

improving the ventilation a 24-foot Guibal fan was erected, run by a horizontal engine, 20x36-inch. Under a speed of 50 revolutions and one inch water gauge, it is exhausting 120,000 cubic feet of air per minute. The upcast has an area of 136 feet and the downcast an area of 100 square feet.

The **Buttonwood** shaft, which is an opening for a new colliery, was sunk to a depth of 680 feet, having cut four coal seams. The air shaft connected therewith is at a depth of 400 feet, having a sectional area of 12x22 feet.

The new breaker is in course of construction and will be ready to ship coal to market some time in 1894.

Improvements by the Newport Coal Company.

At the Lee colliery a new shaft was sunk to work the basin south of the breaker. Its size is 12x15 feet and depth at present 200 feet, and it has cut the Hillman and the upper split of the Baltimore seam. A second opening is effected by connecting to the slope.

PUMPING BY ELECTRICITY.

The first electric pump in this district was introduced into the Woodward colliery of the Delaware, Lackawanna and Western Railroad Company, to be used instead of the steam pump in the red ash seam slope underground. The heat radiating from the steam pipe was detrimental to the ventilation, and in order to dispense with it, the electric pump was introduced on trial and it has proven very satisfactory. The power station is located in the hoisting engine house on surface. The generator is a No. 25 Thomson-Houston machine of 500 volts, driven by a Ball & Wood automatic engine. From the power station two No. 0 B. & S. wires run overground to the air and drop down the shaft to the red ash seam. They simply hang down the shaft from the hangers at the top. From the shaft bottom to the bottom of the slope they are conducted down the return airway, one on each side. The pump is a horizontal triplex, single acting, with bronze outside packed plungers, 6½x8 inches. It is mounted on a truck which constitutes its frame and is furnished with wheels so that it may be quickly moved. It is operated by a 20-horse power motor, the frame of which makes a casing to protect the motor in case of falls or droppings of water. The motor actuates the pump through double reduction cut spin-gears; the high speed pair is running in a gear case filled with oil. On the left of the motor is the rheostat for starting and stopping the machinery. At this point sparks are emitted which would make it unsafe to run in case a squeeze should take place releasing an extra volume of explosive gases. This makes it necessary to keep the steam pump in place ready for emergencies of this character.

CLASSIFICATION OF FATAL AND NON-FATAL ACCIDENTS.

Causes of Accidents.	Killed or fatally injured.	Severely injured.
By explosions of fire-damp,	7	33
By falls of roof and coal,	44	68
By falling down shafts,	2	. . .
Crushed and run over by mine-cars,	7	59
By explosions of powder and blasts,	4	23
By miscellaneous causes underground,	6	27
By miscellaneous causes on surface,	7	23
Totals,	77	233

Number of widows, 46; orphans, 182.

The Collieries of the Fourth District.

During the year 1894 there were forty-three breakers and sixty-six openings at work more or less time, mining and preparing coal for market in the Fourth Anthracite district. An average of 46,789 tons per day worked was produced, making a total production of 7,162,961 tons in an average work of 153.1 days.

The collieries in operation less than 153.1 days were those of the Lehigh and Wilkes-Barre Coal Company. The No. 3 colliery of the Delaware and Hudson Canal Company, which, after working 153 days, was destroyed by fire on the evening of November 15, and remained idle the remainder of the year. The No. 3 colliery of the Susquehanna Coal Company, where the production is not sufficient to keep the breaker working all day owing to the partial exhaustion of the mine. The Gaylord colliery of the Kingston Coal Company, several weeks' idleness caused by the disastrous cave of February 13th. The collieries of the Lehigh Valley Coal Company, the Red Ash Coal Company, the Parrish Coal Company, the Maffet colliery of the Hanover Coal Company, and the Warrior Run colliery of Mr. A. J. Davis.

The Lee colliery of the Newport Coal Company did not work more than 100 days. It was suspended on August 25th, and since then has passed into the possession of another company. The **Buttonwood** colliery of the Parrish Coal Company is an old mine enlarged and reopened. It was lying idle since 1866. The shaft was enlarged and sunk to a deeper seam and a new breaker was erected. It began shipping coal in September, 1894, and worked 50 days until the end of the year.

William H. Sayre, second vice president, South Bethlehem, Pa.

John R. Fanshawe, secretary, Philadelphia.

John B. Garrett, treasurer, Philadelphia.

Israel W. Morris, general land agent, Philadelphia.

W. A. Lathrop, general superintendent, Wilkes-Barre, Pa.

Directors, Robert H. Sayre, George H. Myers, Joseph Wharton, Thomas McKean, Beauvèau Borie, John B. Garrett, Wm. L. Conyng-
ham, James I. Blakslee, C. O. Skeer, Charles Hartshorne, W. A. Ing-
ham, John R. Fell.

Collieries of the Miscellaneous Coal Companies.

Beside the collieries commented on in the foregoing articles, there were twelve collieries operated by smaller companies in the Fourth district. These together produced 1,296,722 tons of coal and shipped to market 1,192,806 tons, in an average of 129.76 days of work. They employed 3,890 persons and mined 185,246 tons of coal per life lost. Three of the seven fatal accidents took place in the Hillman vein colliery, two in the West End, and one each in the Alden and Dodson collieries. The Nos. 1 and 2 collieries of the Red Ash Coal Company, the Parrish and **Buttonwood**, of the Parrish Coal Company, and the Maffet, Warrior Run, Lee and Chauncey, did not have one fatal accident.

These mines are all in safe condition and efficiently ventilated. More or less firedamp is emitted in each, but not in such quantities as we find in the deeper mines. They are working closer to the outcrops where the roof is generally better than in the deeper portions of the basin.

The names of the collieries and of the officers are as follows:

Nos. 1 and 2 Red Ash Coal Company.

M. B. Williams, general superintendent, Wilkes-Barre, Pa.

P. H. Ganahan, assistant general superintendent, Wilkes-Barre,
Pa.

Daniel J. James, mine foreman No. 1 Red Ash.

Joseph Hopie, outside foreman No. 1 Red Ash.

Timothy Theopilus, mine foreman No. 2 Red Ash.

John Herriotts, outside foreman No. 2 Red Ash.

Officers of the Parrish Coal Company.

H. H. Ashley, general superintendent, Plymouth, Pa.

Thomas R. Evans, general mine foreman, Plymouth, Pa.

Parrish colliery, Henry G. Wililams, inside foreman, Plymouth,
Pa.

Parrish colliery, Thaddeus Eddy, outside foreman, Plymouth, Pa.

Buttonwood colliery, Wm. T. Pritchard, inside foreman.

Buttonwood colliery, Merrit Frederick, outside foreman.

Improvements by the West End Coal Company.

A new slope was opened at the West End colliery on the Red Ash seam and sunk to a depth of 500 feet, having an average grade of 10 degrees. When completed it is expected to be about 3,000 feet in depth.

Improvements at the Warrior Run Colliery.

A new fan was erected at this colliery to replace an old one. It is 20 feet in diameter, run by an engine 16-inch diameter, directly connected. At a speed of 62 revolutions per minute 86,000 cubic feet of air is exhausted, the water gauge being 1.8 inches.

The Buttonwood Colliery.

This was an old colliery and was abandoned in 1866 after working but a short time. The Parrish Coal Company re-opened it under a lease from the Lehigh and Wilkes-Barre Coal Company. During the years 1892, 1893 and 1894. The shaft was enlarged to a size of 32x12 feet and sunk through four coal seams, the lowest of which is cut at a depth of 686 feet, which is the present depth of the shaft. They are working the two lower seams, viz: the Hillman and Bennett.

An air shaft was sunk from the surface to the Hillman seam, a depth of 574 feet, having an area of 12x22 feet. The two lower seams are connected also by a tunnel 370 feet in length. A tunnel is being driven to the Kidney seam, which was driven a distance of 42 feet at the end of the year. When this is completed, the workings of the three seams will be connected to the air shaft, which is the second opening.

A new 24-foot fan was erected on the top of the air shaft, run by an engine 20x36 inches, directly connected. At 48 revolutions it is exhausting 93,600 cubic feet of air per minute, with a pressure of .7 inch water gauge.

The new breaker was completed and started to ship coal in September, 1894. It is substantially built and equipped with the best kind of machinery, and every dangerous part is protected by railing or covering, as the law requires. At the shafts and breaker there are three pairs of hoisting engines, aggregating 2,170 horse power.

Concerning the history of the Old Buttonwood colliery and the cause of its abandonment, the following account was kindly furnished by Mr. James E. Roderick, who was in charge at that time.

Stockton, Pa., February 28, 1895.

Mr. G. M. Williams,

Inspector of Coal Mines:

My Dear Sir: Yours of the 26th received. In reply will say that in the early part of 1866 John T. Griffith secured the contract of Buttonwood shaft to put the coal on big cars at so much per ton. Some

Improvements by the Susquehanna Coal Company.

This company drove a tunnel from the George to the same seam which is 700 feet long.

Two tunnels were also driven which are not yet completed. One from the Mills to the Mills seam 8x14 feet area which is now 300 feet long. The other tunnel is from the Hillman to the Hillman, through an anticlinal, having an area of 8x14 feet and is also 300 feet long.

The Kingston Coal Company.

In the No. 1 colliery an air shaft has been sunk from the Cooper to what is thought to be the Bennett seam and a short tunnel has also been driven from the Checker to the Bennett seam. The size of the shaft is 8x10 feet; depth, 125 feet; size of tunnel, 7½x12 feet and 250 feet in length.

Lehigh Valley Coal Company.

At the Dorrance colliery a new slope has been driven from the Hillman seam through the rock on a grade of 7 degrees to the Baltimore seam and following that seam on the north rib of the anticlinal. Its length is 1,300 feet and size 8x12 feet.

At the Franklin colliery a slope has been sunk from the outcrop on the next small seam above the Baltimore. It is 1,000 feet long and will work the upper lifts of said seam. A new fan has been also erected at this colliery to ventilate the upper seams. It is fifteen feet in diameter and operated by a vertical engine. It is the first machine put up in this district to act as a forcing fan. The conditions here are favorable for that, but in gaseous mines where the haulage roads would be the return airways such a method is not practicable.

The Parrish Coal Company.

The inside slope in this mine has been extended to a length of 3,814 feet. It was 3,216 feet before.

At the **Buttonwood** colliery two tunnels have been driven, one for coal haulage from the Hillman to the Kidney 335 feet long, and one for ventilation and "second opening" from the old Bennett to the Hillman seam. This is 62 feet long and has an area of 70 feet.

New Breaker at Warrior Run Colliery.

The old breaker having worn beyond the power of repair has been replaced by a new one having a capacity of about 1,000 tons per day. The machinery and stairs are boxed and fenced in a satisfactory manner. The old one was abandoned at the beginning of

Buttonwood

A compressed air locomotive was put in the No. 6 slope to haul the coal from the foot of the planes to the bottom of the slope. This is the second one put in at this colliery and they work very satisfactorily.

Improvements by the Kingston Coal Company.

In the No. 1 shaft a tunnel was driven from the Cooper to the Lance, having 8x12 feet area and 300 feet in length.

One gravity plane 600 feet long was finished and another is being made.

In the No. 3 shaft a tunnel was driven from the Ross to the Red Ash, 420 feet in length and 8x12 feet area.

Improvements by the Delaware, Lackawanna and Western Railroad Company.

In the Bliss colliery two new rock tunnels were driven; one 681 feet long, from the Ross to the Ross seam across a basin, and one from the Baltimore to the Baltimore seam 400 feet across the same basin. Both have a sectional area of 84 square feet.

The Auchincloss shafts were both sunk at the close of the year to a greater depth than any other shafts in this region. The No. 1 was at a depth of 1,719 feet and the No. 2 at a depth of 1,692 feet. Both will be completed during 1897.

Improvements by the Parrish Coal Company.

In the **Buttonwood** mine four new gravity planes varying in length from 300 to 800 feet were made. Three are in the Hillman and one in the Kidney seam. A slope is in progress of sinking on the Hillman to work the coal to the dip from the shaft. It was at a length of 240 feet at the close of the year.

Improvements by the Plymouth Coal Company.

The rock slope in the Dodson mine was extended from the Ross to the Red Ash seam, an extension of 298 feet. Size, 14x8 feet. Also, another rock slope for second opening 275 feet and 14x8 feet area. These slopes open the Red Ash seam for this colliery.

There were a number of short tunnels, gravity planes and other minor improvements made at a number of the mines, but they were of minor importance and so are not recorded.

which is now at a depth of 201 feet. Its size is 43 feet 2 inches by 12 feet. The second shaft is the Auchincloss which is at a depth of 130 feet, and the third is intended to be an air-shaft and second opening, and is at a depth of 130 feet. The three are the same size h. y. $23\frac{1}{2} \times 12$ feet. They are to be sunk to the lower seam, which is at a depth of about 700 feet.

The Parish Coal Company is reopening the old **Buttonwood** shaft and enlarging it. At the end of the year it was opened to a depth of 443 feet, and in its enlarged size of 32×12 feet, it has passed one of the seams partially mined when it was in operation about 25 years ago.

The Newport Coal Company is sinking a new shaft $15\frac{1}{2} \times 12\frac{1}{2}$ feet which is now at a depth of 70 feet and is expected to cut the Ross seam at a depth of 400 feet, and they expect to work the Ross and a split of the Baltimore seams.

There were a number of improvements effected beside those recorded above, such as additional steam boilers, pumps and machinery, and improvements in the distribution of the ventilation, and in the condition of the collieries in and out, which would be of no special interest to note in detail, in this report.

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.

Parrish Coal Company, 1899.

During the year 1899 the following improvements were made by the Parrish Coal Company:

At the **Buttonwood** colliery three return tubular boilers, made by the Philadelphia Iron Works, 6 feet in diameter and 18 feet long, having 150 horse power each; an additional 20-foot fan, operated by a 16x24-inch engine, and a Vulcan duplex air compressor, 20x30 inches, with a 20-inch air chamber, have been put in place and are now in operation.

A plane has been driven in the Hillman vein 1,000 feet long, and is being operated by a pair of 14x24-inch engines, run by compressed air.

The No. 3 plane has been extended 1,000 feet, and a pair of 12x24-inch engines placed to run it.

A large part of the gangways and airways have been enlarged and retimbered, and the Kidney plane has been enlarged and retimbered. This, in connection with the new fan, has increased the ventilation a great deal.

At the Plymouth colliery, three return tubular boilers, similar to those at Buttonwood, have been put in place, and are now in operation.

An air shaft 42 feet deep has been sunk to the Baltimore vein, and an additional 20-foot fan having been put in operation, and the slope airways having been enlarged, the ventilation has been greatly increased.

A bore hole has been put down to the Baltimore vein and steam pipes put in, thus carrying the steam directly to the pumps.

A tunnel 250 feet long has been driven from the Baltimore vein to the Five Foot vein, and another tunnel, 350 feet long, has been driven from the Five Foot vein through an overlap to the Cooper vein.

Explosion at the **Buttonwood** Colliery.

An explosion of fire damp; causing the death of six men and seriously injuring six others; occurred at about 2 o'clock P. M., October 25, 1901, at the Buttonwood colliery of the Parrish Coal Company. At 1 P. M., as William Morris, who was driving the No. 4 Hillman seam plane extension, was unloading a set of cross-timbers from a car at the face, his laborer ignited some feeders with his naked light, which slightly burned two laborers in the face of the airway which is driven parallel with, and for the purpose of ventilating the plane. Morris and his laborers and August Weiss, the airway miner, thought they had extinguished the burning feeders and went home with the injured men.

When the report of the accident reached the foot of the shaft, the assistant foreman, Ebenezer D. Williams and Gomer Williams, taking with them a number of men, started up the plane, but were assured by Morris and Weiss, whom they met near the foot, that the fire had been extinguished, but that they had better make a thorough examination to satisfy themselves.

When they were near the head of the plane, a second explosion took place, instantly killing Ebenezer D. Williams, assistant foreman; Gomer Williams, assistant foreman; Thomas Guest, pipeman; Thomas Price, tracklayer, and William S. Phillips, company miner, and fatally injuring Daniel Davies, pulleyman, who died on the 27th; also seriously injuring Daniel Davies, mine foreman; Evan Evans, bratticeman; William Frey, tracklayer, and Patrick McHale, doorman.

The ventilation in this part of the mine, under normal conditions is very good, amounting to 30,000 cubic feet of air per minute at the face, but the gangway had met a fault in the coal, which gave off a large increase of gas, so that the feeders could be ignited anywhere from the face of the gangway along the rib for sixty feet down the airway. From the evidence presented at the coroner's inquest, it appeared that when the laborer ignited the feeders at the corner of the cross-heading in the gangway, the flame ran across the face of the gangway in one direction, and in the other, it went through the cross-heading and down along the left rib of the airway, doing but little damage excepting to burn the two laborers and disarrange the ventilation which permitted the accumulation that caused the second explosion. There is no doubt but that there was a small feeder left burning alongside the rib of the airway, and when the gas came in contact with it, the second explosion occurred.

The coroner's jury in its verdict recommended that in mines generating explosive gases, no other light save that of a locked safety lamp should be used; and that flameless powder be used exclusively in blasting.

LEHIGH AND WILKES-BARRE COAL COMPANY

Lance Colliery

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

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

Nottingham Colliery

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

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

Reynolds Colliery

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

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

Wanamie

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

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

PARRISH COAL COMPANY

Parrish Colliery

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

Buttonwood

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

PARRISH COAL COMPANY

Parrish Colliery

One Knowles pump, 18½x8x18 inch (inside); one compressor, 20x30 inch (Duplex); Norwalk compressor, 20x24 inch, set on concrete foundations; new compressor room, 46x56 feet, old Duplex compressor 24x36 feet moved from old building to new compressor building; one 12 foot fan for breaker; four new emery pickers for breaker; re-timbering No. 1 slope for 206 feet from day-light to rock with 12x16 inch Georgia pine, with the exception of about 40 feet near surface, size 12x12 inch (inside); conducted 8 inch line for distance of 500 feet down slope, from air receiver at compressor room, size 36x36 feet (inside); elevated tracks from head of surface slope to foot of breaker plane 1,000 feet; all the above compressors located in new building on concrete foundations.

Buttonwood Colliery

Outside.—One engine 24x36 inch; two Norwalk compressors 28x30 inch; one engine, 12x14 inch, for carpenter shop; planers, etc., for carpenter shop; one Knowles pump, 14x7x12 inch; two 72 inch by 18 foot tubular boilers, 300 H. P.

Inside.—One tunnel 300 feet long from Hillman to Hillman; one pipe line 400 feet from boiler to head hoisting shaft.

DELAWARE AND HUDSON COMPANY

Plymouth No. 2

No. 10 plane driven through fault 350 feet, top Red Ash vein; No. 7 plane Stanton vein extended 650 feet; No. 4 slope extended 590 feet to boundary of Red Ash vein; No. 6 slope Stanton vein extended 200 feet; No. 7 slope Red Ash vein driven 300 feet to limit against fault; No. 8 slope Hillman slope driven 850 feet.

A new plane is being graded and equipped in Bennett vein through old outlet to No. 5 slope.

Pump room in Red Ash vein has been arched with masonry and brick.

Hillman landing has all been retimbered and planked preparatory to flushing culm over timbering.

Jeanesville pump, 22x12x36 inch, installed at Plymouth No. 1 in Hillman vein, pumping water to surface.

Plymouth No. 3.—New rope hole drilled and new engines 12½x15 inch installed for No. 1 Cooper slope which has just been reopened after squeeze of 1903.

This Company is making an effort to prevent mine fires by erecting concrete and brick walls with iron I-Beams, thus eliminating the use of timber.

Condition of colliery is good.

PARRISH COAL COMPANY

Parrish

No. 6 Slope extended 400 feet. Baltimore vein graded this slope to top of an anticlinal, 426 feet, deepest cut 10 feet.

No. 7 Slope extended 252 feet, to synclinal Baltimore vein.

No. 8 Slope extended 1300 feet to Boundary Five Foot vein.

Pair of engines for above 12x14 inches.

A tunnel from No. 2 West Baltimore vein to Cooper vein 99 feet.

A tunnel from No. 6 Slope, 3 West Baltimore to Cooper vein 80 feet.

A rope haulage from No. 3 Slope, Baltimore vein, to Five Foot vein, a distance of 5754 feet.

Pair of engines for above 16x24 inches.

No. 9 Slope sunk along Southern Boundary in Five foot vein for a distance of 450 feet.

Pair of engines for above 10x14 inches.

Condition of colliery is good.

No. 2 Colliery, Buttonwood

No. 1 Plane, Abbott vein, extended 249 feet.

Installed a Knowles duplex pump, 18½x18 inches, in Abbott vein.

No. 3 Slope, Kidney vein, sunk a distance of 99 feet in rock and 129 feet in coal.

No. 5 Slope, Hillman vein, sunk 480 feet.

Pair of engines for same 12x14 inches.

No. 4 Slope Stanton vein sunk 700 feet.

Rock Plane for return from the Stanton to Hillman vein, 7 feet by 12 feet on 30 degree pitch, a distance of 117 feet.

No. 1 Tunnel, East Level, Stanton vein, reopened for a distance of 1800 feet.

Installed a rope haulage at foot of shaft to the foot of No. 4 Plane, Hillman vein, 600 feet, to foot of No. 2 Plane, Stanton vein, 1002 feet.

Pair of engines 14 inches by 20 inches for above.

Condition of colliery is good.

KINGSTON COAL COMPANY

Gaylord

Driving a traveling way for men and mules from surface to Cooper vein. When this is completed the shaft will be abandoned and all mule stables inside.

A tunnel has been driven from the Bennett to the Checker vein about 3 feet 8 inches in thickness.

Installed a conveyor line and Williams crusher for the purpose of breaking down all refuse from breaker and washing it into the mines.

Installed a pump for the purpose of pumping water to the top of culm plane, where bore holes have been put down, through which to wash culm into the mines.

Condition of colliery is fair.

No. 2 shaft.—Concrete for 79 feet from surface to rock, also re-timbered from concrete to bottom, and head frame replaced.

New brick oil house erected 18'x28'.

No. 6 slope in Stanton vein extended 90 feet and stopped in fault.

No. 14 rock plane driven from Stanton vein 550 feet, cutting Hillman, Lance and Abbott veins, and intersecting a 8 by 6" bore hole from surface to rock a distance of 203 feet, for use of rope to operate place.

Plymouth No. 3 Colliery.—Red Ash sump lengthened 450 feet.

No. 6 slope in Red Ash vein opened and driven 260 feet.

No. 15 rock tunnel driven 460 feet from bottom to top Red Ash vein.

Rock tunnel driven 100 feet from Stanton vein to tap shaft for ventilation.

Plymouth No. 4 Colliery.—No. 11 plane, Top Red Ash vein, extended 170 feet.

Plymouth No. 5. Colliery.—Boiler house erected 50'x60' and two Sterling 300 H. P. water type boilers installed.

Boston Colliery.—No. 13 plane, in Bottom Red Ash vein, extended 300 feet.

PARRISH COAL COMPANY

Parrish Colliery.—A rock plane driven from Baltimore vein to the Five Foot vein for ventilation, a distance of 279 feet, size 7' by 18' on a grade of fifteen degrees.

Sank No. 6 slope Baltimore vein a distance of 200 feet.

Buttonwood Colliery.—Sunk No. 4 slope, Stanton vein, a distance of 300 feet, to the boundary line.

Installed a new engine on top of Stanton plane, for plane and slope, geared 18" by 30" (double engine) 460 H. P.

Sank a slant slope from top of No. 2 slope Hillman vein 600 feet, to mine coal in a synclinal between two rolls.

A new plane driven on the Abbott vein 900 feet long, and a pair of geared engines 12" by 16", 124 H. P., installed.

A tunnel driven from the Kidney vein to the Abbott vein, to strike the vein at the southern boundary line, a distance of 470 feet size 7' by 12.

KINGSTON COAL COMPANY

Gaylord Colliery.—The old cylinder boiler plant has been dispensed with and 900 H. P. B. and W. boilers have been erected and installed in brick house. Said plant has been completed with duplicate feed pumps, Cochran water heater, etc.

A new brick house has been erected for electric generator and air compressor.

Two new 7½ ton electric locomotives have been purchased and electric haulage is in course of construction between the foot of the Bennett slope and the Red Ash.

A new washery or wet side addition to the breaker is in course of construction and almost completed, with three banks of shakers, duplicate rolls, duplicate elevator.

A Compound Duplex 28"x36" pump is being installed.

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.

B. P. 10

GEORGE F. LEE COAL COMPANY

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

WEST NANTICOKE COAL COMPANY

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

BRIGHT COAL COMPANY

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

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

Outside:—Completed power house.

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

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

DELAWARE AND HUDSON COMPANY

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

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

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

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

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

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

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

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

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

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

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

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

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

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

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

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

Installed two 20-foot fans outside.

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

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

KINGSTON COAL COMPANY

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

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

CONDITION OF COLLIERIES

LEHIGH AND WILKES-BARRE COAL COMPANY

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

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

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

DELAWARE AND HUDSON COMPANY

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

KINGSTON COAL COMPANY

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

GEORGE F. LEE COAL COMPANY

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

WEST NANTICOKE COAL COMPANY

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

PLYMOUTH RED ASH COAL COMPANY

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

IMPROVEMENTS

LEHIGH AND WILKES-BARRE COAL COMPANY

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

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

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

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

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

Installed machines, tools, etc., in machine shop. Built bridge to No. 3 shaft. Installed one 500 rotary converter, transformers, etc., loaded and retail scales, main conveyor line from Nos. 1 and 2 shafts to breaker. Placed a concrete floor in compressor and fan house.

Avondale Colliery.—Built a blacksmith, carpenter and machine shop.

Truesdale Colliery.—Completed rock tunnel, 453 feet, in Bottom Red Ash vein; rock tunnel, Mills to Hillman vein, 222 feet in length; rock skip No. 4 west airway, No. 1 slope, Mills vein; surface rock slope, No. 20 tunnel, length 780 feet; rock plane from George to Mills vein, length 249 feet; Rock tunnel, Red Ash to Ross vein, No. 2 slope, length 72 feet; rock tunnel, No. 3 slope, for passing branch, length 87 feet; extension of No. 9 slope in rock, length 363 feet; extension of No. 8 tunnel, Cooper to Hillman vein, length 370 feet; second opening rock plane from Top Red Ash to Ross vein, length 61 feet; second opening to No. 2 west lift, No. 6 slope, Hillman to Mills vein, length 87 feet.

Installed one 500 steam hammer for blacksmith shop; motors in three small air hoists; 7-ton locomotive with reel, etc., in No. 2 East lift, No. 6 slope; 7-ton locomotive with reel, etc., in No. 1 slope, Mills vein; 7-ton locomotive with reel, etc., in No. 3 east lift, No. 7 slope; and steam hoist for Forge vein plane, No. 1 tunnel.

LEHIGH AND WILKES-BARRE COAL COMPANY

Sugar Notch No. 9 Colliery.—Completed No. 31 tunnel, Twin to Hillman; No. 33 tunnel, Five Foot to Hillman; No. 34 tunnel, Red Ash to Twin; and No. 32 tunnel, Twin to Hillman.

Maxwell No. 20 Colliery.—Completed No. 31 tunnel, Red Ash to Ross; and No. 30 tunnel, Hillman to Kidney.

Buttonwood Colliery.—Completed No. 10 tunnel and tunnel airway extension to Abbott; tunnel No. 4 to No. 4 vein, and No. 16 tunnel, Abbott to Abbott.

At Inman No. 21 shaft, completed concrete and steel timbering, Hillman shaft level.

Outside: Installed one 32 by 48 inch duplex Corliss valve shaft engine for Hillman shaft, and also one for Baltimore shaft at Inman No. 21. Also built a brick engine house. Two steel head-frames, one for Baltimore shaft and one for Red Ash shaft, were built.

At Parrish washery, a 600 H. P. boiler plant was installed for Parrish slope.

LEHIGH VALLEY COAL COMPANY

Warrior Run Colliery.—Built a new concrete hospital in No. 4 tunnel level.

Outside: Constructed 2,000 feet of new 4 by 8 foot flume to carry creek and surface waters. The old flume was destroyed and washed out by cloudburst of June 27, 1916.

Franklin Colliery.—Completed No. 33 tunnel, from Baltimore to Sump vein; extension of No. 34 tunnel from Ross to Skidmore vein. Started driving No. 35 tunnel from Skidmore to Skidmore; No. 36 tunnel, from Skidmore to Skidmore through an anticlinal; No. 37 tunnel, Sump to Sump vein through fault; and No. 11 tunnel, on No. 4 tunnel level to the breaker.

Baltimore vein in No. 6 slope; rock gangway in fault on No. 1 east lift, west of No. 12 tunnel from Red Ash to Red Ash vein No. 2 slope; extension of No. 33 tunnel, 7 by 12 by 100 feet from Red Ash to Bottom Red Ash vein, No. 3 slope, No. 1 shaft, and No. 21 slope, 7 by 14 by 216 feet, making a total distance of 350 feet from the surface to the Forge vein in the Sugar Notch section.

Installed two 10 ton electric locomotives and nine 7 ton with reel devices; one 1,000 gallon bronze centrifugal pump 400 feet head, 150 H. P., 440 volts, 1160 R. P. M.; in No. 4 west lift, No. 1 slope, Mills vein, one 2 speed electric hoist 1,000 pounds rope strain, 42 H. P., speed 250 feet in No. 16 slope; one 1,800 gallon centrifugal pump and motor complete to pump water from reservoir to annex; two stage turbine, size 10, No. 571191-W, 125 H. P.; electric hoist, rope speed 250 feet per minute, 500 pounds rope strain, 50 H. P. motor on No. 15 slope, Mills vein; new electric signals, cables, etc., in No. 2 shaft.

Erected two new houses for the mine foremen; 31 steel towers to support high tension transmission lines between Nanticoke power plant and No. 20 tunnel, Sugar Notch. Equipped the east end of store room building for emergency hospital purposes and doctor's office to take care of injured employes.

Installed automatic telephone exchange and 32 telephones, connecting the Superintendent's office with all important surface buildings and important parts of the mines. This apparatus was built by the Chicago Automatic Telephone Company.

Continued the erection of new steel breaker which is replacing the original wooden structure. This breaker when completed and equipped with machinery, jigs, etc., will be one of the most modern in the anthracite coal fields, being entirely constructed of structural steel and glass which will allow about 96 per cent. daylight space throughout the entire building.

LEHIGH AND WILKES-BARRE COAL COMPANY

Maxwell No. 20 Colliery.—Completed No. 32 tunnel, Ross to Top Red Ash veins. Retimbered hoisting shaft at Hillman vein.

Outside: Installed two 24 inch by 36 inch hoisting engines, and erected house for same at No. 5 slope.

Sugar Notch No. 9 Colliery.—Completed No. 35 tunnel, Five Foot to Stanton vein; and No. 36 tunnel, Stanton to Hillman vein.

Buttonwood No. 22 Colliery.—Completed tunnel, Hillman to Red Ash shaft, Inman section; No. 9 rock plane, Stanton to Kidney veins; No. 16 tunnel, Abbott to Abbott veins and No. 17 tunnel, Stanton to Hillman veins; rock plane airway, No. 3 to No. 4 vein; No. 18 tunnel, No. 3 to No. 6 vein; extension of No. 14 slope through fault; rock plane airway, Hillman to Kidney, and rock plane airway, Baltimore to Five Foot. Completed the concrete and steel timbering at Hillman shaft level in Inman section.

LEHIGH VALLEY COAL COMPANY

Warrior Run Colliery.—Installed a 16 inch by 8 inch by 18 inch Duplex Jeanesville pump on No. 2 slope.

Franklin Colliery.—The following 8 feet by 12 feet tunnels were completed: No. 35 tunnel, in rock slope workings, from the old Skid-

Sugar Notch No. 9 Colliery.—Completed extension of No. 31 tunnel from Hillman to Kidney vein; extension of No. 32 tunnel from Hillman to Kidney vein; and extension of No. 9 tunnel from Ross to Red Ash vein. No. 37 tunnel was driven from outside tunnel east, Top Red Ash to Bottom Red Ash vein; No. 38 tunnel from outside tunnel west, Top Red Ash to Bottom Red Ash vein; and tunnel through fault, Stanton to Stanton, No. 15 tunnel west.

Buttonwood No. 22 Colliery.—Installed 18 by 30-inch hoisting engines and houses at Red Ash shaft and Inman No. 21 shaft.

LEHIGH VALLEY COAL COMPANY

Franklin Colliery.—Completed No. 17 rock plane, Top Red Ash to Bottom Red Ash vein, in rock slope workings; No. 39 tunnel, Long slope workings, from Bottom Five Foot to Hillman vein; No. 40 tunnel, Long slope workings, from Bottom Five Foot to Top Five Foot vein; and No. 18 rock plane and second opening in the drift workings, from Sump vein to Bottom Five Foot vein. Installed electric dynamo, and placed lights at foot of rock slope and in mule barn.

Warrior Run Colliery.—Completed fireproof foreman's office on No. 1 lift, New slope.

GEORGE F. LEE COAL COMPANY

Chauncey Colliery.—A new breaker has been erected to replace the old one. Completed rock plane from Red Ash to Ross vein, and installed electric power to operate all machinery inside and outside of mines.

WEST NANTICOKE COAL COMPANY

West Nanticoke Colliery.—Completed rock slope from surface to Ross vein. Preparations are being made to erect a new breaker.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in the Lehigh Valley Coal Company's Office Building, Wilkes-Barre, April 23 and 24. The Board of Examiners was composed of Frank Kettle, Mine Inspector; Sheldon Jones, Superintendent, Wilkes-Barre; George W. Raub, Miner, Plymouth; Patrick McGrane, Miner, Sugar Notch.

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

MINE FOREMEN

Raymond A. Gottshall, Askam; Joseph R. Jenkins, Ashley.

ASSISTANT MINE FOREMEN

Percy F. Bray, Millard Kressler, Idris Morgan, John Mainwaring, Nanticoke; **Edward Collett**, Charles Carey, Wilkes-Barre; Daniel Evans, **Buttonwood**; Thomas F. Mooney, Plymouth; William Roachford, Askam; David Richards, Edwardsville; Thomas Williams, Lee Park, Wilkes-Barre.