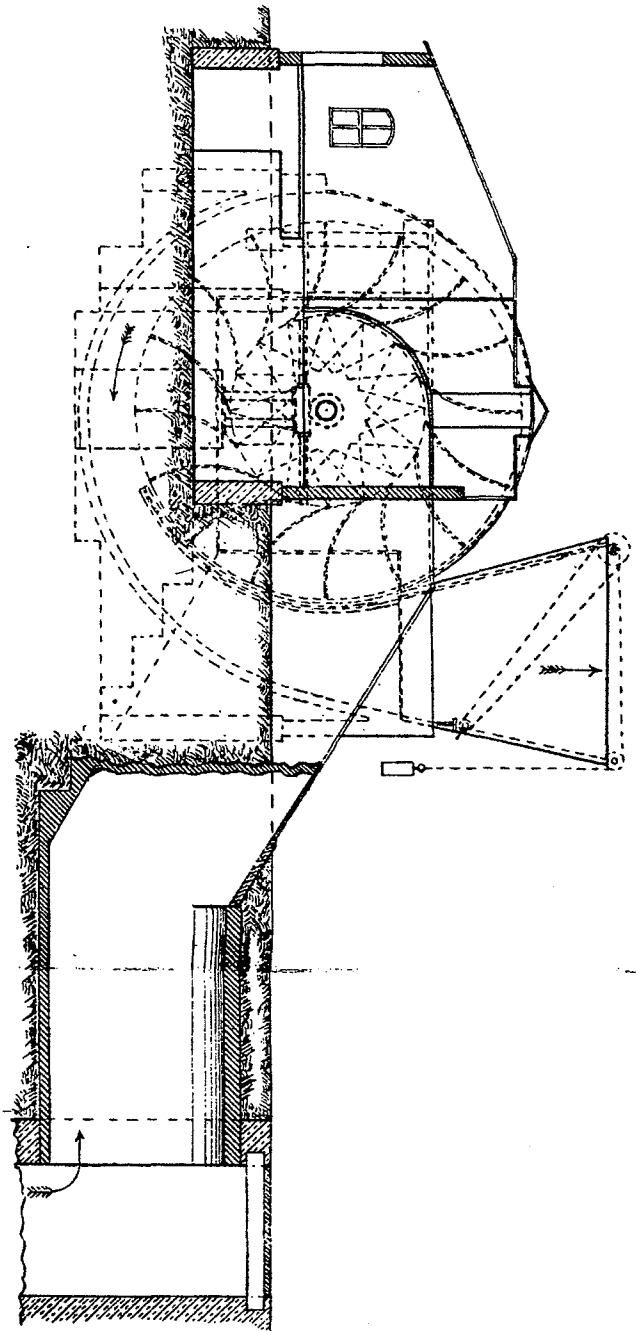
A tunnel from the Red Ash shaft level to the foot of the Baltimore slope a distance of 2,700 feet has been completed.

A 35 foot fan of the same construction as described has been erected at Bliss mines, also a 16 foot diameter Guibal fan has been erected, the former taking the place of a 20 foot direct connected, and the latter a 16 foot open fan.

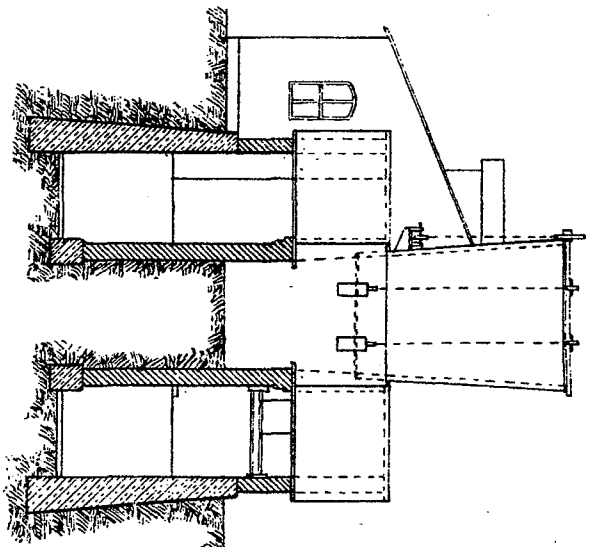
Both show much greater efficiencies, which together with their ability to run at higher speeds, have resulted in a marked increase in the ventilation. The 16 foot Guibal fan is driven from the engine by manilla ropes instead of a belt.

##### Bliss.

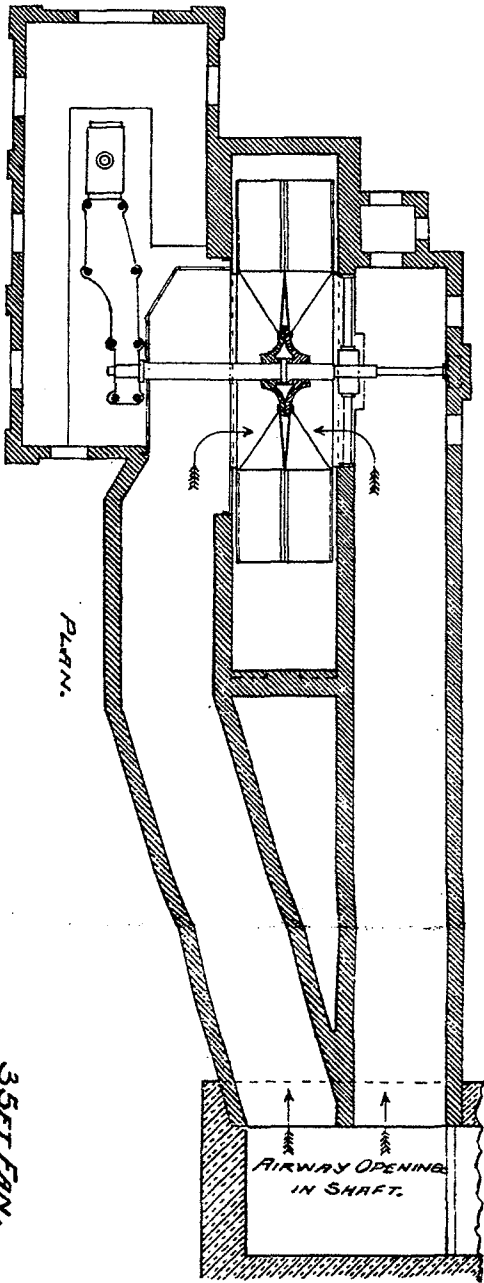
On September 17, 1895, this new colliery was started to prepare and ship coal for the market. It had been in course of construction



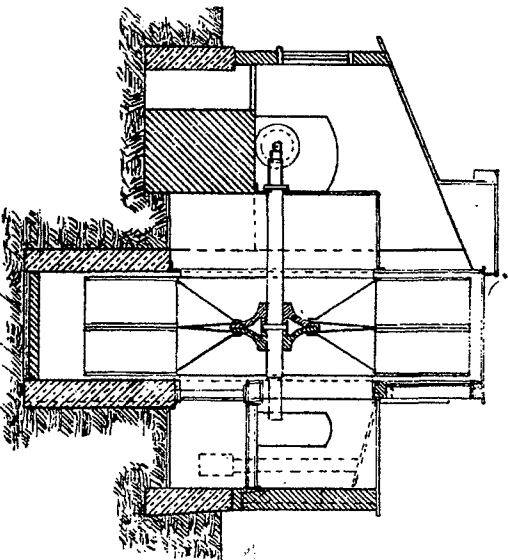
ELEVATION.



SECTION THROUGH AIRWAY.



PLAN.



SECTION THROUGH FAN.

AIRWAY OPENING IN SHAFT.

35 FT FAN.  
D. L. & W. R. COAL DEPT.  
SCRANTON, 1895.

Erected at Bliss and Woodward Collieries &

increased as the water raised. By April 20 the water in Avondale had reached a height of 150 feet vertical above the dams and the leakage into the Nottingham had filled their entire workings below the seventh lift.

At this time it was apparent that the inflow of water had been materially reduced and the D., L. & W. Company decided to instal the pumps and make energetic efforts to control the water. It continued to rise in the Nottingham until May 8. The Lehigh and Wilkes-Barre by this time had installed more pumps than were needed at the fifth lift to hold it. The number of pumps necessary to hold it were started and it was kept at this height until September 13. The workings of six lifts were submerged. On this date they started to reduce the water and have unceasingly pumped day and night in both mines ever since. At this time it has been pumped down to the eighth lift in the Nottingham and to the level of the dams at bottom of No. 1 slope in the Avondale mine. The quantity of inflow has very materially decreased, being not more than one-half as much as it was when it broke into the mine, and it is confidently expected to decrease as much again as the crevices in the top works become filled with clay, etc.

The production of coal had to be suspended in both mines. One of the hoisting compartments in the Nottingham shaft had to be utilized for additional steam and column pipes required for the extra pumps, but after an idleness of two and a half months that part of the mine which was not occupied by the water was put in operation and the coal was hoisted by one cage. They have been hoisting about 400 mine cars per day. On October 7 work was resumed at the Avondale mines and they are working in the No. 2 slope and that part of the Ross seam workings lying to the rise from the shaft level. It is a question of only a few months before both mines will be producing their usual quantity of coal.

In the breaking in of the water at Avondale there is an ominous warning to all who mine under the flats of the Susquehanna river, of the possibility of enough water breaking into one of the mines to flood and ruin all the mines that are connected together. All the mines are connected from West Nanticoke to Edwardsville except the Woodward, and it behooves all to exercise extraordinary care in mining. The outcrops of all the seams are buried under the sandy flats between Nanticoke gap and the upper end of Plymouth, and to mine the coal in the approaches to these outcrops needs more than the ordinary care and even with the exercise of all possible care, a pot hole or deep crevice in the rock may be struck at any time to the ruin of all these mines.

### An Extensive Squeeze at the Woodward Mine.

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

### The Destruction of the Baltimore Tunnel Breaker.

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

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



of 830 feet from the Twin to the Ross seam. It is 7x14 feet area. Three new short gravity planes were made, one of which was in the No. 6 slope.

#### Improvements by the Delaware, Lackawanna and Western Company.

At the **Woodward** mine a rock tunnel was driven through an anti-clinal a length of 621 feet, having a sectional area of 7x14 feet. A new barn has been built in the Red Ash seam which is lighted by electric incandescent lamps. It is the safest, cleanest and best lighted in the whole district. At the Bliss mine two rock tunnels were driven one 1,000 feet in length and the other 179 feet. Each has an area of 7x12 feet. Two slopes were driven, one 1,120 feet and the other 1,140 feet in length. The grade on the first is 20 degrees and on the other 24 degrees.

#### Improvements by the Parrish Coal Company.

At the Buttonwood Colliery a slope has been driven in the Hillman seam to the dip south of the shaft a length of 515 feet on a grade of 27 degrees. Two gravity planes were made, one in the Hillman seam, 850 feet in length and 8 degrees grade, and one in the Kidney seam, 1,100 feet in length on a grade of 11 degrees.

#### Improvements by the Alden Coal Company.

At the No. 2 shaft of the Alden Colliery a new steel head-frame has been erected instead of the old timber one; a very great improvement.

Several other minor improvements were made in the most of the mines which are not of sufficient importance to be recorded in this report.

#### Annual Examination of Applicants for Mine Foreman Certificate.

The annual examination of applicants for certificates of qualification of mine foreman and assistant mine foreman was held at the Union street school building, Wilkes-Barre, Pa., June 12, 15 and 16. The board of examiners was G. M. Williams, Inspector of mines, Edward Mackin, superintendent; Andrew McGeehan and William D. Morgan, miners.

Twenty-three applicants for mine foreman certificates appeared in the examination and the following eleven were recommended to have certificates:

- William H. Thomas, Lee, Luzerne county.
- James D. Nichols, Nanticoke.
- William L. Jones, Peely, Luzerne county.
- William J. Lloyd, Wanamie.

Susq Coal  
No 5

No. 1 shaft, to take the place of the Hillman seam pump, which has been moved to the Lee seam, obviating the necessity of hoisting the No. 1 shaft water by tanks suspended under the cages.

A new washery was built during the strike to supply boiler coal from the old No. 1 breaker bank; this is located near the old No. 1 slope.

There have been driven ten minor rock tunnels for ventilation and second opening and six planes extended, two of them in rock, as well as a shaft sunk 102 feet from the Hillman toward the Forge seam, in No. 4 slope; the total depth of this will be about 175 feet, making second opening from the No. 4 slope, Forge seam, workings.

At No. 6 colliery extensive retimbering has been done, but no new work of importance.

Delaware, Lackawanna and Western Company, 1899.

**Woodward** Colliery.—Slope in Cooper seam, 7x14 feet, 300 feet long; not completed. Slope in Ross seam, 7x14 feet, 600 feet long; not completed. Engine plane in Bennett seam 7x14 feet, 3,000 feet long. One electric hoist for plane, 80 horse power.

Bliss Colliery.—One shaft for second opening to the Hillman seam; size, 5x6 feet, and 45 feet depth. Tunnel from Baltimore to Hillman, 7x12 feet and 290 feet in length. Slope in Baltimore seam, 7x12 feet, 1,500 feet long; not completed. Slope in Ross seam, 7x20 feet, 1,000 feet long; not completed. Tunnel Forge seam to Red Ash, 7x16 feet, 125 feet long; not completed.

West End Coal Company, 1899.

Outside.—Five-foot high pressure return tubular boilers; three at boiler plant, on top of hill, and two at long drift boiler plant. One 6-inch steam line from long drift boilers to bore hole near barns. One 5-inch steam line from boilers on top of hill to old airshaft and down through bore hole to head of slope. One bore hole for 6-inch steam line near barns and bore hole for water column near same place. One bore hole for rope, from surface to head of Sand drift slope, and engine and engine house placed on surface for same. Removed fan from old Conyngham drift and placed it at mouth of old Black Creek tunnel.

Inside.—Rock tunnel driven from bottom split, Red Ash, to top split, a distance of 310 feet. Rock plane driven from second lift, Baltimore slope, to top split, a distance of 246 feet. Gravity plane in "Klondyke," about 200 feet long.

Plymouth No. 3.—Foot in Red Ash vein has been opened out, and is now connected with slope sunk from Boston vein. This slope is now an engine plane for No. 3.

No. 9 tunnel to Stanton vein completed 563 feet.

New fan, 10x28 feet, in brick engine house 48x48 feet, ventilating Red Ash vein, running since July.

Plymouth No. 4.—No. 2 Ross slope down 2,200 feet; still driving.

No. 1 Red Ash slope down 2,250 feet, still driving.

No. 7 plane, in Red Ash up 600 feet; still driving.

Plymouth No. 5.—No. 5 plane, in Red Ash, top split, up 500 feet; still driving.

Boston.—No. 4 plane, top split, Red Ash, completed up 1,400 feet.

#### Improvements by the Susquehanna Coal Company During the Year 1900.

Stearns.—No. 4 shaft, sunk 205 feet to 651 feet total depth.

No. 4 air shaft sunk 553 feet to 663 feet, total depth.

No. 5 shaft, sunk 172 feet to 220 feet, total depth. The sinking of these three shafts is now completed.

Rock foot No. 4 shaft driven 80 feet.

Nanticoke.—No. 14 slope, Lee seam, Nanticoke, rock work for head completed.

No. 12 rock plane, from Lee toward Ross, driven on 20-degree pitch 100 feet.

No. 13 rock plane, 7x14 feet, 20-degree pitch, driven up 100 feet from No. 21 tunnel, completed.

Outside Improvement—New narrow gauge railroad, three miles, from Nanticoke to Stearns.

New compressor plant for No. 14. Slope engines, Nanticoke, Pa. Engines to be inside at head of slope, and compressed air to pass through bore hole.

One thousand horse power new Babcock & Wilcox boilers, No. 5 breaker, Nanticoke.

One thousand horse power new Babcock & Wilcox boilers, No. 1 shaft, Nanticoke.

#### Improvements by Delaware, Lackawanna and Western Company During the Year 1900.

Woodward.—One 500-horse power engine directly connected with one G. E. 330 K. W. Multipolar Electric Generator.

One 80-horse power electric hoist in the Cooper seam.

One 120-horse power electric hoist in the Red Ash seam.

One 7x8-inch Triplex electric pump, 20-horse power motor.

Inside: New openings in Cooper seam, Shaft No. 1, in two places in No. 13 tunnel.

Enlarged main gangway from foot of No. 1 North Shaft to head of No. 9 Slope, and to No. 13 tunnel.

New bore hole, 960 feet deep, from surface to Lee seam, for No. 10 Slope hoisting rope.

#### Improvements at the Delaware and Hudson Collieries During 1902.

Plymouth No. 2.—Tunnel in G vein through fault 200 feet long, 7'x12'. Tunnel from Red Ash to top split, 275' long, 7'x16'.

Outside: A Norwalk compressor, 24"x14½"x22"x24", was installed for furnishing air for pumping.

Shaft No. 1.—A Dickson compound triple expansion pump, with a capacity of 3,000 gallons per minute, size of pump 15"x26"x16"x48".

Shaft No. 3.—Tunnel from Red Ash seam to top split, 275' long, 7'x16'. A 10"x48"x24" Jeanesville pump was installed at the foot of shaft.

Outside: A new breaker engine, 16"x30", was attached to the old one, changing it into a double engine.

Boston: Reopened tunnel and sank slope in the Bennett seam, and put in a pair of 24"x48" haulage engines to take coal from the slope to the breaker.

Outside: Installed nine new cylinder boilers, 34"x36' in length.

Placed one pair of engines, 26"x48", at the bore hole to hoist out of plane from top split of Red Ash.

#### Improvements at the Alden.

A slope in the Cooper seam 550' long to reach the basin.

Tunnel 100' long from the Cooper to Hillman seams, 14'x7' through the rock.

There has also been provided for cases of emergency two "Vajen's" improved head protectors.

#### Improvements at the Delaware, Lackawanna and Western Collieries During 1902.

**Woodward.**—A new steel trestle connecting the breaker with the shaft, and four batteries of Sterling boilers have been installed. One electric hoist and one electric motor have also been installed at this colliery.

Avondale.—One electric motor has been placed inside.

Auchincloss.—An electric breaker of 500 tons daily capacity has been placed in operation and is giving perfect satisfaction.

this most dangerous enemy to the underground worker. I am glad to be able to report to you at this date that we are led to believe that we have succeeded in surrounding this affected district with incombustible material to prevent further spreading of the fire, and expect to be able to report in the near future that this destructive fire has been taken care of.

#### Woodward Colliery

Outside.—The improvements at this breaker during the year consist of labor-saving machinery, automatic slate pickers, conveyors, elevators, shakers, etc., together with a 15-foot dust fan which is materially assisting in improving the conditions at this breaker.

Inside.—The installation of two  $7\frac{1}{2}$  ton electric locomotives, two electric hoists. Cooper and Abbot veins have been opened at No. 2 shaft, which will materially assist in increasing the output of this colliery in the future.

The condition of the colliery has been improved by a general cleaning up, white washing and painting of the buildings, on the outside, and the cleaning and ballasting of the roads on the inside.

#### DELAWARE AND HUDSON COMPANY

##### Plymouth No. 2 Colliery

Reopening Hillman vein, repairs to No. 1 shaft, concreting, etc., making branches, etc., at foot of No. 9 plane; electrical machinery for lighting this division, buildings, etc., two large boilers added to the present boiler plant, extension of boiler house Hillman vein improvements; pump room and tunnel; additions to the washery, fifty new mine cars.

##### Plymouth No. 3 Colliery

Tunnel from bottom to top split of Red Ash vein. Additional compressor with house additions, etc. Additional boilers; fifty new mine cars.

##### Plymouth No. 4 Colliery

Mountain plane in the outcrop, conveyor for fuel to boiler house; fifty new mine cars.

##### Plymouth No. 5

Fifty new mine cars; coal conveyor.

##### Boston Colliery

No. 4 plane, bottom to top split Red Ash; one additional compressor; compressor house, addition to boiler house; rope haulage and extension, 100 new mine cars; chain hoist from tunnel to foot of shaft.

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

### Woodward Colliery

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

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

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

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

### LEHIGH AND WILKES-BARRE COAL COMPANY

#### Lance No. 11 Colliery

Outside.—Colliery shop.

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

#### Nottingham No. 15 Colliery

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

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

#### Reynolds No. 16 Colliery

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

#### Wanamie No. 18 Colliery

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

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

**Woodward**

Notwithstanding the fact that this colliery was operated almost continually during the year, considerable improvements were made, consisting of the following:

Installing a 600 H. P. Cross compound engine and generator to furnish electric power for locomotives and hoists. Also new electrically driven centrifugal pump to furnish water for shakers, screens, etc., and one rope driven dust fan. All of which have added to the efficiency of this breaker.

Inside improvements consists of driving two rock tunnels, one from Cooper vein to Lance vein, and one from Cooper vein to Cooper vein through fault.

The ventilation in this colliery has been improved by the erection of six concrete brick and iron air bridges.

The condition of the haulage roads and return air-ways have been improved by cleaning up and enlarging.

**Report of Jersey Fire**

I am pleased to be able to report that this most stubborn and serious mine fire, if not entirely extinguished, has been so surrounded by incombustible material that it will be practically impossible for it to spread into any other part of the adjacent old workings.

This fire was discovered on May 18, 1901. The origin has always been a mystery. It has cost the company a tremendous amount of money. The officials and workmen engaged at this work have also suffered a great many trying ordeals, and are very well pleased with the conditions existing at the present time, as the work of fighting a fire of the magnitude of this one in old abandoned workings, where no system of ventilation could be adopted or applied, is a problem that taxes the ability of the most competent mining men.

The most important question in fighting a mine fire is to produce a sufficient quantity of air to dilute and render harmless noxious and dangerous gases, so as to enable the mine workers to attack their most insidious enemy.

A great deal of credit is due the men in charge of this work and those who have worked with them.

**WEST END COAL COMPANY****West End**

One 110 and one 250 K. W. electric generator installed in concrete power house. One 7 ton electric locomotive, No. 1 Lee, and one 7 ton electric locomotive, R. A. Split. One 4 stage Worthington turbine pump, electrically driven, No. 1 Lee, one 5 stage Worthington pump, electrically driven, Lee shaft, one 15 foot Guibal fan, No. 1 Lee, electrically driven, and two Flory electric hoists. Three 300 H. P. Maxim water tube boilers, in concrete boiler house; 54 steel mine cars.

## Boston

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

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

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

Air return in rock driven from Ross vein to Top Split of Red Ash. Steel tower erected to take the place of frame structure over main shaft.

Condition of colliery is good.

## LEHIGH AND WILKES-BARRE COAL COMPANY

## Lance No. 11

Outside.—Fuel conveyor.

Inside.—Compound condensing pump and rooms.

Condition of colliery is good.

## Nottingham No. 15

Outside.—Colliery office.

Inside.—Duplex pump, 9th East.

Condition of colliery is good.

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

## Avondale

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

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

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

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

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

Condition of colliery is good.

## Woodward

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

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

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

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

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

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

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



New brick blacksmith and carpenter shop completed; new brick oil house and hospital and new brick warehouse completed.

Fifty foot addition to stable.

Addition of 300 H. P ; B. and W. boilers completed for washery.

Electric haulage is now in service between the Red Ash vein and foot of slope.

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward Colliery.**—The work of sinking Woodward No. 3 Shaft on the Kingston flats has progressed to a depth of 450 feet. The shaft will be completed during this year to the Baltimore vein.

The rock tunnels have been driven from the Cooper to Five Foot vein for development.

The work of installing the sub-station mentioned in last year's report has been completed, but it is not yet in operation.

The No. 2 Shaft hoisting engines have been equipped with new drums and clutch arrangement; also steam brake and reverse.

The three slide valve breaker engines have been replaced with three compound Corliss valve engines, in order to economize in the consumption of steam with very good results.

Four new concrete and steel air bridges have been built during the year.

Avondale.—The work of installing an inside sub-station mentioned in last year's report is now completed and is in operation and running order.

The Ross shaft has been abandoned as a hoistway and will be used hereafter as an air shaft only.

One concrete and steel air bridge has been erected on 4½ East lift, No. 2 Slope, Red Ash vein.

A rock tunnel was driven from Ross vein to surface for second opening to Ross and Red Ash veins.

#### DELAWARE AND HUDSON COMPANY

Plymouth No. 2 Colliery.—Rope hole, 93 feet deep, drilled for No. 7 plane.

Air shaft to Lance vein sunk 40 feet.

No. 9 slope, Top Ash vein, driven 340 feet.

Plymouth No. 3 Colliery.—Air shaft to Lance vein sunk 40 feet deep.

No. 9 plane, Station vein, extended 450 feet.

Plymouth No. 5 Colliery.—Slush hole for ashes drilled 448 feet deep.

No. 2 slope Cooper vein, rope hole drilled 177 feet deep.

Rock slope from Bennett to Cooper vein completed 350 feet long.

Four Emery slate pickers installed in breaker.

Boston Colliery.—New plane No. 6 driven from Boston to Plymouth No. 5 in Bottom Red Ash 4,200 feet long, to take Boston coal to Plymouth No. 5 breaker. Rope hole 446 feet deep drilled, and pair of 22 x 48 inch Dickson engines installed. Boston breaker has been abandoned.

A rope hole has been completed from the surface to the Ross vein and a set of hoisting engines installed on the surface, thus removing the inside slope rope from No. 3 shaft and the inside gangways.

A tunnel has been completed on the first lift from Bennett to Red Ash vein, and another tunnel has been started on the lower lift from Ross to Bennett vein.

A series of tunnels and rock holes has been completed from the Ross vein to the overlying split, and mining has now been started in the small vein 2 feet 6 inches thick.

Gaylor Colliery.—The wooden housing and building of the 25-foot ventilating fan has been replaced with reinforced concrete and brick. The fan is reversible and fire-proof.

A new brick-concrete wash-house has been erected for the use of the employes, and equipped with 100 steel lockers, ten bath tubs, shower baths, hot and cold water and steam. The conveniences and sanitary arrangements are worthy of mention.

A brick-concrete mule hospital has been constructed.

Powder house has been changed to a more isolated place.

A new 8-inch bore hole driven for pump discharge from Bennett vein to the surface for a new pump in the Bennett vein.

Progress has been made in the reopening of the old caved district in the Red Ash vein. To this end a slope 1,500 feet long has been sunk through the old workings in the Red Ash vein and a tunnel 650 feet long driven from the Bennett vein to the Ross vein.

Additional bore holes have been completed for culm flushing, which has been extensively carried on during the last year, into the old workings.

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery, Outside.—The work of replacing old trestling work connecting No. 1 shaft landing with surface with re-inforced concrete, is now under way and will soon be completed.

The breaker building has been re-piped and is now heated with exhaust steam in a very satisfactory manner.

Considerable repairs and improvements, including the installation of mechanical pickers, etc., have been made at the breaker with very good results.

Inside.—The work of sinking No. 3 shaft, located on the Kingston Flats, from the surface to the Cooper vein to a depth of 783 feet, was completed by Messrs. John Pugh and Sons on September 12. This work was started September 13, 1907, thus making the time occupied in doing the work about two years. The erection of a steel tower over this shaft is now under way and will soon be completed.

The underground workings have been connected to the main shafts at Woodward, and the work of grading roads for the mining of coal in this neighborhood is now being done.

The No. 17 slope, or surface slope, was sunk from the Snake Island to the Abbott vein. A 16-foot ventilating fan was installed upon this slope, and is now in operation.

The following rock tunnels were driven:

(a) Rock slope through fault, Hillman to Kidney vein, on 8 per cent. dip, was completed.

(b) Second opening for this slope in 2 per cent. grade was completed.

(c) Rock tunnel, Cooper to Lance, on shaft level gangway, connecting old workings of Lance vein, was completed.

(d) The work of grading over and through anticlinal at foot of No. 1 slope, Red Ash vein, is now under way and will soon be completed.

(e) Short rock tunnel on No. 3 West lift, No. 2 Slope, Cooper vein to Cooper vein through fault, completed.

(f) Also rock tunnel from Cooper to Lance vein, No. 3 East lift, No. 1 slope, completed.

The electric sub-station at head of No. 2 slope, Cooper vein, is now in operation. The high tension lines are being carried from the Nanticoke power plant through a 6-inch bore hole to this room, where the current is transformed and distributed to the various points along the haulage roads.

In addition to this, 20 concrete arches have been erected in No. 1 tunnel, Red Ash vein, to replace timbering on main haulage road.

A triplex expansion pump at foot of No. 1 Shaft, to pump the water to the surface, is now under way and will soon be completed and installed in a concrete and steel pump room of large dimensions.

Avondale Colliery, Outside.—A concrete storeroom has been erected of sufficient capacity to handle all the supplies at the colliery.

The work of installing a 25-foot ventilating fan for auxiliary purposes to main shaft is progressing very well and ought to be in operation during the early part of 1910.

A new concrete and brick mule barn is also under way, and, when completed, the present dilapidated buildings, located but a short distance from the barn now being constructed, will be torn down.

Inside.—The new sub-station in No. 2 slope has been placed in operation, the high tension line being carried from the Nanticoke power plant through a bore hole to the sub-station.

An additional 14-inch bore hole has been connected to the No. 2 slope electric pump 800 feet deep, through which the water is now being pumped to the surface.

Two concrete and steel air bridges have been erected in No. 8 slope, which has improved the ventilation.

The work of extending rock tunnel from Ross to Mills vein is under way.

A small shaft to connect Nos. 5 and 7 slopes is being sunk for the purpose of ventilating the old workings in these slopes by return air currents.

The mule barn near foot of shaft has been practically rebuilt with concrete walls and floor, and conditions have been improved very materially.

Dundee Colliery.—Operations were started at this point August 16 for the sinking of two shafts, 50 feet 2 inches x 12 feet in the clear, to a depth of about 920 feet, to what is known as the "Hillman vein." Both shafts have been sunk to a depth of 48 and 58 feet, respectively.

In connection with the sinking of these shafts and the development of this important property, there appeared in the Wilkes-Barre Record of December 13, 1909, some very interesting reminiscences regarding the sinking of the old Dundee Shaft located about 1,250 feet southwest of this locality. The following is quoted from the Wilkes-Barre Record of the Times of December 7, 1859, fifty years ago, when the old Dundee Shaft pierced the Mills seam at a depth of 810 feet:

## BRIGHT COAL COMPANY

Hillside.—Safety, ventilation and drainage good.

## DUNN COAL COMPANY

Dunn.—Safety, ventilation and drainage good.

## IMPROVEMENTS

## KINGSTON COAL COMPANY

Kingston No. 2 Colliery.—A new manway has been completed in the Mountain Tunnel district from the foot of Rock slope to the surface.

A tunnel has been driven from the Ross vein through the Lift vein to the Bennett vein, making a second opening for No. 2 shaft.

The inside hoisting engine in Red Ash vein has been removed to the surface, rope being conveyed through bore hole to inside slope instead of through shaft-way.

Two new manways have been completed along the plane in the Cooper vein for the safe travel of men. Also reopened main gangways for width in Lance and Bennett veins.

New barn completed at foot of No. 2 shaft, with sheet iron, cement and concrete stalls, equipped with electric light. A similar outfit has been provided at foot No. 3 shaft.

A new brick-concrete locomotive house completed.

A new brick carpenter-blacksmith shop under construction to take the place of the old buildings around the head of Nos. 2 and 3 shafts.

Gaylord Colliery.—Completed brick and expanded metal concrete housing over 25 foot ventilating fan.

Complete brick pump house for silting pumps.

Installed two 12 by 8 by 12 boiler duplex feed pumps.

Installed new jigs in washery.

Tunnel 650 feet long completed from Checker vein to the Ross vein.

Old air shaft opened from Ross vein to Red Ash vein in squeezed territory, and steps placed in air shaft for a traveling way.

Red Ash slope has been extended through the squeezed territory to a total distance of 1,800 feet.

Two silt holes and one new rope hole were drilled. Silting operations have been carried on extensively during the year.

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery.—In the Cooper vein several air bridges have been rebuilt with concrete and steel.

The main haulage road has been timbered with creosote timber and the old timber taken out.

In No. 1 shaft concrete fire bosses' stations have been erected on the inside. The fire bosses are now located at the foot of these openings where they can better protect the entrance to the mine.

A tail rope has been installed on "G" gangway, Red Ash vein.

Twenty concrete arches have been erected in No. 1 tunnel. Several sets of treated timber upon which a comparison is to be made for future reference.

An old passenger coach has been equipped with the "Draeger Rescue Apparatus," consisting of four helmets, oxygen storage tanks,

electric lamps, pulmotor, etc. They also have a trained corps of employes who are able to equip themselves with this apparatus at any time in case of mine fire.

The working of installing two 20-foot Jeffrey ventilating fans on Woodward No. 3 shaft has been commenced and will be completed in the early part of 1911.

A massive steel frame has been erected over No. 3 shaft.

Avondale Colliery.—Outside: Erected new locomotive house for mine locomotive.

Breaker improvements consisting of additional rolls, elevators, etc.

Inside: The work of extending rock tunnel from Ross vein to Surface vein was progressing very well until interrupted by the general "squeeze" referred to above.

The work of installing a 25-foot ventilating fan is now being held up on account of inside conditions.

Loomis.—The work of sinking these two shafts is being proceeded with and they have now reached a depth of 465 feet in No. 1 shaft and 375 feet in No. 2 shaft.

A 20-foot Jeffrey ventilating fan is being installed on the air drift, equal distance from each shaft, which will provide sufficient ventilation when the desired seams have been reached and connections made.

The shafts are 54 feet 2 inches in length by 12 feet in the clear, and are being timbered with wall plates and studdles from the concrete foundation wall to the bottom.

The outside improvements at these openings are of a temporary nature.

### MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held at Plymouth, Willow Street School, April 19 and 20. The Board of Examiners was composed of the following members: D. T. Davis, Mine Inspector; Thomas R. Evans, Superintendent, Plymouth; William Toner, Miner, East Plymouth, and James Addis, Miner, Edwardsville.

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

#### Mine Foremen

John Cassidy, Plymouth; Daniel D. Davis, Kingston; James B. Lewis, Plymouth; Richard Lewis, Plymouth; Samuel Pritchard, Edwardsville; George A. Spare, Larksville; William Walters, Plymouth.

#### Assistant Mine Foremen

Edward P. Davis, Edwardsville; Thomas Dougherty, Plymouth; William Edwards, Plymouth; James Wolf, Plymouth; David J. Thomas, Edwardsville; Handel J. Jones, Wilkes-Barre; Thomas E. Jones, Plymouth; Addison Keating, Edwardsville; William King, Lee Park; Andrew Mahler, Plymouth; Thomas Morcom, Plymouth; John Mitchell, Plymouth; George McKechnie, Edwardsville; Joseph G. Morris, Edwardsville; William J. Morgan, Plymouth; John Nichols, Plymouth; John L. Picton, Plymouth; Timothy Price, Edwardsville; Charles Roberts, Plymouth; Thomas Rowlands, Edwardsville; William Russell, Courtdale; Thomas H. Rowlands, Plymouth.

## LEHIGH AND WILKES-BARRE COAL COMPANY

Nottingham No. 15 Colliery.—Outside: Wash house at Reynolds.  
Feed water system.

Inside: New manway for No. 1 slope.

One compressed air locomotive installed.

No. 5 tunnel, Ross to Top Ross.

Started remodeling pumping plants, No. 1 slope.

New rope hole for No. 2 slope.

No. 8 tunnel, Ross to Surface.

No. 9 tunnel, Surface to Baltimore.

One compressed air locomotive installed.

Lance No. 11 Colliery.—Outside: Wash house.

Five hundred H. P. boiler.

Inside: 12 by 16-inch hoisting engines provided for No. 19 plane.

Three compressed air locomotives installed.

No. 12 plane extended from Baltimore to Cooper and 12 by 16-inch hoisting engines provided.

Double-tracking No. 4 tunnel.

Inman No. 21 Colliery.—Developing in Baltimore vein.

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery.—The No. 3 shaft connecting with Nos. 1 and 2 main shafts has been equipped with two Jeffrey multi-blade 20-foot ventilating fans, which are now in running order and are capable of producing 420,000 cubic feet of air per minute.

In No. 2 shaft there is also under way and almost completed a multi-blade, Jeffrey 20-foot ventilating fan, which will take the place of two 16-foot fans now operating on this shaft.

The breaker building has been equipped with galvanized or iron dust boxes, connected to a 14-foot direct driven fan installed in a brick and concrete building.

A large exhaust steam generator is now being installed, housed in a brick and concrete building, near the No. 1 shaft ventilating fan, which will generate considerable power for this colliery.

No. 17 slope from Surface to Snake Island or Abbott vein, has been connected by parallel tunnels for second openings and return.

Two rock tunnels have been driven from Cooper vein to Lance vein for development and ventilation.

The work of erecting concrete arches and of grading a main haulage road to Woodward No. 3 is under way, and they expect to have the same finished during the early part of 1912.

A large triple expansion pump, 3,500 gallon capacity, has been installed at the foot of shaft, Red Ash vein, to pump water to the surface. It is housed in a concrete and steel building lighted with electricity.

During the year the colliery has been equipped with four Draeger helmets, known as "Life-saving Apparatus," and men have been trained in their use.

The work of rebuilding pump-rooms, engine houses and mule barns with incombustible material is about completed.

The condition of the colliery's workings from a safety standpoint is receiving the attention of the officials, and every effort is being made to reduce the number of accidents.

## LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

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

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

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

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

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

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

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

## PARRISH COAL COMPANY

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

Outside: Washery was completed.

## GEORGE F. LEE COAL COMPANY

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

## WEST NANTICOKE COAL COMPANY

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

## BRIGHT COAL COMPANY

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

## IMPROVEMENTS

## LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

Outside:—Completed power house.

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

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

## DELAWARE AND HUDSON COMPANY

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

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

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

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

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

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

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

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

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

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



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

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

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

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

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

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

Installed two 20-foot fans outside.

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

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

#### KINGSTON COAL COMPANY

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

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

tunnel airway, Abbott to Abbott; No. 15 tunnel, Baltimore to Five-Foot; No. 9 rock plane, Stanton to Hillman, and rock slope on shaft level.

Outside: Completed an oil and lamphouse, washhouse, lumber shed and motor house. Installed a 27 by 40 by 22½ by 30 inch air compressor and fuel conveyor.

At the Parrish, changes were made to breaker so as to connect with washery operations. Completed lamphouse and inside foreman's office, oilhouse and blacksmith shop.

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Avondale Colliery.—Completed rock tunnel from Ross vein across measures to Hillman vein, a distance of 1650 feet, and made a second opening for same; also rock tunnel through fault in No. 10 slope and rock return airway, parallel with No. 2 slope, to assist in ventilating the live workings. Built a blacksmith and carpenter shop of concrete and brick. Installed pumps for unwatering the mine workings flooded in November, 1910, and pumping equipment in No. 5 slope section of Ross vein. The installation of this pumping equipment has been very costly and the expense of reopening the colliery shows that to mine anthracite coal in the Wyoming Valley requires capital, as the dangers from flooding are quite imminent.

Loomis Colliery.—This colliery is, perhaps, the most wonderful operation of its kind in style and construction, that has ever been erected in the anthracite region. The breaker building and annex or washery is practically fireproof, and is constructed of concrete, steel and wire glass, and all the other buildings are most modern in their equipment. The breaker will be completed during the year 1916. It is electrically operated, with separate units, and is expected to have a large capacity. There are already miles of gangway developed, so that a large tonnage might be expected as soon as the breaker is placed in operation. The work of sinking No. 3 shaft, near the Susquehanna River, is underway. The shaft will be sunk to a depth of about 660 feet to the Hillman vein. The old Dundee shaft is also to be widened and sunk to the Ross vein bed.

Woodward Colliery.—Preparations are now being made to reconstruct the breaker of concrete, steel and wire glass; this building was placed in operation during the year 1888. It has been a large producer for the past ten years. It was the first breaker that prepared 1,000,000 tons of coal in a year, which was accomplished in 1905. Side walls are being built and "I" beams placed for roof support, instead of ordinary mine timber along the haulage roads. This is in line with the progressive movement established some years ago by this company. Completed the driving of rock tunnels for the necessary development and transportation of the coal.

#### DELAWARE AND HUDSON COMPANY

Plymouth No. 2 Colliery.—In November the breaker was abandoned and the coal is now being prepared at Plymouth No. 5 breaker. Completed a tunnel, 290 feet, from the Stanton vein to the Hillman vein.

## EXPLOSION AT WOODWARD COLLIERY.

### REPORT OF INSPECTOR D. T. DAVIS, TWELFTH DISTRICT

August 8, 1916, an explosion of gas occurred at Woodward Colliery, No. 3 Shaft, No. 26 Slope, Hillman vein, of the Delaware, Lackawanna and Western Railroad Company, by which 6 persons were killed.

No. 3 Shaft is sunk to the Baltimore vein at a depth of 815 feet and penetrates the vein on the Southrise.

The Hillman vein development is principally in No. 26 Slope, pitching from 12 degrees at the head of the slope and varying to almost level at other parts. The development is proceeding very rapidly. All the work, practically, is double shifted. The seam is known to be very gaseous, and in order to protect life, improved locked safety lamps are used exclusively, and permissible explosives, with their equivalent detonators, are used for blasting and fired by electric batteries.

The great majority of the persons employed at No. 1 East 26 slope, Hillman vein, had quit work for the day after the semi-weekly measurement of their places had been taken, a short time prior to the explosion. If they had remained at work the loss of life would no doubt had been much greater.

Walls and brattices were completely destroyed in this lift. The force of the explosion was so great that it was noticeable to all the workmen in all the other parts of the Hillman vein.

Realizing the danger from after-damp, the men hurried to the shaft. It was evident from the destruction that the fire damp had reached its most explosive point. Concrete walls, 9½ inches in thickness, between the main slope and slope airway, above and below 1st West, where the explosion occurred, were moved out a distance of over three feet, and parts of the walls blown out ranging from three feet four inches to four feet four inches and to seven feet four inches, while walls in close proximity to the lift were blown to atoms. The slope road moved 2 feet from its alignment, and "T" iron rails constituting a portion of the slope road were torn from their fastenings and turned on their sides. Doors were converted into matchwood and scattered in every direction. A trip of empty cars standing several hundred feet above No. 1 West lift on the slope branch was derailed and several cars were thrown across the track. A loaded car was standing a short distance in the lift where the explosion occurred and the rear mule of a team was hooked to the head of the car. The topping and a large portion of fine coal in the car had been blown away and the lead mule was found in the rear of the loaded car. The doorboy, John Litwok, was blown up the slope a distance of 90 feet and probably dashed against the pillar. When his body was found he still held the handle of the door gripped tight in his hand. The bodies of Globoski, a runner, and Hilton, a footman, were found close to where they were engaged at work when the explosion occurred.

There is sufficient evidence to show that the entire atmosphere of No. 1 West gangway had reached a fire-damp mixture of a highly explosive character which, when it ignited, made this passageway a veritable seething furnace.

### REPORT OF COMMISSION OF INSPECTORS

We, the undersigned inspectors, at the request of the Chief of the Department, accompanied Inspector D. T. Davis, to the Woodward colliery, No. 3 Shaft, No. 26 Slope, No. 1 West Hillman vein, of the Delaware, Lackawanna and Western Railroad Company, August 8, to investigate the cause of an explosion that had occurred that day. We entered the mine before all the bodies had been removed to the surface, and upon information from the colliery officials that the dead and injured had been removed from the section where the explosion occurred, we proceeded to make an investigation as to the cause of the accident.

When the explosion took place, the main current of air was short circuited, which allowed a large quantity of gas to accumulate in all portions of the slope workings. This gas was rapidly being removed by the use of boards and canvas, that were substituted in place of doors, and walls which had been destroyed by the force of the explosion.

After the gas had been removed we proceeded with our examination, and found that the explosion had taken place in No. 1 West Gangway, No. 26 Slope, Hillman vein. This slope, as shown by the map, is in an early stage of development and is double shifted throughout.

The records of the second assistant foreman in his early morning examination of this date show that he found the slope clear of gas, with the exception of a very small quantity that had accumulated in a crosscut in the lift above from where the explosion occurred. This was removed at 8.00 A. M. and the place made safe.

After our examination had been completed we decided to wait until the slope was placed in its original condition. On September 5, the work of reconstruction had been completed, and on September 6, accompanied by Mr. Henry G. Davis, Efficiency Engineer, Richards Thomas, Superintendent, and William White, Inside Foreman of the Woodward mine, we completed our investigation. We are unanimous in our opinions that the three main doors on the cutoff between the slope and slope airway, No. 1 West, No. 26 Slope, were responsible for the short circuiting of the air current, remaining open for such a length of time as to permit the air in No. 1 West Gangway to reach an explosive condition. As the percentage of gas in the air was gradually increasing, the intensity of the heat, due to the elongation of the flame, shattered the glass of Stanley Puzia's lamp, which permitted the flame to communicate with the external air, thereby causing the explosion.

No open lights are allowed in No. 3 Shaft. The employes working in the Hillman vein use nothing but safety lamps. The lamps used are the Wolf, Koehler and Kramer, with Pyro metal igniters and

magnetic lock. Monobel, a permissible explosive, is used for blasting and fired by an electric battery. We also suggested to the officials of the mine that some change should be made in the ventilating system. The officials looked with favor upon the suggestions, and decided to suspend operations in No. 26 Slope, Hillman Vein, until such time as required to complete the work.

Appended hereto are the mine tracings showing the location of the explosion.

D. T. DAVIS,  
Inspector 12th District.  
JOSEPH J. WALSH,  
Inspector 14th District.  
THOMAS J. WILLIAMS,  
Inspector 11th District.  
JOHN B. CORGAN,  
Inspector 10th District.

#### VERDICT OF CORONER'S JURY

"The said Stanley Puzia came to his death by an explosion of gas which occurred in the Woodward Colliery of the Delaware, Lackawanna and Western Coal Company at Edwardsville Borough, Luzerne County, on the 8th day of August, 1916. The cause of the explosion is unknown to the jurors.

E. R. Morgan, John D. Williams, D. R. Lozo, James Williams, W. H. Chapin, Albert E. Miller, Jurors."

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#### INCREASE IN INSPECTION FORCE

By the act of June 1, 1915, four inspectors were added to the force: Three in the first election district, Luzerne county, and one in the second election district, Lackawanna county. This increases the number of Inspectors from twenty-one to twenty-five. The new districts are Nos. 22, 23, 24 and 25. With an augmented inspection force, more frequent inspections can be made of the mines and it is the hope of the Department that there will be a decided decrease in casualties.

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#### WORK OF THE MINE INSPECTORS

During the year they spent 4,526 days inspecting mines; 160 days inspecting machinery and plants; 407 days investigating accidents; 81 days attending inquests; 1,333 days at office work; 16½ days inspecting maps and plans; 465½ days in consultation on mining matters; 11 days in consultation on legal matters; 83 days traveling on duty; 99 days on sick list; 152 days legal holidays; 89½ days attending court; 15 days at mine fires; 164 days on Mine Foremen's Examining Boards; 36 days attending mine inspectors' examination;

## CONDITION OF COLLIERIES

### DELAWARE AND HUDSON COMPANY

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

### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery.—Safety conditions, ventilation and drainage, good.

### LEHIGH AND WILKES-BARRE COAL COMPANY

Lance No. 11 and Nottingham No. 15 Collieries.—Safety conditions, ventilation and drainage, good.

### KINGSTON COAL COMPANY

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

### PLYMOUTH RED ASH COAL COMPANY

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

### SHAWNEE COAL COMPANY

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

## IMPROVEMENTS

### DELAWARE AND HUDSON COMPANY

Plymouth No. 3 Colliery.—Completed a tunnel and return airway, 150 feet long, through fault in the Stanton vein. The shaft landing in the Five Foot bed was secured by concrete walls and steel beams.

On December 2, 1916, the breaker was completely destroyed by fire, and the coal from this opening is being prepared at Plymouth No. 5 breaker.

In No. 3 shaft, a tunnel 150 feet long and a return airway 40 feet long were completed from the Top Red Ash to Ross vein. A tunnel from the Stanton to the Five Foot bed was driven 200 feet.

Plymouth No. 5 Colliery.—A tunnel 290 feet long and a return airway 80 feet long were driven from the Bottom to the Top Red Ash. Four tunnels, averaging 120 feet in length, were driven from the Top Red Ash to the Three Foot bed.

Installed a 2,000 G. P. M. pump to pump from Bottom Red Ash to surface.

The mouth of No. 1 tunnel was secured by concrete walls and steel beams.

### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery.—Completed a rock tunnel for haulage from the Lance to the Five Foot vein; distance 654 feet. Ventilation tun-

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

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

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

#### LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

#### KINGSTON COAL COMPANY

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

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

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

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

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

#### MINE FOREMEN'S EXAMINATIONS

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

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

#### MINE FOREMEN

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

PA Mine Inspection 1916

## CONDITION OF COLLIERIES

### DELAWARE AND HUDSON COMPANY

Plymouth No. 5 Colliery.—Ventilation, drainage and condition as to safety, good.

### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

### LEHIGH AND WILKES-BARRE COAL COMPANY

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

### KINGSTON COAL COMPANY

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

### PLYMOUTH RED ASH COAL COMPANY

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

### SHAWNEE COAL COMPANY

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

## IMPROVEMENTS

### DELAWARE AND HUDSON COMPANY

Plymouth No. 5 Colliery.—At Plymouth No. 2 completed a slope from surface to Primrose bed, a distance of 160 feet, and an air shaft, 42 feet deep, from the surface.

Plymouth No. 3.—Completed No. 20 tunnel, Stanton to Five Foot vein, a distance of 600 feet; No. 20 tunnel, Five Foot to Cooper vein, a distance of 450 feet, and a slope from the surface to Snake Island bed, 140 feet long.

Plymouth No. 4.—Completed rock plane, Top Red Ash to Ross vein, and an air return Top Red Ash to Ross bed.

In the Boston section completed No. 14 tunnel, Top Red Ash to Bottom Ross, a distance of 250 feet, and an air return from Top Red Ash to Ross vein, a distance of 60 feet.

All coal in the Plymouth Division is prepared at Plymouth No. 5 breaker since the destruction of Plymouth No. 3 breaker by fire in December 1916.

### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Woodward** Colliery.—The entire mine was thoroughly sectionalized and each section foreman had a concrete building erected in his respective section, equipped with an electric heater and telephone so that he can give his entire time to care and direction of his section.



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

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

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

#### LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

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

#### KINGSTON COAL COMPANY

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

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

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

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

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

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

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

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

#### MINE FOREMEN'S EXAMINATIONS

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

## REORGANIZATION OF THE DEPARTMENT OF MINES

In compliance with the wishes of Governor Fisher, as expressed in his inaugural address, the Department of Mines was reorganized in order to give the mining industry the best service possible. The reorganization took effect July 1, 1927. A head of the Department, designated as the Secretary of Mines, was named and two additional Deputies were appointed to have charge, respectively, of the Anthracite and Bituminous Divisions, which heretofore had functioned directly under the Secretary of Mines. Four electrical inspectors were temporarily engaged, one of whom was retained permanently, whose duties were to examine in detail all enclosed electrical machinery in use in the gaseous mines and report the condition to the District Mine Inspectors.

Contact was made by the Secretary of Mines with National bodies interested in questions of freight rate regulations, mining legislation, mechanization of mines, Mine Rescue and Safety work, and education of those engaged in the mining industry. Close relations were established between the operating end of the industry and the Department of Mines with the object of reducing the accident toll and simplifying and standardizing the reports submitted by the operators to the Department.

## MINE CATASTROPHES

### **WOODWARD** COLLIERY CAVE-IN AND EXPLOSION

"Catastrophe" is the term applied to an accident in which five or more lives are lost. An accident of this kind occurred May 26, 1927, at the Woodward Colliery of the Glen Alden Coal Company, Edwardsville, Luzerne County, Pa., when a cave-in and explosion of gas caused the loss of seven lives. The report of the Inspector who investigated the accident is given below:

"Nine miners were at work cutting and loading coal on 9 west counter when the explosion occurred and the cave-in took place. In about fifteen minutes after the cave-in, a very severe concussion took place due to an explosion of gas.

After all the persons had been removed from the mine, the company mustered the officials from the other collieries of the company. Several of the mine inspectors who had heard of the accident reported to the mine and with the colliery workmen, descended the shaft to the Baltimore vein. We discovered stoppings, doors and one air bridge had been destroyed by the explosion. On the main haulage road considerable debris had been scattered about, trolley lines were down, stringers and props were lying about, many of them scorched. Two small fires were started by the explosion, but were easily extinguished. An effort was made to go in 10 west return which is only a short distance from 9 west counter where the three miners were working. The current in 10 west return was found to be highly explosive. An effort was made to reach 9 west counter from 9 west gangway. We found the passageways filled with coal and evidence of the squeeze still continuing. There was slight evidence of afterdamp; no smoke could be detected in the air. The fan was not affected by the explosion and was working at its normal speed. In the afternoon efforts were made to restore ventilation and the night was spent in cleaning and propping the principal

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

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

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

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

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

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

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

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

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

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