

horse power, all in engine room, and 1 hoisting engine inside of 25-horse power; they have a metal speaking-tube in the shaft; they use clevis cones and standard wire ropes; the flanges on the sides of hoisting drums are of sufficient strength and dimensions for safety; they have a good steam brake on hoisting drum; the boilers have been cleaned and examined and reported in good condition according to law; they have a safety-valve and steam gauge attached to their boilers, for the purpose of safety and to indicate the pressure of steam; the breaker machinery, screens, shaftings, cog-wheels, beltings and pulleys are boxed and fenced off so that operatives are safe.

*Remarks.*—The company have furnished a map of the mines; they have a house for men to wash and change their clothes in; they have some standing water in the mines but they are not working towards it; the mining boss is a practical and competent man; he has no fire boss or assistant; there are no boys allowed to work in the mines under 12 years of age; the engineers seem to be experienced, competent and sober men; there are no persons allowed to ride on loaded cars on planes around the mines; the parties having charge know their duty in case of death or serious accident; persons are prohibited by the mine regulations from riding up or down the shaft; the shaft-landings are protected by safety-gates.

#### CENTRAL COLLIERY.

This colliery is located in the city of Scranton, and lying about one mile north-west of the Lackawanna river. It is 176 feet deep to the Diamond vein, 202 feet deep to the Rock vein, and 320 feet deep to the G or Big vein. The opening is 34 feet by 10 feet. It is operated by the Delaware, Lackawanna and Western railroad company. John Flynn is mining boss, and S. N. Stetler is outside foreman.

*Description.*—There is a double breaker attached to the shaft tower; they mine and prepare about 450 tons of coal per day; they employ 50 miners, 58 laborers, 26 drivers, 8 door-boys and 22 company men in the mine; 57 slate pickers, 8 head and plate men, 3 drivers, 15 company men, 7 mechanics and 2 bosses outside; in all 257 men and boys; they are working the G or Big vein; average thickness 12 feet; they work headings 12, air-ways 18 and chambers 30 feet wide; they leave pillars to sustain the roof, 21 feet wide; they leave cross entrances 60 feet apart for the purpose of ventilation; the roof is good slate; the mine is in a good working condition.

*Ventilation.*—Ventilation is produced by means of a fan, located on the surface close to main shaft; the intakes are located in main shaft and Hyde Park air shaft; it contains an area of 160 feet in main shaft; the upcast is located at main shaft; it contains an area of 90 feet; the average supply of fresh air per minute is 36,500 cubic feet; they have inflammable, noxious and poisonous gases evolved in the mine; the mine is examined every morning before the men are allowed to go to work, and every evening to see that the main doors are all closed, so as to keep up a steady current of air; the main doors on headings and air-ways are hung so as they will close of their own accord, and they have attendants at each to keep them closed; they have double doors on main traveled roads, and an extra one in case that one of the others would get broken; they do not work over fifty men in any split of air; the amount of ventilation has been measured and reported according to law; ventilation is good.

*Machinery.*—The engines in use at this colliery are one pair of hoisting engines of 120-horse power, one fan engine of 60-horse power, and one breaker engine of 80-horse power, all in engine room; one steam pump at foot of shaft of 15-horse power; 2 pumping engines of 150-horse power in shaft engine room; they have a metal speaking tube in the shaft; they have two patent safety carriages with all the modern improvements; they have flanges of sufficient strength and dimensions attached to the sides of the hoisting drums; they have an adequate brake on hoisting drums; they use clevis, cones and standard wire ropes; the boilers have been cleaned and examined and reported in good condition according to law; they have a steam gauge and safety-valve for safety and to indicate the pressure of steam; the breaker machinery is boxed and fenced off so that operatives are safe; all the machinery, boilers, &c., are new and in good condition.

*Remarks.*—The company have furnished a map of the mine; they are connected with the Hyde Park shaft, which can be used as a second opening; they have a

house for men to wash and change their clothes in ; there is no standing gas or water in the mine ; the mining boss seems to be a practical and competent man ; he has a fire-boss to assist him ; there are no boys allowed to work in the mine under 12 years of age ; the engineers are said to be competent, practical and sober men ; there are no persons allowed to ride on loaded carriages in the shaft ; they do not allow more than 10 men to ride on the safety carriage at one time ; the persons having charge know their duty in case of death or serious accident ; the shaft landings are protected by safety gates.

#### SLOAN COLLIERY.

This colliery is located in Lackawanna township, and situated 1 mile north-west of the Lackawanna river ; the shaft is 250 feet deep to the Diamond, 285 feet deep to the Rock, and 393 feet deep to the G or Big vein ; this is the cross-section of strata in the shaft opening ; they are also driving a slope for the second opening ; it is 500 feet long to the E vein, and 580 feet long to the T vein ; they employ 18 company men in the mine, 5 mechanics and 2 bosses outside ; in all 25 men ; they have a double breaker attached to the shaft tower ; they do not intend to mine any coal until they connect between the shaft and slope for a second opening ; it will take 3 months before they can connect.

#### ARCHBALD COLLIERY.

This colliery is located in Lackawanna township, and lying one and one-fourth miles north-west of the Lackawanna river, in Keiser valley. It is operated by the Delaware, Lackawanna and Western railroad company. John Gooden is mining boss and John Fern is outside foreman. The slope is used as a second opening.

*Description.*—These mines are opened by a shaft ; it is 188 feet to the Diamond, 216 to the Rock and 307 feet deep to the "G" or Big vein ; it is 10 feet by 27 feet, and by a slope 500 feet long driven at an angle of 18 degrees ; it is — feet wide by — feet high ; there is a double breaker attached to the shaft tower ; they mine and prepare about 240 tons of coal per day ; they employ 28 miners, 28 laborers, 8 drivers, 2 door-boys and 13 company men in the mines ; 52 slate pickers, 7 head and plate men, 1 driver, 19 company men, 9 mechanics and 2 bosses outside ; in all 169 men and boys ; they are working the "G" or Big and Rock veins of coal ; average thickness of "G" or Big vein 10 and Rock 6½ feet ; they work headings 12, air-ways 15 and chamber 30 feet wide ; they leave pillars from 5 to 6 yards wide to sustain the roof ; they leave cross-entrances from 50 to 70 feet apart for the purpose of ventilation ; the roof is good slate ; the mines are in a good working condition.

*Ventilation.*—Ventilation is produced by means of a fan located near the main opening ; the intake is located at mouth of shaft ; it contains an area of 160 feet ; the upcast is located in air-shaft, it contains an area of 110 feet ; the amount of fresh air is 10,200 cubic feet per minute ; there is very little noxious or poisonous gas evolved in these mines ; the main doors are hung so that they will close of their own accord ; they have attendants at main doors ; they have double doors on main traveled roads and an extra one in case of an accident to any of the others ; the air is circulated to the face of the workings in two splits ; the amount of ventilation has been measured and reported according to law ; ventilation is good.

*Machinery.*—They use one pair hoisting engines of 120-horse power, one breaker engine of 80-horse power ; in shaft engine room one fan engine of 80-horse power, one steam-pump at foot of shaft of 20-horse power ; they have two metal speaking tubes in the shaft ; they have two safety-carriages with all the modern improvements ; they have an adequate brake and flanges of sufficient strength and dimensions for safety attached to the hoisting drums ; they use standard wire ropes with clevis and cone attachment ; the boilers have been cleaned and examined and reported in good condition according to law ; they have a steam-gauge to indicate the pressure of steam ; the breaker machinery is fenced and boxed off so that operatives are safe.

whole number at present in the district is forty-nine. One old fan was replaced with a new one, and two have been removed from one mine to another. Several air-shafts have been sunk, and a large amount of work has been done inside of the mines, for the purpose of utilizing a greater proportion of the air entering them.

The Delaware, Lackawanna and Western Railroad Company still carry the palm for having the best ventilated mines—all of their collieries having excellent ventilation, with the single exception of Tripp's slope. This slope needs attending to, and it is expected that long before the close of the current year, there will be no cause of complaint even here. A new fan, twelve feet in diameter, and three feet six inches face, was erected at the air-shaft connected with the Hampton shaft in place of a furnace, which has increased the ventilation from forty-four thousand six hundred to sixty-two thousand six hundred cubic feet per minute. This fan commenced running on the 27th of October.

The Dodge shaft is also ventilated at present by the fan at the Scranton Coal Company's slope adjoining, which has been lying idle for years. This also is a change from the furnace heretofore used, and has undoubtedly been affected, because it is so much cheaper to run a fan than to keep up a fire in a large furnace. The furnace in this instance produced more air for the Dodge shaft than the fan does, but the fan furnishes ventilation for the Scranton mines in addition to the Dodge. The furnace at the Dodge has produced as high as one hundred and forty-two thousand cubic feet per minute, exerting a horse power of 26.66 to move the air, and I doubt very much that another furnace is to be found in any colliery in the country, that will give so favorable a result. It is a double furnace, having an aggregate grate surface of one hundred and twelve square feet, the depth of the upcast being three hundred and thirty feet, and the sectional area, one hundred and thirty-two square feet. As an example of a first class furnace, I here insert a plan of it. There are two other furnaces—one at the Hyde Park shaft, and the other at the No. 2 Diamond slope—both of them sisters to the one at the Dodge, but neither of them has ever produced the quantity of air that this one has, and the difference is accounted for by the comparative shallowness of the upcasts which makes a great difference in the height of the motive column. A new fan has been put in to replace an old one at the Sloan shaft, the old one being so much worn as to require the change.

A number of the collieries of this company are quite fiery, especially the Taylor shaft, Bellevue shaft, Bellevue slope, Dodge Shaft, Sloan shaft, **Central** shaft, and Hampton shaft, while there is considerable gas generated in nearly all of the others. But the ventilation is so sweeping, that no explosion can occur unless it be through want of proper distribution, or through some inexcusable blunder. I find the general mine superintendents, Messrs. B. Hughes and T. D. Davies, always careful, and prompt to inaugurate improvements whenever such are needed, and they always manifest a cheer-

prevent explosions in the mines will be conceded throughout the world, and when this is universally admitted these terrible explosions will cease.

#### PRESENT CONDITION OF THE COLLIERIES.

I am happy to be able to report that the condition of the collieries in the district, so far as ventilation is concerned, is on the whole satisfactory. There are but few poorly ventilated mines, and the number is being reduced each year.

The Delaware, Lackawanna and Western Railroad Company's mines are kept well in hand, there being only one or two that cannot be rated as first class. There is never any trouble with the mines of this company, for the gentlemen in charge of them have always shown a cheerful readiness to comply with the requirements of the ventilation act. They have one colliery at present, the **Central** shaft, where the volume of gas evolved is increasing to such an extent as to require an early addition to the quantity of air now provided for the workings. Gas stands in small quantity in several of the working places, and the workmen are in continual danger from explosions on a small scale. But they are driving to make a connection with the Oxford air-shaft, where, I am informed, they intend to erect a fan as soon as possible. This will provide all the ventilation they will need. The other collieries of this company are well provided with a liberal quantity of air, with the exception of Tripp's slope; and there is no cause for complaint, only occasionally, when the mine bosses neglect to conduct the air to the face of the workings.

The Delaware and Hudson Canal Company's mines have been greatly improved. They have only two collieries now in my district which are not well provided with ventilation, and neither of these is very bad, and I have been assured by A. H. Vandling, Esquire, that one of the collieries referred to will be provided with two fans as soon as they can be put in place this coming spring. These fans are intended for the Grassy Island shaft, Olyphant borough, and when they are erected, they cannot fail to produce ample ventilation for the colliery, if it will be properly utilized by the inside bosses. The other colliery referred to is the White Oak colliery, Archbald borough. This is an old colliery and nearly exhausted; and as the ventilation is not very bad, it would be unjust, perhaps, to require costly improvements to be made in it. The air now provided can be better utilized by attending to the inside air-courses. A shaft will soon be sunk, to take the place of this colliery, which, I am assured, will be provided with a fan from the start.

A. H. Vandling, Esquire, is entitled to great credit for doing so much to improve the ventilation of the collieries under his charge during the last four years, and it gives me great pleasure to award him the credit due him. I am free to admit, that I was impatient to have improvements inaugurated, especially in the collieries at Carbondale, for I found them in very bad condition; and, perhaps, I was too impatient under all the circumstances. I am aware that a great part of the expense incurred should have been

work the Rock seam out that was left in the Oxford shaft. The rock seems to be of better quality east of the shaft than on the west.

**Central Shaft.**

This shaft has been re-timbered, as to new buntons and guides, from bottom to top, and also a new fan put in to re-place the old one.

**Oxford Shaft.**

Put in new cribbing on top of shaft, and are now in process of sinking from Rock to big and Clark seams of coal about one hundred and sixty feet deeper.

**Oxford Air-Shaft.**

Has connected with G or big seam workings in Central mines. Put in two new hoisting engines, also a fan engine; also a new fan, twelve feet diameter by three and a half feet face. The intention is to lower the coal from the Diamond and Rock seams to the Big and hoist it up the Central main shaft. The distance to be lowered is one hundred feet. Also put in new cribbing on top of shaft.

**Scranton Coal Company's Slope.**

This mine has been cleaned and new rails re-laid preparatory to commence to work the Clark seam of coal, are now ready to operate. This slope has been idle for years.

**No. 2 Diamond Shaft E or Diamond seam.**

Are sinking a new slope from the Diamond to the Rock or F seam. The opening is seven by eleven feet in the clear. More than half the distance is already sunk.

**Tripp Slope**

Made an extra opening in the West mountain, by driving up the pitch about  $40^{\circ}$  for ninety feet, then sunk a shaft fifty-seven feet deep. It gives an intake for air in the extreme end of the mine workings, and an opportunity for the men to come out that way, if they feel so disposed. This shaft is one and three fourths miles from the mouth of the slope.

**Brisbin Shaft.**

A heading has been driven to the outcrop on the West mountain from the level gangway, and they are now grading three gravity planes to let the coal down the steep grades from the West mountain side.

**Cayuga Shaft.**

This shaft has been overhauled, and new cribbing put in to a depth of about sixty feet from the surface.

**Storr's Shaft.**

This is a new shaft, located in Dickson City borough. It is about two thousand feet northwest from the Lackawanna river. The sinking is pro-

15 MINE REP.

## COLLIERY IMPROVEMENTS FOR YEAR 1888.

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

*Bellevue Shaft.*—A new fan was erected close to the old one, size 16 feet diameter by 4½ feet width of face. A pair of new hoisting engines were put in place at head of inside slope 12"x30" to replace old ones removed.

*Bellevue Slope.*—A new tunnel was driven from Rock to Diamond vein, 150 feet long.

*Cayuga Shaft.*—A new shaft was sunk for second opening about one mile north from main shaft, size 10'x37½'; area of opening 375 square feet, and sunk to G or Big vein, a distance of 436 feet.

*Central Shaft.*—A new slope driven in G or Big Vein 500 feet long on a dip of 1' in 6'. Also a new pair of first motion hoisting engines 24"x60".

*Hyde Park Shaft.*—A new tunnel was driven from New County to Clark Vein.

*Pyne Shaft.*—A new fan 14 feet diameter by 4 feet face was put in to replace old fan which was not sufficient to ventilate the mine.

*Tripp Shaft.*—A new slope was driven in Clark vein about 500 feet in length. Dip is 1' in 6'. A new pair of engines, second motion, dimensions 10"x30", was placed outside at Diamond for hoisting culm.

**Delaware and Hudson Canal Company.**

*Dickson Shaft.*—Built new fan 20 feet diameter by 5 feet face, closed periphery, run by direct motion engines, one on each end of shaft to replace a fan of 12 feet diameter and 3 feet face, which was not of sufficient capacity to ventilate the mines. They sunk a slope in Clark vein 600 feet in length and placed in position a pair of hoisting engines 12"x16" at head of slope.

*Leggetts' Creek Shaft.*—Sunk main shaft 10x26 feet, 177 feet from 14 feet or G to Clark vein and made connection with Von Storch mine workings for second opening.

*White Oak Mines.*—Reopened old No. 5 drift near head of No. 27 plane on the Gravity railroad with a tunnel through hard pan 365 feet in length to coal. Sunk an air-shaft in rock 11 feet in diameter and 36 feet deep to coal. Built a furnace with a fire surface of 64 square feet. Built 3,900 feet of railroad track to head of plane which plane is 1,328 feet long, having a gauge of 2½ feet, to take coal to the breaker, for which a small locomotive is used.

**Pennsylvania Coal Company.**

*Shaft No. 1.*—A second opening has been made in "Top Vein" by making a connection with Shaft No. 3 or Gypsy Grove. An air-shaft was sunk from top to "Second Vein," giving a second opening to this



|   |                  |
|---|------------------|
| Number of tons of coal sold for local consumption in<br>1888, . . . . . | 205, 308.02      |
| Number of tons of coal sold for local consumption in<br>1889, . . . . . | 197, 805.16      |
| Decrease in local sales in 1889, . . . . .                              | <u>7, 502.06</u> |

There were 266,631 kegs of powder used in mining 8,621,980.16 tons of coal, which would give  $32\frac{1}{2}$  tons of coal mined for each keg of powder used.

There are in this district 2,707 horses and mules and 31 mine locomotives for the transportation of coal in mines, and between mines and breakers. There are 881 steam boilers which supply steam for 392 hoisting, breakers and fan engines, having 21,465 horse-power; also for 253 pumping engines and steam pumps, with a horse-power of 8,621.

There are 67 breakers which have a capacity for preparing, cleaning and shipping 52,685 tons of coal per day for market, there are also three chute buildings for cleaning and dividing coal into various sizes and also for shipping it.

Respectfully submitted.

PATRICK BLEWITT,  
*Inspector of Mines.*

#### COLLIERY IMPROVEMENTS FOR YEAR 1889.

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

*Brisbin shaft.*—Finished a new plane in mines 790' long; sectional area 7'x15', equal to 105 square feet.

*Central shaft.*—New shaft was sunk for second opening from Fourteen Foot to Clark vein, size of opening 10'x28' and 84' deep.

*Holden shaft.*—Finished a new plane 414' long on a grade of 1 in 3; sectional area 7'x16', equal to 112 square feet.

*Hyde Park shaft.*—New rock tunnel driven from 14' to new county vein 69' long; sectional area equal 7'x11' or 77 square feet.

*Pyne shaft.*—New plane finished, 250' long; sectional area 7'x14', equal 98 square feet and on a grade of  $7\frac{1}{2}^\circ$ .

*Sloan shaft.*—New plane finished, 600' long; sectional area 7'x14', equal 98 square feet.

*Storrs.*—The Storrs colliery with a capacity of from 1,200 to 1,500 tons per day was completed in 1889. It is one of the most thoroughly equipped breakers in this part of the anthracite region, having all the modern improvements for the preparation, separation and cleaning of coal.

Referring now to diagram No. 1, the line a b is the common boundary. The mine workings and the line in black are as determined by the engineer of that mine. The mine workings and line in red are as determined by the engineer of the mine. It is assumed that the dividing line is not well established on the ground, as is often the case. Now a b and a b are in reality the one and the same line; the two positions shown are owing to the difference in the opinions of the engineers. It will be further noticed that the workings in black are fifty feet from the line of the same color, and the workings in red are also fifty feet from its corresponding line. On this account the parties interested have some reason to believe that a barrier pillar of 100 feet is reserved. However, owing to the fact that the position of lines overlap by twenty-five feet, the barrier pillar is less than 100 feet by the amount of the overlap.

The duplication of the survey of the underground workings does not reveal this error. Diagram No. 2 shows the barrier pillar as it will appear when the tracings of the adjoining mines are put together. The line a b is placed on a b for comparisons, and, consequently, the pillar will appear to be 100 feet wide, when in reality it is twenty-five feet less. It, therefore, seems apparent to the writer that such lines should be surveyed by the engineers of the adjoining properties in conjunction.

Seeing that it has been well established that a very few feet may mean a "material" error in such cases as we have quoted, it seems that some means of testing the lengths of tapes used in such important work should be provided in all mining centers. In addition to such standards of lengths, suitable and convenient "bench marks," from which tidal elevations may be carried, together with a fixed line from which, by comparing the bearings as given by the various instruments used, the declinations of the magnetic needle may be ascertained with little labor.

The benefits to be derived from the provisions of the foregoing are manifold.

#### Collieries which Have Resumed Operations During the Year 1899.

The Delaware, Lackawanna and Western Railroad Company's Sloan and **Central** mines and the Sloan breaker resumed operations during the latter part of the year. During the long suspension of work at these mines, the two shafts, namely, the Central main hoisting shaft and the Sloan hoisting shaft, have been sunk to the Dunmore veins, and improvements in the breaker have also been effected.

#### Breaker Rebuilding.

The Oxford breaker, which was formerly owned by the Delaware, Lackawanna and Western Railroad Company, and which was de-



P. at 150 pounds pressure, divided into seven and one-half batteries Babcock & Wilcox vertical headed water tube boilers. They are fitted up with McClave & Brooks Automatic Stokers and self-feeding arrangement for fuel from storage pockets, and also have attached the Green Economizers, divided as follows: One for eight batteries and one for seven and one-half batteries, with induced fan draft in connection with forced fan draft. This plant is all under one roof. The steam pipe connections are as follows: To Sloan shaft 1,420 feet of 8 inch pipe. To Central shaft 1,400 feet of 8 inch pipe. To Hyde Part shaft, 3,140 feet of 8 inch pipe. To Hampton Shaft, 1,400 feet of 12 inch pipe. To Continental shaft 1,500 feet of 8 inch pipe. The above plant takes the place of ninety-five boilers, cylinders and locomotives. A new reservoir 100 feet in diameter has also been located near the plant which will hold 500,000 gallons of water.

At Pyne shaft a tail rope system of haulage is being installed. Length of main rope 4,000 feet; size of engines 15 feet x 30 feet geared.

Sloan Mine.—A new air shaft has been sunk to the surface vein and a connection driven from the bottom to the upcast compartment of main shaft. A new ventilating fan will soon be erected over this shaft. The fan which is now ventilating the mine and is located at the breaker over the main shaft will be removed, thus reducing the risk from fire, and at the same time doing away with the possibility of the air—which is being exhausted, entering the downcast again.

New Water Shaft.—A new shaft is being sunk at a point between the **Central** and Sloan shafts. This shaft is 8'x33' in the clear, and will be 500 feet deep. It is to be used to drain the mine workings of the company's Keyser Valley collieries. When the work is finished it is proposed to raise 7,000,000 gallons of water every twenty-four hours, by the use of buckets.

An electric motor system of haulage has been installed in the Dodge mine, and a new steam generating plant erected, at a point between the Dodge and Bellevue breakers. This plant will supply steam to the two mines and breakers.

A new ventilating shaft has been sunk at the Taylor mine from the surface to the Clark vein.

In the Manville shaft of the Delaware and Hudson Company and the Delaware, Lackawanna and Western Railroad Company, and the Delaware, Lackawanna and Western Company's Holden shaft, the old cribbing has been removed and replaced by expanding metal. The work was successfully accomplished in each case, and the result is highly satisfactory.

The improvements made in the several mines in the district are of the usual kind, and as important as the condition of the mine required and the increased output demanded.

Pyne colliery.—A new belt-driven ventilating fan 5x4½ feet by 16 inches was erected at the Pyne. The fans erected in 1903, together with this one, were attached to the breaker, which was a source of danger from fire.

One Rock Plane tunnel located about 1,700 feet north-east of shaft from the Clark to the Big vein; 7x14 feet, length 663 feet, pitch 12 degrees.

Six 6½ ton electric locomotives have been installed, four of which are equipped with reels to work in chambers. Sub-station erected outside for 200 K. W. rotary converter which supplies 250 volts power for the six (6) electric motors inside.

Power is supplied from the central power station near Hampton colliery.

The new 1,500 horse power B. & W. water tube boilers and brick house are now nearly completed. Located about 250 feet north-east of breaker.

Sloan Colliery.—One Rock plane tunnel located about 2,000 feet north-east of shaft from Clark to N. C. vein, 7x14 feet length 275 feet, pitch 10 degrees.

**Central** Colliery.—One rock tunnel plane, located about 800 feet north-west of shaft, 7x14 feet length 375 feet, from Clark to New County vein, pitch 10 degrees.

Hampton Colliery.—One rock plane tunnel, located about 2,600 feet south of shaft, from Rock to Diamond vein, 7x14 feet, length 200 feet, grade 5 per cent.

Holden Colliery.—Air shaft from the Big vein to New County vein, size 6x8x36 feet deep, for ventilation.

#### LEHIGH VALLEY COAL COMPANY

William A. Colliery.—A rock tunnel was driven from the middle to the upper-split of Red Ash vein, at a point near foot of long slope, just west of the Lackawanna river. It was put at this point in order that the coal in this vein between the river and shaft could be mined separately from the same vein east of the river, the coal under the river being kept as a barrier or safety pillar. Since the Hallstead mine was flooded a system of silting has been in operation at this mine. All of the finer refuse from breaker, together with the dirt from culm banks on surface, has been silted into the old workings.

The workings along the Hallstead mines have been thoroughly filled from barrier pillar to main gangway. The work is being continued in the old workings along the Pennsylvania Coal Company's line. A slope has been driven from the shaft level to the lowest point in the Flag and Drake tracts. This was for the purpose of saving in haulage, the foot of Long or Main slope being a considerably higher elevation.

Taylor Colliery.—The ventilation has been greatly improved during the year but there is still room for improvement; drainage good.

National Shaft.—General condition fair.

#### LEHIGH VALLEY COAL COMPANY

William A. Colliery.—Ventilation and drainage fair.

Lawrence Colliery.—General condition fair. The principal work done at this mine is robbing pillars.

Babylon Colliery.—Condition good. The principal work is robbing pillars.

#### PENNSYLVANIA COAL COMPANY

Old Forge No. 1.—Ventilation fair, drainage good.

Old Forge Slope.—General condition good.

Old Forge No. 2.—General condition as to safety fair.

#### JERMYN AND COMPANY

Jermyn No. 1.—Ventilation fair, drainage good.

Jermyn No. 2.—Ventilation fair, drainage good.

Jermyn No. 3.—Ventilation and drainage fair.

#### DELAWARE AND HUDSON COMPANY.

Greenwood No. 1.—General condition fair.

Greenwood No. 2.—General condition fair.

Spring Brook Colliery.—Ventilation and drainage good.

#### ELLIOTT, McCLURE AND COMPANY

Sibley Colliery.—Ventilation and drainage fair.

#### AUSTIN COAL COMPANY

Austin Tunnel.—General condition fair.

#### GIBBONS COAL COMPANY

Gibbons Mine.—Ventilation fair; drainage good.

### IMPROVEMENTS

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Central** Water Shaft.—800 horse power electric hoist; buckets 6 feet in diameter and 20 feet in depth; capacity of buckets 4000 gallons. This electric hoist was put in operation August 14, and the hoist regulated by hand. The next day the machinery was put to work automatically. The starting, stopping, dumping, reversing and over-hoist cut-off arrangements all worked successfully. Depth of shaft 518 feet. By this method of concentrating the drainage above the Clark vein level from Pyne, Archbald, Continental, Hyde Park, Hampton, Central and Sloan at this point, the steam pumps at these different collieries will be done away with. They are also making preparations to install at the foot of the shaft in the Clark vein, an 800 horse power 6 stage electric pump, capacity 5000 gallons per minute, as a substitute to the bucket water hoist in case of emergency.

Pyne Colliery.—A second opening rock tunnel was driven from the New County vein to the Big vein, size 7 feet x 12 feet, length 200 feet, pitch 18 degrees. Installed one 200 K. W. electric rotary converter for mine haulage purposes. Installed and working two 6½ ton motors without reels, and five 6½ ton motors with reels. Installed new water fire lines for protection outside to breaker and out-buildings. Installed 2½ batteries or 10 boilers of the Babcock and Wilcox water tube type, 1515 horse power. Brick building, boilers brick lined, iron trusses for roof, and equipped with Parson's steam blower. Cylinder boilers and old boiler house removed. Hoisting engines were remodeled and removed further away from breaker onto a new foundation and in a new brick building.

Archbald Colliery.—Installed two batteries or 8 boilers of the Babcock and Wilcox water tube type, 1212 horse power. Brick buildings, boilers brick lined, iron trusses for roof, and equipped with Parson's steam blower. Old cylinder boilers removed and old boiler house torn down and removed. Installed fire lines and plugs on the outside for fire protection. Rock tunnel driven from Rock to Diamond vein, size 7 feet x 12 feet, and 75 feet long. Rock plane tunnel from New County vein to Big vein, size 7 feet x 14 feet, length 220 feet.

Continental Colliery.—Second opening rock tunnel driven from Dunmore No. 2 vein to Clark vein, size 7 feet x 12 feet, length 125 feet.

Sloan and Central Collieries.—Second opening rock tunnel driven from Clark vein to New County vein, 7 feet x 12 feet, length 150 feet. Also to do away with hoisting coal at the Central main shaft to the surface, and hauling over with steam locomotive to Sloan breaker; the coal is now transported by electric motor from Central to Sloan under ground, in the Clark vein. Six additional reel motors were installed at this mine during the year.

Dodge Colliery.—A new brick hoisting engine house, size 36x36; and a new pair of direct acting engines, size 22 inches x 36 inches. A new washery annex, size 24 feet x 60 feet for small sizes, capacity 400 tons per day.

Taylor Colliery.—Installed 4 new tubular boilers, 150 horse power each, also brick boiler house for the same, size 53 feet x 41 feet. Installed pair of breaker engines 12x30 inches in a new brick building 36 feet away from breaker. Rock tunnel driven from New County vein to Clark vein, size 7x14x184 feet, also new air shaft for ventilation from New County vein to Clark vein to ventilate above tunnel, size 8x10x23 feet.

#### LEHIGH VALLEY COAL COMPANY

William A. Colliery.—A new boiler plant consisting of seven batteries, with 2100 horse power was completed. A steam line was extended from this plant to the Lawrence and Bablyon mines, and the steam for the three collieries is now furnished from this plant. New cribbing was placed in the main shaft. One pair of 12x22 inch hoisting engines was placed in the Clark vein to replace the old pair which was too small for the work. One 1000 and one 600 gallon pump was placed in the Red Ash vein for silting.

Lawrence Colliery.—A William's crusher was installed to dispose of refuse from breaker, which is run in the mine.

Hampton Colliery.—Idle since October 20 for extensive repairs on breaker. When completed the breaker will be almost entirely equipped with new machinery which includes 12 of the latest improved 5 foot tandem slate pickers. The wood cribbing in the shaft was taken out and replaced with concrete and expanded metal. A new fire proof mine Hospital and Foreman's office were also completed inside.

Sloan Colliery.—One rock tunnel was driven from the New County vein to the Big vein for return air.

**Central** Mines.—A new 8x6x24 foot diameter fan with steel casing on concrete foundation has been installed at this mine to replace the old 14 foot diameter belt-driven ventilating fan. Also a fire proof brick building for engine room. Class and size of engine: Corless Tandem, high pressure cylinder 14x36 inches; low pressure cylinder 22x36 inches, 84 horse-power. The engine is connected direct to the fan. The fan was connected to the mine May 26.

**Central** Boiler Plant.—Installed a modern 6,000 horse-power open Cochrane water heater and a new fire proof brick building for water feed pumps, store room and Foreman's office.

#### Electrical Machinery Installed

Pyne Colliery.—One 10 ton electric motor on west gangway Clark vein. One 1,000 gallon electric centrifugal pump at foot of slope in Clark vein; induction motor, alternating current 400 volts. One 450 gallon electric centrifugal pump in west side dip; induction motor; alternating current 400 volts. Power is taken to these pumps from the surface through bore holes.

Archbald Colliery.—One 6½ ton electric motor in the Big vein.

Continental Colliery.—One 100 horse-power electric motor hoist on Dunmore slope; induction motor; alternating current 400 volts.

Hyde Park Colliery.—One 100 horse-power electric hoist on Dunmore slope; induction motor; alternating current 400 volts.

Sloan Colliery.—One 5½ ton electric motor in surface vein.

**Central** Water Shaft.—Installed during the year at the foot of the shaft in the Clark vein, an 800 horse-power six-stage electric centrifugal pump. Capacity 5,000 gallons per minute; alternating current; 3 phase; 2,100 volts. Column pipe 16 inch diameter. Lift 480 feet. This pump was put in operation the latter part of December, and to date is apparently working satisfactory. This pump is used in connection with the automatic bucket water hoist that was installed and commenced operation in August 1905.

Bellevue Colliery.—Grading and cutting rock at foot of Main shaft No. 2 Dunmore vein to improve the foot. Installed electric hoist in No. 2 Dunmore vein to operate No. 2 slope. Installed electric motor on V gangway Clark vein. Installed electric motor in New County vein. Rock cut in New County vein to take Big vein coal to New County vein. Tore down old boiler house. Installed new middle rolls in breaker. New water line reservoir to pump house. Erected new brick office for foremen, also new brick pump room. Erected a new brick oil house.

Dodge Colliery.—Installed 3 electric motors, one in Diamond vein, and two in New County vein. Tore down old boiler house.



## CONDITION OF COLLIERIES AND IMPROVEMENTS

### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Archbald.—A new washery annex was completed and put into service on September 13, capacity 600 tons per day.

Hyde Park.—One rock tunnel 6 x 12, length 125 feet, from Rock vein to Diamond vein, to be used as a second opening.

One 10 x 18 shaft, east of the breaker, sunk to the Surface vein a depth of 80 feet, to be used as a second opening and air shaft. This shaft has been completed, but the ventilating fan has not yet been installed.

One 12 x 12 air shaft, to be sunk to the Dunmore veins, has been sunk to a depth of 35 feet, and is now in progress of sinking. This shaft will be equipped with an 8 x 24 Guibal fan with a steel casing.

Hampton.—One rock tunnel 7 x 12, length 159 feet, from Rock to Diamond vein, to redeem bottom coal in Diamond.

Sloan.—One rock tunnel 7x12 feet and 90 feet in length, from surface to Surface vein, to be used as a second opening.

One rock slope from the Clark vein to the No. 3 Dunmore vein, 7x12, and 475 feet in length, pitch 15 degrees.

One shaft 12x32 and 185 feet in depth, from the Clark vein to the No. 4 Dunmore vein, located about 700 feet east of Central main shaft. This shaft was completed during the year, and operations commenced in the Dunmore vein.

Central Boiler Plant.—The work of installing six new Maxim boilers, with a total of 3,500 horse power, is now in progress and nearly completed.

Dodge.—Main shaft sunk from Big vein to Dunmore vein and also general improvements made in breaker.

### Electrical Machinery Installed

Pyne.—One 300 K. W. rotary converter, and an addition to the sub-station building to house the same, one 6½ ton electric locomotive in Clark vein, one 6½ ton electric locomotive in Big vein.

Archbald.—Two 6½ ton electric locomotives to operate on Rist and Rossars gangways in Big vein.

Continental.—One 300 K. W. rotary converter located on top of the Dunmore vein slope, one 6½ ton electric locomotive to operate in the Dunmore vein.

Hyde Park.—One 300 K. W. rotary converter with addition to sub-station to house the same. One 300 K. W. rotary converter taken away from this colliery and installed at the Central Water shaft for Sloan New County vein.

Three 6½ ton electric locomotives to operate in the New County and Dunmore veins. One Jeffrey rock crusher and foundation, to crush all rock and bone coming from the breaker in order to flush the same into the mines.

Hampton.—Three 6½ ton electric locomotives in the Diamond and Rock veins.



An 80 horsepower electric hoist was installed at Corey slope and a fireproof engine house built. A fan 15 feet in diameter, driven by a 55 horsepower motor, was installed in a fireproof fan house to properly ventilate the workings of the Corey slope.

**Central Colliery.**—No. 13 shaft has been abandoned as a hoisting shaft. A motor road was made from No. 13 to Laws shaft, and the coal is hoisted at Laws shaft. No 13 shaft is only used as a pumping station and for lowering and hoisting men.

A new electric pump has been installed in Laws shaft, capable of handling 1,000 gallons of water per minute.

#### DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

**Pyne Colliery.**—A second opening and return airway, 7 by 12, was driven from the Clark to the No. 1 Dunmore vein, pitch 25 degrees, total length 78 feet. A Welch automatic overwind device, or engine stop, was installed on the hoisting engines.

**Taylor Colliery.**—Concrete breaker and washery completed and put in operation during the month of July.

#### JERMYN AND COMPANY

**Jermyns Colliery.**—A new wash-house was built of brick and concrete, 80 by 20 feet, to accommodate 200 men and boys, with shower bath and lockers. A supply house was built of brick and concrete, 80 by 24 feet. Made slope from outside to Clark vein, to be used as second opening, also air shaft from Clark vein to Monkey vein. Balance plane in No. 2 mine. A new tower was erected at No. 3 shaft.

#### ELLIOT, McCLURE AND COMPANY

**Sibley Colliery.**—Concrete stables were completed in No. 2 Dunmore vein, also one in No. 3 Dunmore vein. Two Lehigh Valley double jigs for the preparation of egg and stove coal were installed in the breaker. An additional air compressor is being installed. A new compound duplex Jeanesville pump, with steam cylinders 22 and 34 inches, 16 inch plunger, 36 inch stroke, is being placed in position in the Dunmore vein. Big vein is being opened by a drift north of shaft. This drift has been driven about 300 feet.

#### HILLSIDE COAL AND IRON COMPANY

**Consolidated Colliery.**—Made a new opening on the North dip for hoisting slope for Red Ash vein. Engines moved from inside to outside. Fan and fan-house, car and blacksmith shop, barns, storehouses, locomotive house, foreman's office, emergency hospital, wash-house and boiler plant, were built near slope. This was done on account of fire in surface vein under location of old buildings near breaker.

Considerable work has been done grading the main haulage roads in No. 2 shaft to eliminate the present grades.

**Central Colliery.**—For better fire protection a new fire pump was installed outside.

Rebuilt the head frame over Laws shaft.

Considerable work has been done filling in the old workings in the Red Ash veins with culm and broken rock from the breaker.

A saw mill, operated by electricity, has been built to cut the props for the colliery.

The engine and pump house at No. 13 shaft was rebuilt, making it fireproof.

A rock plane, 7 by 12 feet, on a 20 degree grade, was driven from Nigger vein to Clark vein, in Laws shaft, a distance of 470 feet.

An air shaft, 10 by 14 feet, was sunk from the surface to the Nigger vein for a second opening and ventilation.

A traveling way was driven from surface, striking the crop of the Clark vein near Laws shaft. This provides a second opening and a good traveling way from this seam.

#### JERMYN AND COMPANY

Jermyns Colliery.—Old revolving screens taken out and new shaking screens put in breaker.

Three pairs of compounded rollers were installed in the breaker.

#### HILLSIDE COAL AND IRON COMPANY

Consolidated Colliery.—Considerable work has been done rebuilding the washery pockets.

At Consolidated drift an air shaft has been sunk from the surface to the Red Ash vein to provide better ventilation and at the same time makes another second opening to the surface.

A slope has been driven from the surface into the top split of the Stark vein at Consolidated drift.

At the Red Ash slope an additional pump to pump to the surface has been installed.

The old Brown slope near Consolidated breaker has been reopened for the purpose of taking out the pillars.

#### 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, Old Forge, June 6 and 7.

The Board of Examiners was composed of Augustus McDade, Inspector; R. W. Rees, Superintendent, Rendham; Morgan E. Griffiths, Miner, Taylor; John F. Hayes, Miner, Old Forge.

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

#### MINE FOREMEN

Nelson N. Nichols, Thomas Farmer, Stanley Gleason, David Reacham, Scranton; Patrick L. Heneghan, Thomas Loftus, William H. Cordy, Old Forge; John T. Harris, Thomas J. Jones, Alfred Jones,  
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