

egress since July last, and they are driving from 185 to 195 feet per month, through coal; they had done some work in this direction prior to July last, but it had been made a secondary consideration; they had then about 250 feet, more or less, of vertical height to overcome, in reaching the surface. At this time the company did not own the land upon which the seam of coal cropped out, the nearest point to which was about 3,600 or 3,700 feet from the shaft, and about 3,000 feet from the face of their workings. Since then they have made arrangements for the adjoining land, where the seam crops out, and have lately commenced to drive a slope to meet the one coming up from the shaft. At the present time they have 2,300 feet to complete the second mode of ingress or egress, and contemplate being through by July or August, 1871.

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THE NORTHERN COAL AND IRON COMPANY—NO. 1 SHAFT, SINGLE OPENING.

*The Delaware and Hudson Coal and Canal Company, owners.*

This shaft, situated a short distance east of Plymouth, is 295 feet deep; they are working two seams of coal, neither of which had a second mode of ingress or egress. I served them with a notice to comply with the law in regard to the second mode of ingress or egress, since which time they have succeeded in making a connection with their No. 2 shaft, in one of the seams of coal worked, and but for disputes about wages with the men, in consequence of which work was suspended, a connection would have now been complete in the other seam of coal, and the law complied with; as it stands they have now about two weeks' work to complete the connection, through coal, but there some irregularities in the seam that have retarded their progress.

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THE LANCE SHAFT, SINGLE OPENING.

*William L. Lance, owner.*

This shaft is located in close proximity to the borough of Plymouth; is 175 feet deep, and has a large breaker attached to the head house. In August they began to sink a small shaft to connect with the old working in an upper seam; the same is now near completion, having only 140 feet to sink, and the second mode of ingress or egress will be complete.

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THE FELLOWS, DODSON & CO.'S SHAFT, SINGLE OPENING.

This shaft is operated by the above company, located almost if not quite within the borough of Plymouth, is 220 feet deep, and has a very large breaker attached to the head house. It is not long since this mine was opened, and now they have but very little gangway driven on either side of the shaft; they have about 900 feet to drive through coal, and about — feet through rock to complete the second mode of ingress or egress. This is according to a proposed plan of connecting with the worked out seam at the Lance shaft. The rock work could be done from the Lance mines, while the Fellows & Dodson could continue in the coal towards the point of connection, thus making a second mode of ingress or egress.

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

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

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

**Lance shaft.**—This colliery is located near Plymouth borough. It was sunk last year from the Lance vein to the Bennet vein. Gangways, air-ways, &c., have been started in the Cooper bed or the top bed of the Baltimore vein. There is to be a second opening made between this and the Dodson shaft, by driving gangways from both sides to meet. The old 8 feet fan has been replaced by a 15 feet fan. They are changing some of the hoisting machinery and remodeling the breaker, and expect to be ready to ship coal in 1873.

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

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

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

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

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

25,500 cubic feet; amount at face of mine, 23,300 cubic feet per minute. Number of persons employed inside, 80.

Daniel Reese, mining boss; Jno. T. Griffith, mining superintendent; Wm. Smyth, assistant; Geo. H. Parrish, general superintendent; F. Tiffeney, assistant.

*Gaylord slope.*—This slope is located in Plymouth borough. It is sunk across the measures and has its bottom opened out on the Cooper bed and has a tunnel into the Bennet vein. The body of its present workings are in the Bennet seam, the Cooper not proving as good as it does in other localities. On the western end of the mine the two seams, Bennet and Cooper, are united into one large vein, not having more than six inches of slate between the two beds.

*Condition.*—This mine is a very safe one, has good roof and does not generate any fire-damp. Many important improvements have been made in this mine during the time that this company has had possession of it, such as the putting up of a fan 15 feet in diameter; the laying of new roads; building of stone and mortar stoppings instead of wooden ones, as heretofore; new air-ways, cut through the solid rock, and a new set of steps put in alongside the slope for a traveling road, with a row of ten-inch timber thickly set between the traveling and the hoisting road, and planked on the side nearest the car with two-inch plank; this makes a tolerably good traveling road, about as good as can be made when placed in the slope as this is—a very unfit place to have a traveling road if it can be avoided; but when a slope is sunk through rock it is difficult to overcome this matter.

Ventilation is tolerably good. Amount of air at inlet, 35,200 cubic feet per minute; amount at face of mine, 32,600 cubic feet per minute; number of persons employed inside, 115. George Pickton, mining boss; John T. Griffith, mining superintendent; William Smyth, assistant; George H. Parrish, general superintendent; F. Tiffeney, assistant.

*New shaft.*—This is a new shaft just being sunk. It is down about 50 feet, and ready to put in the permanent timber. Dimensions, 46×13 feet. It is intended to reach the Red-Ash vein with this shaft at a depth of 50 feet. Officers in charge, Smyth, Griffith, Tiffeney and George Parrish.

The following new breakers are being built by the Wilkesbarre coal and iron company: One at Sugar Notch, which is almost ready for operation at present; one at the Diamond shaft, which will be ready early next spring. Besides the above, the Lance breaker, now being remodelled, will be ready for operation next spring.

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#### LOCAL OPERATIONS.

There are some nine of these that I have a record of; most of them, however, work only during the winter months.

##### MESSRS. DAVIS & Co.'s COLLIERY.

This mine is located a short distance north of the West Pittston old shaft. It is a small opening just being opened on the water level to supply a local trade. Employs 14 persons inside and 9 outside. Mr. Joseph Davis, mine boss.

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##### PAYNE PETYBONE'S DRIFT.

This is a small drift located on the back north of the town of Wyoming. It is worked only during winter to supply a local trade. Wm. Jones, mining boss.

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##### MOSS & POLLOCK'S DRIFT AND SLOPE.

These mines are located a short distance west of the Petybone drift, on the back road, and work only during the winter months to supply a local trade.

## CONSUMER'S COAL COMPANY'S SHAFT, KINGSTON, PA.

*East Boston Shaft.*—No. 1 carriage dropped, first trial,  $13\frac{1}{2}$  inches; second trial, 6 inches; third trial,  $9\frac{1}{2}$  inches. No. 2 carriage not used for hoisting or lowering persons.

## DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY'S SHAFTS.

*Avondale Shaft.*—No. 1 carriage dropped, first trial, 2 inches; second trial,  $1\frac{3}{4}$  inches; third trial,  $1\frac{3}{4}$  inches. No. 2 carriage dropped, first trial,  $1\frac{1}{2}$  inches; second trial,  $1\frac{1}{2}$  inches; third trial,  $1\frac{1}{2}$  inches.

*Boston Shaft.*—No. 1 carriage dropped, first trial,  $1\frac{1}{2}$  inches; second trial,  $1\frac{1}{4}$  inches; third trial,  $1\frac{1}{2}$  inches. No. 2 carriage dropped, first trial,  $1\frac{1}{2}$  inches; second trial,  $1\frac{1}{2}$  inches.

## RIVERSIDE COAL COMPANY'S SHAFT, PLAINSVILLE, PA.

*Enterprise Shaft.*—No. 1 carriage dropped, first trial, 4 inches; second trial,  $\frac{3}{4}$  inch. No. 2 carriage not used for hoisting or lowering persons.

## LUZERNE COAL AND IRON COMPANY'S SHAFTS, PLAINSVILLE, PA.

*Henry Shaft.*—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

*Prospect Shaft.*—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

## DELAWARE AND HUDSON CANAL COMPANY'S SHAFTS.

*Pine Ridge Shaft.*—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial, 2 inches. No. 2 carriage dropped, first trial, 2 inches; second trial, 2 inches; third trial, 2 inches.

*Conyngnam Shaft.*—No. 1 carriage dropped, first trial, 12 inches; second trial, 14 inches; third trial, 8 inches. No. 2 carriage not used for lowering or hoisting persons.

## NORTHERN COAL AND IRON COMPANY'S SHAFTS, PLYMOUTH, PA.

*No. 1 Shaft.*—No. 1 carriage dropped, first trial, 2 inches; second trial, 2 inches. No. 2 carriage dropped, first trial, 2 inches; second trial, 2 inches.

*No. 2 Shaft.*—No. 1 carriage dropped, first trial, 3 inches; second trial, 2 inches. No. 2 carriage dropped, first trial, 3 inches; second trial, 2 inches.

*No. 3 Shaft.*—No. 1 carriage dropped, first trial, 3 inches; second trial, 2 inches. No. 2 carriage not used for hoisting or lowering persons.

*No. 4 Shaft.*—No. 1 carriage dropped, first trial, 6 inches; second trial,  $2\frac{1}{2}$  inches. No. 2 carriage dropped, first trial, 6 inches; second trial,  $2\frac{1}{2}$  inches.

## WILKES BARRE COAL AND IRON COMPANY'S SHAFTS.

*Dodson Shaft.*—No. 1 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches. No. 2 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches.

*Lance Shaft.*—No. 1 carriage dropped, first trial, 5 inches; second trial, 4 inches; third trial, 6 inches. No. 2 carriage dropped, first trial, 6 inches; second trial, 6 inches; third trial, 6 inches.

**The Gaylord Coal Company.**

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

**J. H. Swoyer.**

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

**W. G. Payne.**

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

**Plymouth Coal Company.**

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

**NEW FANS ERECTED DURING 1880.**

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

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

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

**Alden Coal Company.**

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

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

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

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

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

**Lehigh Valley Coal Company.**

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

**Plymouth Coal Company.**

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

**Hanover Coal Company.**

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

SUSQ COAL

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

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

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

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

*Improvements by the Lehigh Valley Coal Company.*

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

*Improvements by the Alden Coal Company.*

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

*Improvements by the Plymouth Coal Company.*

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

*Improvements by the Parrish Coal Company.*

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

FILLING OLD WORKINGS WITH CULM AT THE **DODSON** COLLIERY OF THE PLYMOUTH COAL COMPANY.

Superintendent J. B. Davies, of the Plymouth Coal Company, assisted by his efficient foremen at the Dodson colliery, in the latter part of the year 1891, concluded to fill the old workings below the shaft level with the refuse culm from the breaker. The dump space for refuse on the surface was small and nearly filled, and they saw that if it could be packed in the old workings it would serve well to strengthen the pillars and prevent caving in.

The apparatus was prepared and completed ready to begin to flush the culm into the mine by November 20, 1891, and in the fourteen months following enough culm was flushed in, to fill sixteen acres of the workings. All the old workings west of the underground slope, except one passage left for an airway along side of the solid coal below the filled workings, have been completely packed. Plate 1 in this report shows these workings in which the culm has been filled. It shows also a series of old breasts filled to the rise of the level gangway. The dotted part of the map shows the filled workings. To convey the culm and effect the packing, an iron pipe, six inch diameter, was used. The shaft piping has a vertical height of 410 feet. On top of the pipe a short section of a boiler, 36 inches diameter, is fixed to receive the culm from a breaker-chute. Leading into this a branch pipe is also brought from the column pipe of the pump. See plate 2. The quantity of water needed may be regulated by a valve on the column pipe near the discharge end.

At the bottom of the shaft, the bend of the ordinary elbow was found to be too abrupt, and a special combination elbow, with long easy bend, a stand, and branch flushing-pipe was constructed which has worked satisfactorily.

If the culm rushes in too fast, it has a tendency to block at this elbow, and when it does so, it can easily be started by forcing water in the branch or flushing-pipe at the elbow.

The culm was conveyed successfully through a horizontal pipe a distance of 1,600 feet from the bottom of the shaft. When filling the workings to the dip from the level gangway, it required 325 gallons of water per ton to flush it successfully, and thirty-two tons per hour was conveyed and deposited in the workings.

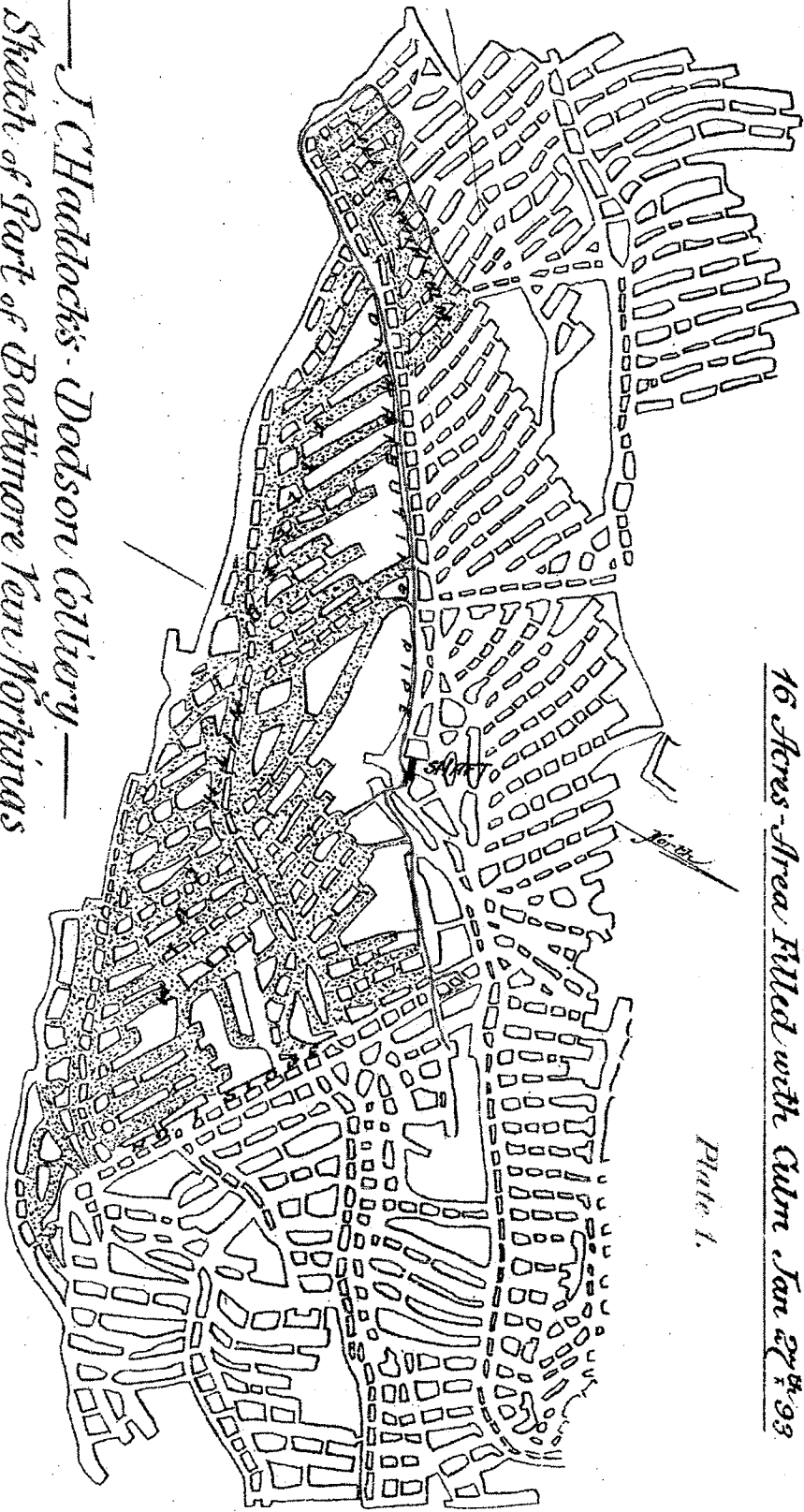
The flow of culm must be regulated so as to be as nearly uniform in quantity as possible, or it has a tendency to block and cause trouble in starting the flow again. Nothing larger than what can pass through a  $\frac{3}{8}$  inch mesh is allowed to enter the pipe; a larger size was tried, but it caused too much trouble by blocking.

After filling the workings to the dip they laid a pipe to the rise to a height of forty feet vertically, rising from the horizontal pipe at a distance of 1,200 feet west of the shaft and reaching an elevation of forty feet



16 Acres Area Filled with Culin Jan 27<sup>th</sup> 93

Plate 1.



J. Chadlocks' Dodson Colliery —  
Sketch of Part of Baltimore Ten Workings  
showing Distributing Gyle and Area Filled with Culin.  
Scale 400 Feet.  
Pittsburgh, Pa.  
Atkinson & Howard Engrs.

in a distance of about 300 feet. The pipe has a rise of from naught to twelve degrees and they have experienced but little trouble in filling the workings at this elevation, but it requires a quantity of 440 gallons of water per ton to flush it successfully up to these high points.

The red line on the map, plate 1, shows the line of the pipes. It is shown that they are laid both east and west from the bottom of the shaft. This is arranged so that when the pipe is being extended on one side, the other can be used to deposit the culm.

The discharge from the pipe is not a steady flow on account of the large quantity of air carried down by the inflow of the culm and water, but is an intermittent noisy emission at frequent irregular intervals. Care must be taken in approaching the discharge end of the pipe lest there may be explosive gases therein. At a number of times, they have found it emitting considerable gas of an explosive nature, and where the space is confined, the gas is liable to accumulate.

An airway is kept open all around the filled workings with an efficient current of air passing through. They have taken several of the pillars out and filled their places with culm. There was more or less apprehension of the culm becoming heated and taking fire spontaneously, but though a slight degree of heat is generated, nothing has transpired to cause the slightest alarm, and the arrangement of the pipe is such that any point could be flooded with water in a short time. In truth they have solved the problem of depositing dirt in mines, and utilizing it in sustaining the overlying strata in an economical manner.

#### SHAW'S STANDARD GAS TESTING INSTRUMENT.

Two of these valuable instruments were procured for use in this district during the year 1892. One by the Lehigh and Wilkes-Barre Coal Company for use at the South Wilkes-Barre colliery, and the other by the Susquehanna Coal Company, for use at the collieries at Nanticoke. The Mine Inspector's office was furnished with one, about three years ago.

It is a valuable instrument when a positive knowledge of the proportion of explosive gas or black-damp existing in the air is required, and frequently this knowledge is found useful in distributing the ventilation of a mine. The different splits can be regulated so that equal proportions of gas is found in the air of each split.

The writer used it with good effect in the Conyngham mine. The return air was so charged with deadly gases that no one could enter the mine. It extinguished a light as effectively as water, and two or three inhalations made a man exceedingly sick. It came from an inaccessible part of the mine, where the source of its production could not be ascertained. From a point where it was mixed with all of the air of the mine, a current of 70,000 cubic feet per minute, a sample was taken and examined, in which four per cent. of carbonic acid was found. This

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 **Dod- son** collieries. The Nos. 1 and 2 collieries of the Red Ash Coal Com- pany, 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 out- crops 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.

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.

much less, and especially is this the case in mines where a large quantity of marsh gas is emitted. The gas is emitted at a higher rate than the velocity of natural diffusion and it accumulates in a pure unmixed state, which is not explosive and does not support combustion. Therefore, the probability of its accumulating around a fire without exploding, is much greater than it would be if the air was gradually reduced and mixed with marsh gas.

#### The **Dodson** Mine Fire.

At about 6.15 A. M., July 13, the Dodson breaker of the Plymouth Coal Company, at Plymouth, was discovered to be on fire. In a short time the whole structure, including the shaft tower and engine house was aflame and was totally consumed. The shaft cages, sheaves and a mass of burning timber fell down the shaft, which set the pump room and timber at the foot also on fire. Streams of water were poured down the shaft to extinguish the fire below, but the air current caused by the falling water drove the fire into the workings. There were fifteen men in the mine, but they came out safely through the Gaylord mine. Soon after they had started out, the burning shaft became the upcast and the fan was stopped. At this time the fire bosses went in from the Gaylord mine and found the bottom of the shaft a raging mass of fire. They came out and recommended pouring water down and when this was done the shaft became a downcast and the mine was soon filled with smoke. Later the water was stopped and an attempt made to go into the mine from the Gaylord workings in the Ross seam. On reaching a rock slope sunk from the Baltimore to the Red Ash, they found the slope full of fire damp, being drawn up from the Red Ash seam, and they hastily returned and reported the situation. At 9.30 P. M. a shock, as if an explosion had taken place inside, was felt on the surface.

The following day, July 14, at a conference of the officials and mine superintendents, it was determined to flood the mine with water. While the preparations for flooding were going on, the shaft and all other openings to the mine were hermetically sealed, and on July 17 the pouring of water down was stopped. The whole mine filled with non-combustible gases in a few hours. On July 19 explosive gas appeared at all the stoppings, which showed that carbonic acid was no longer produced, and that combustion has ceased. The carburetted hydrogen had no air intermixed and so was not combustible. On July 30, at 4.30 P. M., thinking the fire extinguished, the stoppings at the Gaylord mine were reopened and the Dodson fan was put in operation to ventilate the mine. On August 2 explorers entered the mine but failed to go to the seat of the fire owing to falls of top and explosive gases. On August 3 a second exploration discovered a

small fire burning between the head of the Rock slope and foot of plane. The next day the fire was much more extensive and the mine was again closed. On August 9, there being not enough non-combustible gas to fill the mine, it was decided to ventilate it and try to fight the fire directly. This was tried for twenty-two days without success, under a great disadvantage owing to the great distance for water to be conveyed and the material through old workings, having no roads or tracks. On September 2 it was decided to fill the mine with water. All openings were again hermetically sealed and a large stream of water was pumped in from the Susquehanna river until 6 A. M., October 4, when it was stopped, having reached a height of 118 feet in the shaft, a vertical height of 545 feet from the lowest point in the mine.

At this date, February 8, 1900, the water has been pumped out to the shaft bottom, but the slope extending through the measures to the Ross and Red Ash seams is still full, as is also the workings of said seams. It was exceedingly difficult to repair the shaft and pump the water out, but it has been accomplished without an accident. The gangways leading from the shaft to head of slope are all closed by falls of top and will have to be reopened before the water in the slope can be reached.

On repairing the shaft it was seen that a destructive fire had also been in the old Hillman vein, leading in from the shaft a distance of about 200 feet. The timber had all burned away and the fallen roof had been on fire, but this had been extinguished by the non-combustible gases during the time the air was excluded. The water had never got near it, but the air had been sealed off from that seam for a much longer time than it was from the Baltimore seam lower down where the shaft terminated. The lower part of the mine was effectively sealed for only thirteen days and there being a large fire, some of it was still burning when the non-combustible gases were forced out and replaced by a current of air. It is evident that where a mass of material is on fire, while combustion is stopped by an atmosphere of non-combustible gases, the process of cooling is exceedingly slow, and it requires more forbearance than most men possess to wait the necessary time for the heat to be entirely dissipated.

It has been demonstrated a number of times, that to fill an extensive mine with water and pump it out again and repair the damage which is done at all times to the gangways and airways, and the workings generally, it takes from nine months to a year and a half to remove the effects, and an enormous expense must be incurred. The time required to extinguish a fire by sealing and excluding the air is exceedingly uncertain, but it has been proven many times that two or three weeks is not long enough, even under the most favorable

conditions, but in cases where it has been kept sealed for five or six months it has been successful if a non-combustible atmosphere is secured and the conditions are favorable for maintenance of such atmosphere.

#### The Great Danger to Mines from Outcrops of Coal Seams and Pot Holes Buried Under Deep Deposits of Quicksand.

Next to that attending the emission of large volumes of explosive gases, the cause of the greatest anxiety for the safety of the mines in the Fourth Anthracite District is that which is presented by the possibility of a mine-working striking a deep pot hole, crevice or the outcropping of a coal seam buried under a great depth of detritus consisting of sand, gravel or clay. Contemplation of the probable physical condition of the surface of the rock strata and of the probable existence of pot holes, deep crevices or channels, and of the irregular form of the outline of the outcrops of the coal seams beneath the deep deposit of gravely wash found in the Wyoming Valley, makes one shudder lest a calamity causing great loss of lives should occur in some of the mines. The Wyoming coal basin has been likened in a general way to a huge canoe in form. It is about fifty-eight miles in length from Forest City to a point three miles west of Shickshinny. The ends are narrowed, like the point of a spoon, but the breadth in the widest part is from three and a half to four miles.

The base of the coal bearing strata is the well-known conglomerate rock seen exposed at the crest of the mountain sides all around the basin. Taking the conglomerate rock to be the canoe-like base, the coal-bearing strata consisting of alternate layers of rock and seams of coal are like a pile or series of canoes of gradually reduced sizes laid in or upon one another in the canoe-like form of the conglomerate. The greatest depth of strata hitherto tested at the bottom of the valley lying above the conglomerate is about 2,200 feet, which was tested by a borehole in Hanover township, in the neighborhood of Hanover park.

The conglomerate rock is found turned up and exposed on the surface forming the crest of the east and west slopes of the mountain ranges on each side of the Wyoming and Lackawanna Valley. At a line lower on the mountain slope we find the crop of the rock overlying the conglomerate, and lower still the outcrop of the lowest coal seam, known here as the Red Ash seam. Passing another series of rock and slate outcrops, each at lines lower on the slope, the second coal seam appears, which is known as the Ross seam. Lower still, small areas here and there of the third, the Baltimore seam, are found to have extended up the side of the mountain, but the outcrop of that is most generally found at or near the base of the mountains, except in places where it has been washed away. The outcrop of all other seams are at various lines at the bottom of the valley, if at all exist-

Three fatal and 31 non-fatal accidents took place in the mines and 8 fatal and 20 non-fatal on the surface. These occurred in divers ways which could not be classed with the others. Some struck themselves while using axes. Some were struck by pieces of ice falling down the shafts from the sides. Some were caught in machinery, etc.

This class of accidents can be reduced only by a rigid discipline on the part of officials, and a greater care for their own safety by the men themselves.

#### Fires in Mines.

The year 1900 was remarkably free from mine fires of any magnitude. The Empire mine fire, reported last year, and the Maxwell mine fire are still sealed in, so that they cannot be examined, but there is no discernible evidence of the existence of fire in either mine.

#### Abandonment of the Hillman Vein Colliery.

The coal of the Hillman Vein colliery of the Hillman Vein Coal Company having become exhausted, the mine was abandoned on August 16, 1900. This colliery started to prepare and ship coal on September 28, 1883, and produced, including the coal used at the colliery for steam purposes, 1,244,972 tons. The Hillman, Kidney and Abbott seams were mined out.

The size of the hoisting shaft was 16x11 feet, sunk to the Five Foot seam, a depth of 280 feet.

#### The **Dodson** Colliery of the Plymouth Coal Company.

The damage done to this colliery by the burning of the breaker July 13, 1899, has been nearly all repaired. Nearly every yard of the gangways and airways was closed by falls of roof caused by destructive explosions of gas and the flooding of the workings with water. The airways having been closed the workings were filled with explosive gases, and it has been a slow and tedious work to reopen the mine, but, by working entirely with safety lamps the work was accomplished without accident. A new breaker is being constructed which will be ready to prepare coal about the middle of March, 1901.

#### Examination of Mine Foremen.

The annual examination of applicants for certificates of qualification for mine foreman and assistant mine foreman was held in this district on the 14th, 15th and 16th of June, 1900, at the council room, city hall, Wilkes-Barre.



## WEST END COAL COMPANY

## Long Drift Basin

One 7x12 foot plane from the Red Ash to the Ross seam, 370 feet; one 7x12 foot tunnel from the Red Ash to the Ross, 400 feet; one 150 foot rope haul at the head of main slope; one 400 foot rope haul at the foot of Ross rock plane; one pair direct motion 24x36 inch slope engines, for main slope.

## Lee Basin

One slope 10x12 feet in Red Ash seam, down 400 feet No. 1 Lee; one slope in Red Ash seam 10x12 feet down 300 feet No. 2 Lee.

Outside.—One 10 foot by 14 inch Vulcan mine locomotive; one 300 H. P. Maxim water tube boiler; new pockets, and a car haul and automatic car tipple at the breaker; 100 mine cars.

## PLYMOUTH COAL COMPANY

## Dodson Colliery

The improvements consist of two items, pumping 96 feet of water out of the Gaylord shaft and increasing pumping capacity over 50 per cent. in order to handle the extra amount of water.

In the year 1894, the Gaylord mines caved in. The company took out their pumps and set them in the shaft some distance above the Ross vein. The water rose to that point—157 feet in the shaft. The Plymouth Coal Company on account of this had to leave 200 feet of coal in the barrier pillar from line to line. In order to mine this coal, arrangements were made by the Plymouth Coal Company to pump this water out. One extra duplex Jeanesville pump 30x12x36 inches was built under the shaft, and one extra Scranton pump, Jeanesville pattern, 24x10x36 inches was built at the bottom of the Red Ash slope. In the meantime two narrow places were driven from the upper gangway, on Red Ash plane, through the above mentioned pillar towards the water, when within 100 feet of the water 3 bore holes were kept in each plane some 60 feet ahead, until the water was struck. Five holes were put through, 3.2 inch and 2.2½ inch holes. Pipes with valves were put on two of them, and the others left running. The head of water on these holes was 134 feet, and they were started October 11, 1904, and by December 31, 80 days, they had discharged 110,277,700 gallons of water or 1,378,471 gallons per day.

Parrish Colliery.—Inside: Completed 3 concrete and steel air bridges; 4 concrete engine houses; 3 concrete pump rooms, and 4 concrete barns in Baltimore vein. Made new intake for manway in Five Foot; 3 rock planes 160 feet, and a rock shaft 55 feet to improve ventilation. Drove a tunnel 400 feet long from Baltimore vein to Top Baltimore, and made an opening to Five Foot vein, for safety; also a tunnel 300 feet long from Baltimore vein to Five Foot, for production. Made two 10-inch bore holes from Parrish Baltimore vein to Hillman vein Buttonwood colliery, for new pumping plant, a total of 495 feet. Reopening through a "squeezed" area in Top Baltimore vein a distance of 1,200 feet. Made a new airway along a fault in Hillman vein a distance of 650 feet, to remove doors from haulage road. Silting operations have been carried on extensively during the year.

Outside. Washery was enlarged.

#### PLYMOUTH COAL COMPANY

**Dodson** Colliery.—Inside: Built a stable in Red Ash vein to accommodate 24 mules; engine house at West slope Red Ash vein; engine house East slope, Red Ash vein; pump house foot of rock slope, Red Ash vein; engine house at head of rock slope, Bennett vein; all of concrete and steel, also built a hospital of concrete in Bennett vein, and an office room of concrete and steel at foot of shaft. Placed 48 sets of steel timber at head of rock slope, Bennett vein, 18 inch "I" beam collars 8 inch H section legs. Installed in Bennett vein at foot of shaft one 28 by 10 by 36 inch Duplex Jeanesville steam pump; in Red Ash vein at foot of rock slope one 24 by 10 by 18 inch Duplex Scranton pump, and also one 11 by 18 inch Duplex Jeanesville electric pump driven by 150 horse power General Electric motor.

Outside.—Installed one 21 by 36 by 33½ by 20½ by 30 inch Ingersoll-Rand air compressor, cross compound, non-condensing Corliss engine, running 120 revolutions per minute and producing 3,300 feet of free air per minute. Installed one 16 by 26 by 30 inch cross compound non-condensing Corliss breaker engine to operate breaker, speed, 85 revolutions per minute.