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, 265 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 60-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-

Belmont Mines.

There has been a new fan erected here during the year, which gives general satisfaction.

Delaware, Lackawanna and Western Railroad Company's Oxford Shaft.

Sunk main shaft from Rock vein to Clark, a distance of about 165 feet, and sunk a new air-shaft from surface to Clark vein, 354 feet; 10×26 feet for ventilation, and to hoist men and let down material. We will set a fan over this one, and a fan at the old, or main shaft, to ventilate part of it and all of Bellevue slope, so as to leave Bellevue fan for Bellevue shaft alone. The slope at Diamond shaft E vein is completed, and working all right. At the Brisbin shaft we have two of the gravity planes we alluded to last year, all ready and working. The third one is very near ready. At Cayuga shaft we are driving a tunnel, or plane, from G to Diamond vein, to let down the coal to G vein. Expect to be ready in 1883. At Sloan shaft we are resinking from G vein to Clark; are also sinking a second opening from G to Clark—size, 8×10 feet in the clear. We intend to make this to that men can go up or down. Storrs shaft being sunk 416 feet, we are now opening gangways in G or big vein 285 feet down. Not developed yet.

Yours, respectfully,

B. HUGHES.

SCRANTON, *March 6, 1883.*

PROVIDENCE, *February 23, 1883.*

PATRICK BLEWITT, Esq.,

Inspector of Coal Mines:

DEAR SIR:—The following are the improvements made in and around the D. & H. C. Co.'s mines for the year ending December 31st, 1882:

Coal Brook Mines.

Have graded a new gravity plane to let coal down on north-east side. Have driven seventy feet of rock tunnel, 7×9 feet, to open No. 3, or four-foot vein from Lackawanna tunnel, in bottom coal on a level with breaker. Have about 600 feet of heading cut in coal.

No 1 Shaft.

Have graded a new gravity plane to let coal down on north-west side.

Powderly Slope.

Commenced pumping out water October 20th; are also building schutes and outside plane.

Jermyn No. 1.

Have finished sinking inside slope to basin. Put up a new 17-foot fan, by four-foot face, on air-shaft that was being sunk last year.

Grassy Island Shaft.

Have sunk fan-shaft, 11×14 feet, 252 feet deep to the Grassy Island vein.

Total number of employés,	21,269
Tons of coal mined for each employé,	401
Total number of persons working in mines,	14,729
Tons of coal mined for each,	579
Total number of miners and laborers,	10,199
Number of tons of coal mined for each,	836
Ratio of employés per life lost,	373
Ratio of employés for each personal injury,	95

Respectfully submitted.

PATRICK BLEWITT,
Inspector of Mines.

Colliery Improvements During 1887.

Delaware, Lackawanna and Western Railroad Company.—This company reports but very few improvements during the year, except driving headings and airways to open up their different mines, so as to mine sufficient coal to supply the market.

Cayuga Shaft.—The company is sinking a new shaft about one mile north-east of the main shaft for a supply shaft and for the purpose of lowering and hoisting persons into and out of the mines.

Sloan Shaft.—Sunk a new slope in coal in mine; and are also building a new plane in mine.

Storr's Shaft.—Are sinking a new shaft for second opening and supply shaft.

Delaware and Hudson Canal Company have not reported any improvements during the year 1887, except the usual advancement of their workings to supply the coal demand and sinking the two shafts at Dixon mines from G or Big to Clark vein of coal.

A. Langdon & Co.—Belmount Colliery put in place three new boilers, erected a double elevator and built two new pockets in breaker.

Bridge Coal Company—Bridge Shaft Mines.—This company made second opening in new County vein, and are now finishing new foot for same.

Lackawanna Iron and Coal Company—Capouse Shaft Mines.—This company is driving a tunnel from rock to Diamond vein; size, 14x6 feet.

Dolph Coal Company—Dolph Mine.—This company is driving a rock tunnel.

Hillside Coal and Iron Company—Forest City Mines.—The shaft reported as being sunk 160 feet to bottom vein in last year's report (1886), has reached a depth of 199 feet. Suspension of work for some months accounts for it not being finished. Work is now going rapidly forward to completion.

Number of tons of coal sold for local consumption in 1888,	205,308.02
Number of tons of coal sold for local consumption in 1889,	197,805.16
Decrease in local sales in 1889,	7,502.06

There were 266,631 kegs of powder used in mining 8,621,980.16 tons of coal, which would give 32⅓ 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 7½°.

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-

stroyed by fire in April, 1898, is about to be rebuilt by the People's Coal Company, of Scranton, which will operate the colliery in the future.

Washeries.

A number of washeries have been built during the year, and others are in course of construction.

Colliery Improvements During the Year 1899.

Following will be found a brief description of the improvements made in and about the mines of the district during the year. Other items of similar work have been omitted, owing to the inability to collect the particulars of the same. Therefore, the statement does not cover all the new work done during the year to facilitate development, transportation, ventilation and drainage.

Delaware, Lackawanna and Western Railroad Company.

Archbald Mine.—The work of installing a main and tail system of haulage in the Rock vein is in progress. This will require 9,000 feet of rope; the grade is regular for the most part, and in favor of the loaded trips. The engine which will be used is 16x36 inches.

A pair of first motion engines have been erected and are ready for use to hoist in the main shaft; dimensions 22x48 inches. These will take the place of the geared engines formerly used.

A new tunnel is in course of construction, its dimensions are as follows: 7 feet by 14 feet by 300 feet long. It will connect the Rock and Diamond veins on a grade of 5 per cent. when finished.

Sloan and Central.—These shafts have been sunk from the Clark to the Dunmore vein. The work of developing the latter named vein has not yet been commenced beyond the sinking.

Cayuga.—There has been installed at the above mine an electric haulage plant, which is now in operation. The power house is located on the northerly side of breaker on the same elevation as the hoisting engines.

The engine is a McEwing design and built by the Ridgway Engine Company, of Ridgway, Pa. Its rated horse power is 305, stroke 16 inches; bore of cylinder, 10 inches; speed, 240 revolutions per minute. The dynamo or generator is of the Westinghouse Electric Company make. Its speed is 500 revolutions per minute, voltage 250, amperes 600.

The current generated is transmitted to the interior workings of the mine by a four naught insulated wire, where three electric motors of the General Electric Company's make, weighing thirteen tons

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. Tto 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.

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.

Sloan.—One 100 H. P. electric hoist on Dunmore vein slope, induction motor. Three 6½ ton electric locomotives installed to operate in the Surface and New County veins.

One 200 K. W. rotary converter at water shaft to supply power to Sloan New County vein. One 4x14 feet dust fan, in progress of erection, to take the dust from the breaker.

Bellevue.—One 450 gallon capacity electric pump installed in Clark vein. Electric pumps installed in Nos. 1 and 2 slopes and No. 3 tunnel. Electric chain hoist installed at foot of main shaft. Four electric locomotives to operate in the Clark and Dunmore veins, and one rotary converter. A new concrete wash house with lockers erected. New fire pump and fire line.

Dodge.—One 30 H. P. motor for endless rope, three electric locomotives inside, one rotary converter sub-station installed.

Taylor.—Lighting breaker and buildings with electricity, one 300 K. W. rotary converter and sub-station building.

Holden.—Four electric locomotives installed in Clark vein and one electric pump in Clark vein.

National.—One electric hoist in Clark vein, three electric locomotives, and a new water reservoir outside.

DELAWARE AND HUDSON COMPANY

Greenwood.—Checker vein plane at No. 1 new shaft extended 600 feet. No. 1 slope in No. 2 shaft driven 125 feet and completed. No. 1 plane in No. 2 shaft driven 900 feet.

The general condition of almost all the collieries in the district, as to ventilation, drainage and general safety, is good.

One rock slope from the No. 2 to the No. 3 Dunmore vein, 7 x 12, to a depth of 193 feet.

One 4 x 4 x 14 ventilating fan on the surface vein, driven by a 10 H. P. electric motor, was installed; one 50 H. P. electric motor to drive the ventilating fan at the Central Air Shaft to replace the steam engine, and one 35 H. P. electric hoist to replace the steam hoist to operate the Central Air Shaft.

Hampton Colliery, Outside.—Installed one 750 gallon steam pump for fire protection.

Sloan Colliery.—Installed one 150 H. P. electric hoist on the rock slope sunk from the Clark vein to No. 2 Dunmore vein.

Continental Colliery.—One rock tunnel, 7 x 12, in length 218 feet, from the Clark to the New County vein on the pitch, for the purpose of shortening the haulage.

The main shaft and the air shaft were concreted, replacing the old wood cribbing.

Bellevue Colliery.—New concrete barn in slope. Rock tunnel from New County to Big vein, and a second opening to the same tunnel. Rock tunnel from No. 2 to No. 1 Dunmore vein, and a second opening to the same tunnel.

Built new concrete blacksmith and carpenter shop, outside.

Dodge Colliery.—Concrete partition in main shaft.

Holden Colliery.—Installed electric hoist on plane to Surface vein.

National Colliery.—Installed dust fan in breaker. New brick blacksmith and carpenter shop, concrete barn built, inside. New fire pump and fire line installed. Outside.

DELAWARE AND HUDSON COMPANY

Greenwood Colliery.—Drift opened from outside to Checker vein. Haulage road built from breaker to head of plane, outside, distance 1,000 feet. A plane 400 feet in length, equipped with 10 x 12 engines, was built to hoist coal from mouth of drift to the Surface railroad.

Sloan Colliery.—The new air-shaft was sunk a distance of 336 feet during the year.

Bellevue Colliery.—New annex to breaker under construction. Two Triplex Plunger pumps installed. Two low vein coal-cutting machines installed. New concrete mule barn inside.

Dodge Colliery.—New locomotive house. (Outside.) One additional electric locomotive installed. One new 750 gallon fire-pump installed. New concrete mule barn inside. New wash-house.

Holden Colliery.—One additional electric locomotive installed. One additional boiler installed. New wash-house. New concrete barn inside.

National Colliery.—Rock tunnel, No. 2 to No. 1 Dunmore vein. New wash-house. New concrete barn inside.

This Company is to be commended for its efforts in educating its non-English speaking employes. Colonel R. A. Phillips, the General Manager, conceived the idea of having pictures taken in the mines showing how accidents occur and how they are prevented. Two hundred of these pictures appear in book form with simple statements. The book was prepared under the direction of Colonel Phillips and Mr. C. E. Tobey, Superintendent of the Coal Mining Department, and ten thousand copies have been printed and will be distributed to groups known as extension schools in the various mining communities.

The company is promoting this educative work through the local branch of the Young Men's Christian Association.

SCRANTON COAL COMPANY

Capouse Colliery.—All inside buildings reconstructed of incombustible material.

PEOPLES COAL COMPANY

Oxford Colliery.—New mule barn inside constructed of incombustible material.

New breaker was erected south of the site of the old breaker with a capacity of 1,500 tons daily, equipped with the most modern machinery of every kind.

CARLETON COAL COMPANY

National Colliery.—New breaker erected, capacity 100 tons daily. Began operations December 12.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in the City Hall, Scranton, April 15 and 16. The Board of Examiners was composed of the following persons: H. O. Prytherch, Mine Inspector, Scranton; John P. Corcoran, Superintendent, Rendham; William J. Jenkins, Miner, Scranton; James W. Reese, Miner, Scranton.

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

CONDITION OF COLLIERIES

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Sloan Colliery.—Ventilation in Sloan Surface vein good. A new air shaft has been sunk to improve the conditions.

Bellevue, Archbald, Hyde Park, National, Dodge, Holden and Continental Collieries.—Ventilation, drainage and condition as to safety good.

HUDSON COAL COMPANY

Greenwood Nos. 1 and 2 Collieries.—The ventilation where fans were in use was good. In the openings where natural causes were depended upon, the quantity was a variable one, but sufficient to maintain a healthy condition. Drainage fair. Condition as to safety, good.

SCRANTON COAL COMPANY

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

PEOPLE'S COAL COMPANY

Oxford Colliery.—Ventilation, drainage and condition as to safety fair.

CARLETON COAL COMPANY

Carleton Colliery.—Ventilation, drainage and condition as to safety fair

MINOOKA COAL COMPANY

Minooka Colliery.—Ventilation, drainage and condition as to safety fair.

IMPROVEMENTS

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Bellevue Colliery.—New annex to breaker under construction. Installed railing around all dangerous parts of machinery. Built a new annex to the breaker, which will clean all of the small sized coal, from pea coal down, and installed in this annex all modern machinery and proper safety appliances, which will greatly decrease accidents caused by coming in contact with exposed machinery. A Welch automatic overwind or engine stop was installed on supply shaft engine.

Archbald Colliery.—All the inside buildings reconstructed of incombustible material. A tunnel 134 feet long was driven to redeem pillars from Rock vein to Diamond vein. An automatic overwinding device was attached to hoisting engine.

Sloan Colliery.—The new air shaft was sunk a distance of 640 feet to No. 3 Dunmore. Installed a fan 24 by 8 by 6. An automatic overwinding device was attached to hoisting engines.

Holden Colliery.—Cleaned the shaft to the No. 2 Dunmore vein and installed an electric signal system. Sunk air shaft from the surface to the Rock vein. Installed a fan and engine and are building fan house. Completed tunnel through fault in the Diamond vein to develop the top split of Diamond vein.

Sloan Colliery. At Sloan shaft a water tunnel, 7 by 10 by 850 feet, was driven to carry water from the Holden and other places to Hampton water shaft.

Installed fire escape on breaker, and railed off all hoisting engines.

HUDSON COAL COMPANY

Greenwood Colliery.—A new washery has been added to the breaker.

MINE FOREMEN'S EXAMINATIONS

The annual examination of applicants for certificates of qualification as mine foremen and assistant mine foremen was held in Scranton, June 16 and 17. The Board of Examiners was composed of Jenkin T. Reese, Mine Inspector, Scranton; Joseph P. Jennings, Superintendent, Moosic; James W. Reese, Miner, Scranton; and William J. Jenkins, Miner, Scranton.

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

MINE FOREMEN

James Alexander, John Davies, James Degnall, Thomas Goodfellow, Luther E. Harris, Evan Jones, Henry Jones, George Jones, John Jones, Richard Jones, Stephen Martin, William Mildiz, Isaac Morgan, Frank Mulrooney, Rees T. Reese, Scranton; Hugh B. Garvin, Old Forge.

ASSISTANT MINE FOREMEN

Nelson Anderson, Evan R. Davis, Myron Albert Evans, John P. Gallagher, Benjamin F. Hughes, William King, William Knox, Philip McAndrew, Edward E. Roberts, James Sharples, Ernest Telford, William Witzel, Thomas Robson, Scranton.

Sloan Colliery.—Outside:—Installed an auxiliary line between Hampton and Sloan mines.

Archbald Colliery.—Completed a bore hole from surface to New County vein, and changing cable.

Installed one Goodman coal-cutting machine in the Diamond vein; also four 7-ton locomotives with reel devices, etc.

Outside:—Installed one rotary converter, transformer, switchboard; changing equipment in sub-station.

Continental Colliery.—Installed one 7-ton electric locomotive, with reel, etc., in Dunmore No. 3 vein, also one Goodman coal-cutting machine.

Outside:—Built a new washhouse.

National Colliery.—Installed one motor in Dunmore No. 1 vein and an endless rope at foot of shaft in No. 2 Dunmore vein.

Outside:—Built stairway, railings, etc., around boilers.

SCRANTON ANTHRACITE COAL COMPANY

Oak Hill Colliery.—Completed a new slope to the No. 2 Dunmore vein. Built an addition to the breaker.

SPRUKS COAL COMPANY

East Mountain Colliery.—Inside:—Installed an electric hoist.

Outside:—Installed one 12 HP. gasoline engine and built an engine house for same. Built a new office and scale house, mule barn, hospital with equipment, and track and trestle from breaker to Erie tracks, and a set of coal pockets for storing coal for delivery.

Sunk an air shaft.

CONDITION OF COLLIERIES

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Bellevue, Dodge, Continental, Archbald, National and Sloan Collieries.—Ventilation, drainage and condition as to safety, good.

DELAWARE AND HUDSON COMPANY

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

SCRANTON ANTHRACITE COAL COMPANY

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

CARLETON COAL COMPANY

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

SPRUKS COAL COMPANY

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

IMPROVEMENTS

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Bellevue Colliery.—Installed 5 7-ton electric locomotives, wing reel device, etc.

Dodge Colliery.—Completed roof cut from New County to Big vein. Installed 3 7-ton electric locomotives, and 3 200 KW transformers, cable, bore hole, etc.

National Colliery.—Installed 2 7-ton electric locomotives.

Sloan Colliery.—Completed second opening from Diamond gangway, No. 2 Dunmore vein, into the No. 2 Dunmore vein, at Bellevue Colliery.

DELAWARE AND HUDSON COMPANY

Greenwood Colliery.—Completed a plane in Dunmore No. 3 bed, from old No. 1 shaft and New No. 1 shaft, to lower coal to New No. 1 shaft, thereby doing away with old No. 1 shaft.

Stripping of New County bed started.

Installed two 1200-gallon pumps at foot of New No. 1 shaft, one centrifugal and one plunger. Direct motion engines installed at No. 2 shaft, and 18 Lehigh Valley jigs in the breaker.

A great deal of interest is manifested in this district in the workings of the Greenwood Colliery Safety Institute which gives splendid promise of producing results.

CONDITION OF COLLIERIES

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Bellevue, Dodge, Archbald, Continental, Sloan and National Collieries.—Ventilation, drainage and condition as to safety, good, except in a few places where conditions should be improved.

HUDSON COAL COMPANY

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

SCRANTON ANTHRACITE COAL COMPANY

Oak Hill Colliery.—Ventilation and drainage, good. Condition as to safety, fair.

CARLETON COAL COMPANY

Carleton Colliery.—Ventilation and drainage, good. Safety conditions, fair.

SPRUKS COAL COMPANY

Spruks Colliery.—Ventilation and drainage, good. Safety conditions, fair.

JOHN GIBBONS COAL COMPANY

Gibbons Colliery.—Ventilation and safety conditions, fair. Drainage, good.

IMPROVEMENTS

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY

Bellevue Colliery.—Completed two rock tunnels from New County vein to Big vein, each 200 feet long, on a grade of 5 per cent. Erected a new engine and rotary house, of brick, with concrete roof.

Archbald Colliery.—Completed a rock plane from New County vein to Big vein.

Continental Colliery.—Completed a rock tunnel from Rock vein to Diamond vein.

Sloan Colliery.—Completed a rock tunnel from No. 2 Dunmore vein to No. 1 Dunmore vein, 500 feet in length.

Hampton Washery.—Installed two Simplex jigs.

HUDSON COAL COMPANY

Greenwood Colliery.—Installed a car pull at the coal tipple; a lump coal shaker in the breaker; also stationary hoist at No. 2 shaft to eliminate mule haul. A new addition was built to the office building. Completed a connection from No. 1 shaft to No. 2 shaft for water, which eliminates the danger of No. 2 shaft being flooded in case of high water.