

We know but little in this country about the worst kind of danger from gas explosions—caused from the sudden liberation of large quantities of explosive gas, whereby a whole side or section of a mine is flooded. This takes place where the mines are very deep, and the gas pent up, under heavy pressure. Such cases are of frequent occurrence in Europe. A safety lamp, in such cases, is the only hope of the miner, and that only under favorable conditions. We are very free from this danger, and working mines on longwall system, another evil.

#### Mine Improvements.

For several years past, mining improvements already commenced have been suspended, and those in contemplation postponed, but the great and sudden change that took place in the coal business during 1879, with its unprecedented increase in the production of coal, caused a stir in the matter of mine improvements, as it is well known that with having done so little dead work since 1873, and with the prospects ahead of mining from twenty-three to twenty-five millions of tons of anthracite coal for 1880, and an increase afterwards yearly during the period of time required to produce, as it certainly will be, another general business stagnation, if not a panic, then I say our coal men see at a glance that the sooner they get to work on improvements, the sooner they will be able to take part in the increase above mentioned. Knowing that it is necessary to do so, in order to keep their capacities even up to an ordinary production, much less the apparent increase. Hence, I say, the work of sinking shafts, erecting breakers and new machinery of various kinds, has been resumed.

Salem Coal Company, Shickshinny, has driven a new, tunnel to reach a basin or trough of coal dipping westward, and disconnected from their former workings by a rock fault, and which is claimed will enable them to mine considerable coal in time to come.

**SUSQUEHANNA COAL COMPANY.**—The most important of the improvements made by the above company that I know of, is the erection of two new fans, and a new breaker under way. A fan, twenty feet in diameter, was placed adjacent to the one previously located near No. 2 slope, to assist in the ventilation of No. 4 and No. 2 slope workings, and the old mines. This fan, at first, did not operate satisfactorily, but after that they separated the air passages, so that each could work independent, then it gave more satisfactory results. The other fan was located near the same place, and was of the same dimensions, but it is to ventilate the upper seam operated in the No. 1 shaft, which was formerly ventilated by the fan located at the shaft head, but which may now be used exclusively for the lower seam, where they are driving out for a second opening, and confining themselves to the number of "not exceeding twenty persons" employed there at one and the same time, as per last decision of his honor, Judge Harding. A new fan is soon to be placed near No. 1 slope, twenty-five feet in diameter, to ventilate No. 2 shaft mine.

they have concluded to leave the shaft for the present at this depth, and proceed to work the Hillman seam as soon as a second opening can be effected to the Stanton air-shaft, where it is intended it shall be made.

**The Delaware and Hudson Canal Company.**

At the Laurel Run mine a short tunnel was driven from the lowest split of the Baltimore seam, a distance of 129 feet and  $7 \times 12$  feet area, to the checkered vein  $5\frac{1}{2}$  feet thick, from which that seam will be mined to a more or less extent, and there is a large area of it intact.

At the Conyngham shaft, a pair of new fans  $17\frac{1}{2}$  feet diameter was erected to supersede the old one, which proved inadequate for the ventilation required in the mine. These fans are of Mr. Scharar's pattern, and are giving satisfaction.

At the No. 5 shaft, Plymouth, a second opening was effected to the workings of the Cooper seam by sinking a shaft thirty feet depth and sixteen feet area, which can be used as an escape for the men in case it be required.

**The Susquehanna Coal Company.**

This company has under way a number of improvements, some of which are the following: At the Grand Tunnel, the water was pumped out of the old slope workings, with a view of re-opening them and sink a slope to mine the coal lying below these workings, of which a large area lies intact.

A large air-shaft is in progress of sinking for the purpose of ventilating the No. 4 slope and other workings, which was, at the end of the year, 160 feet deep, having an area of  $13 \times 18$  feet, upon which, when completed, a pair of double fans will be erected to create the ventilation.

At No. 2 shaft, a new slope was sunk from the level of the shaft to a length of 381 feet, and is still in progress of sinking at this writing. It passed through a series of rolls, but is now opening a track of good coal, in which two lifts have already begun to be mined. A new tunnel is also in progress, and has already reached a length of 672 feet, having an area of  $7 \times 15$  feet, which is destined to open the Ross and Twin veins at that level.

The No. 4 slope is being extended also, and had reached a depth of 318 feet from the old foot at the close of the year.

**The Wyoming Valley Coal Company.**

This company bought the Albright Coal Company's colliery, formerly called the Ellenwold, and they have pumped the water out of the shaft and are mining the coal from there since. A new fan was also erected on the air-shaft, a description of which can be seen in the table of New Fans in this report.

**The Kingston Coal Company.**

Another new shaft is in progress of sinking for the Red Ash seam by this company, the size of which is  $10 \times 30$  feet; and it was down over 200 feet at the close of the year 1882.

D + H Co.

11'x46½'. The engine cylinders are 26"x48", connected directly to a cone drum having a diameter of 10' in center and 6' at the ends.

At the Conyngham colliery a shaft was sunk from the surface to a depth of 93' where it penetrated the Hillman seam. It is equipped with a pair of hoisting engines, drum and cages and makes a second opening for the workings of the Hillman seam. The sectional area of the shaft is 11'x25'.

At the Boston mine the underground engine hoisting from the slope was taken out and another to do the same work was erected on the surface. These are a pair of engines having 22"x48" cylinders, having a parallel drum 7' in diameter attached. The rope passes over a wheel and down through a bore-hole 8" in diameter, incased by a 6" pipe. The slope from which this is hoisting was extended a distance of several hundreds of feet during this year. The temperature of the air in the mine was considerably reduced by the removal of the hoisting engine to the surface, and the condition of the ventilation was much improved.

At the No. 3 shaft a new underground slope was sunk to work coal to the dip from the shaft in the Cooper seam. The hoisting engines were located on the surface and the rope passing down into the mine through a bore-hole. This slope opens a wide range of good coal at a very convenient point to the shaft.

At the No. 5 colliery six new boilers were located at a point convenient for the underground hoisting engines and slope pumps. They were erected on the surface and the steam-pipe passes into the mine through a bore-hole 340' deep.

#### *Susquehanna Coal Company.*

In the No. 1 shaft, Lee vein, a tunnel was driven from the Lee to the Ross seam, a length of 1,460'. Its sectional area is 7'x16'. The second opening will be effected by driving opening to connect with the Ross vein workings of the No. 2 shaft.

The underground slope in this mine was extended to a length of 1,030', on an average grade of 6½°, which is the average inclination of the strata. The hoisting plant is located on the surface, and the rope passes down a bore-hole 929' deep. Electric bells are used for signals and a telephone used for conversation between the slope men and the engineer.

A telephone was also placed at the main shaft by which conversation can be held between the footmen and the hoisting engineer.

At the **No. 4 slope** the main slope was extended through the strata intervening between the Mills and Hillman seams, at a point where a small anticlinal intersected the slope in the Mills seam. The extension was 220' long on a grade of 15°. Second opening was also effected by driving a passage through the rock on a grade of about 30°.

*Improvements by the Susquehanna Coal Company.*

At the No. 1 shaft a tunnel was driven from the "Forge" to the Hillman seam. It is 650 feet in length and 7×14 feet area. It is intended to work the coal of No. 2 slope through this tunnel and abandon the slope.

The workings of the Forge Vein No. 1 shaft were connected by a tunnel from the No. 2 shaft and it is intended to convey the coal from a part of the Forge Vein workings by that way, to the No. 2 shaft when necessary.

In the No. 4 slope a tunnel was driven from the Mills to the George seam on a grade of twenty degrees, to make a gravity plane. It is 300 feet in length and 7½×12 feet area. A second opening was driven to connect with the workings of the George seam in the No. 1 shaft, and from there an airway was driven out to the surface. Upon this airway to ventilate the George seam workings, a new fan was erected, 18 feet in diameter, which is exhausting about 50,000 cubic feet of air per minute. At the No. 6 shaft a rock gravity plane has been completed, extending up to the No. 6 tunnel. It is 700 feet in length on an average grade of 14 degrees.

A great deal of work has been done in enlarging the return airways in several of the mines of this company, which has effected a marked improvement in the ventilation in each case.

*Improvements by the Kingston Coal Company.*

At the No. 1 shaft a tunnel was driven 1,200 feet from the Bennett seam to what is supposed to be again the Bennett. Its size is 7½×11 feet. In the No. 2 shaft an outlet has been driven to the outcrop to be used as an intake and travelling way.

At the No. 4 shaft two underground slopes were completed in the Red Ash seam.

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

At the Avondale mine each of the two underground slopes were extended, and they have commenced to drive a tunnel from the Red Ash to the Ross. Its size is 7×12 feet. At the Woodward colliery, a rock tunnel was driven from the Red Ash seam to the Ross, and continued to be driven to the Baltimore seam. Its length now is 1,200 feet, having an area of 7×14 feet. The two slopes, one in the Red Ash seam, and the other in the Baltimore, were extended to a length of 1,713 and 3,700 feet respectively, the Baltimore slope being the longest. This is now an extensive mine, well ventilated and kept in good order.

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

At the Boston colliery, several hundred feet east of the old shaft, a new shaft has been started. It is intended to sink it from the surface to the red ash seam. Its size is  $12 \times 33\frac{1}{2}$  feet and it was sunk to a depth of 110 feet by the end of the year 1893.

The sinking of another shaft is in progress by this company about a quarter of a mile east of the No. 5 shaft. It was sunk at the close of the year to a depth of 115 feet. Its size is  $10\frac{1}{2} \times 33\frac{1}{2}$  feet.

#### Improvements by the **Susquehanna Coal Company.**

At the No. 1 shaft a slope was made through old workings a length of 1,400 feet on a dip of  $8\frac{1}{2}$  degrees; size  $8 \times 16$  feet.

Another slope is being sunk in the George seam. Its size is  $8 \times 16$  feet and it was at a length of 1,000 on an average dip of  $8\frac{1}{2}$  degrees at the end of the year.

A new tunnel was driven from the Forge to the Mills seam a length of 800 feet, and a size of  $8 \times 14$  feet.

At the **No. 4 slope**, a tunnel 300 feet long was driven from the Mills seam and a rock plane was driven from the Mills to the George seam. Its length is 300 feet; grade, 20 degrees, and size,  $8 \times 14$  feet.

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

At the Avondale colliery a horizontal tunnel was driven through the rock from the red ash to the Ross seam. Its size is  $7 \times 10$  feet and its length 300 feet. This opens a large area of the Ross seam.

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

The three new shafts in progress of sinking by this company in Hanover township are not yet completed. The Bliss shaft was at a depth of 669 feet. The Auchincloss No. 1 at a depth of 661 feet, and the Auchincloss No. 2 at a depth of 659 feet. The size of each shaft is  $12 \times 43$  feet 3 inches.

#### Improvements by the Parrish Coal Company.

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

## Colliery Improvements During the Year 1896.

The coal trade was unusually lax, requiring work for less than two-thirds time; such improvements only as were urgently needed were made during 1896, and such as were made and had effect on the condition of the mines are recorded in the following:

## Improvements by the Lehigh and Wilkes-Barre Coal Company.

In the Empire mine a rock plane on a rise of 25 degrees was driven from the Ross to Baltimore seam in the abandoned Diamond colliery. It is 10x10 feet area and 435 feet in length. It enables the ventilation to be improved and they can work the remainder of the coal in that part of the Diamond mine.

At the South Wilkes-Barre colliery the No. 4 tunnel was extended to a length of 1,200 feet. It is driven from the Hillman through an anticlinal to cut the same seam on the other pitch.

No. 2 slope was sunk and connected to the No. 1 air shaft, effecting a third opening by which the ventilation will be effectively improved.

At the Lance No. 11 colliery two short tunnels were driven from the Cooper to the Five Foot seam. Their lengths are 200 and 250 feet respectively, and they have sectional area of 7x12 feet.

## Improvements by the Delaware and Hudson Canal Company.

At the No. 2 colliery the shaft was driven from the Bennett to the Red Ash seam on an extension of 273 feet, making the total depth of the shaft from the surface 859 feet.

## Improvements by the Susquehanna Coal Company.

At the No. 1 shaft a rock tunnel was driven from the Lee to the Lee seam through an anticlinal. It is 600 feet in length and 8x16 feet area.

A rope haulage was installed in the Forge seam in place of a mine locomotive, which is a decided improvement to the quality of the air.

In the No. 4 slope and No. 2 shaft several minor improvements were made. A tunnel was driven from the Hillman to the Mills seam. It is 500 feet in length with 7x14 area. An extension was made to the No. 5 slope which added 600 feet to its length. Size, 7x14 feet, grade 11 degrees. An extension of 300 feet was also made to the No. 11 slope.

In the No. 6 colliery Glen Lyon, 5 new gravity planes were made, varying in length from 200 to 500 feet, and a tunnel was driven from the Twin to the Ross seam. It is 700 feet in length and 7x14 feet area.

the coal from the shaft to the breaker. Another conveyor line was constructed to convey the coal of the Baltimore No. 4 shaft to this breaker.

At the Boston colliery the breaker hoisting tower was torn down and a conveyor was constructed to scrape the coal from the dump at the shaft to the head of the breaker, and in the mine a tunnel has been driven from the bottom to the top split of the Red Ash seam. It is 400 feet in length and 7x12 feet area.

The No. 2 shaft at Plymouth was extended from the Bennett to the Red Ash seam 312 feet, making the total depth of the shaft 898 feet.

A new fan was erected to take the place of the old one. It is 22 feet in diameter, encased by a brick wall. It runs 70 revolutions and is exhausting 97,800 cubic feet of air. The engine is horizontal direct acting, 16x30 inch cylinder.

At the No. 3 colliery, Plymouth, the Hillman seam was opened and a slope was sunk to a length of 620 feet; average grade 12 degrees; 7x12 feet area.

At the No. 4 colliery a new slope has been sunk in the Red Ash seam to a length of 800 and it is still being driven. It is 7x14 feet area and has an average grade of 7 degrees. It opens a large area of excellent coal.

#### Improvements by the Susquehanna Coal Company.

In the No. 1 shaft, Nanticoke, an extension of tunnel has been driven from the Lee to the Ross seam a length of 960 feet, and 7x14 feet sectional area. A tunnel has been driven from the Forge through troubled ground a length of 1,570 feet, 7x14 feet area and is still being driven. An extension has been made by a tunnel from the Hillman to the Forge seam 650 feet in length, 7x14 feet area. A tunnel has been driven for ventilation purposes from the Hillman to the Hillman 240 feet in length and 7x14 feet area.

In the No. 4 slope, Nanticoke, the main slope has been extended through the rock from the Hillman towards the Forge seam a length of 350 feet and it is still being driven. The No. 21 tunnel was extended a length of 700 feet from the Mills to the Mills and Tunnel No. 23 driven on from the Hillman to the Mills a length of 500 feet. The area of all is 7x12 feet.

In the No. 2 shaft, Nanticoke, No. 5 slope was extended through an anticlinal from the Lee to the Lee a length of 420 feet and the No. 11 slope was driven through the rock from the Ross to the Lee seam an extended length of 850 feet. A new gravity plane 850 feet in length was made in the Ross seam.

At the No. 6 shaft, Glen Lyon, No. 5 tunnel was driven to a length

Plane is now up 1,400 feet. At present is driving through fault or upthrow to bottom split in which vein the plane will be continued. Sinking slope and airway in Red Ash bottom split. Now down 1,400 feet. This slope will be an engine plane and second opening for No. 3 colliery. Pair hoisting engines, size 18x36 inches, at outlet shaft. Brick engine house, 22x43 feet.

Improvements by the **Susquehanna Coal Company, 1899.**

The principal improvements made by this company during 1899 have been in opening a tract of coal land situate at Stearns Station, Newport township, Luzerne county, about half way between their Nanticoke and Glen Lyon lands; these consist of three shafts in process of sinking, viz:

**No. 4 shaft**, four compartments, 15 feet 6 inches by 33 feet 10 inches inside, concrete coping; this has been sunk 430 feet and provided with a steel head frame 48 feet high to carry four 14-foot sheaves, one of which is in place; temporary hoisting engines, 18x36 inches, geared  $3\frac{1}{2}$  to 1, to 12 foot drum; 6-foot Sturtevant ventilating fan and compressor, 20x20x30 inches, with the necessary engine, fan and compressor houses.

**No. 4 air shaft**, being sunk as a second opening for No. 4 shaft, is located about 330 feet northerly from it, size 14x16 feet, inside concrete coping; this has been sunk about 100 feet and provided with wooden head frame 35 feet high, and permanent 15x48-inch direct acting hoisting engines, with 6 foot drum, the intention being to use a small carriage about 5x8 feet in one corner for hoisting men and materials, for repairs and in emergencies; there is also a ladderway partitioned off, the shaft being used as an airway to the permanent fan.

No. 5 shaft, located about 730 feet northerly from No. 4, is being sunk to develop the upper seams in the north basin, independent of the main No. 4 shaft; about 40 feet has been sunk. It is 22x15 feet 2 inches inside the concrete coping, providing for two hoistways and a pump and manway; a wooden head frame 42 feet 2 inches high has been erected, with two 14-foot sheaves and permanent hoisting engines, 20x36 inches, geared  $3\frac{1}{2}$  to 1, to 12 foot drum, with engine house.

The steam for this plant is furnished at present by two 250 horsepower Babcock & Wilcox boilers, the boiler house being located about 190 feet northeasterly from No. 4 shaft. There have also been built two blocks of miners' dwellings and a foreman's house, with sewerage, and water pipes have been extended from the Nanticoke Water Company's main, throughout the plant.

The improvements made at Nanticoke consist of four additional pumps put in No. 4 slope to control the water from the cave of April 13, and a new Peanesville pump 30x12x36 put in the Forge seam,



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

No. 9 tunnel to Stanton vein completed 563 feet.

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

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

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

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

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

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

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

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

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

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

Rock foot No. 4 shaft driven 80 feet.

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

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

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

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

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

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

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

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

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

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

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

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

to determine safe working rock cover on the flats near the river. New concrete cribs have replaced the old wooden ones in both hoist and ventilating shafts. New and improved safety gates and stop blocks put on Baltimore shaft. New brick electric light house. New brick and concrete safety lamp house. New concrete pump house on river bank.

#### Franklin Colliery

No. 8 slope extended 320 feet to Brown pillar line. No. 8 tunnel extended 190 feet to Ross vein. No. 15 tunnel is being driven from Red Ash rock slope to Ross, 480 feet to date. Tunnel extended 150 feet in Baltimore slope district to Abbot vein. New tunnel from top to bottom split of Red Ash completed. A new slope started in Ross vein. A new inside slope begun in top split of Red Ash. The old Brown slope reopened. Work is progressing on installation of 300 additional H. P. return tubular boilers. New fan, blowing engine installed. New 14x20 engine set in place at Red Ash second outlet shaft. New corrugated iron powder house. New dam and corrugated iron pump house. Washery completed and working. Number of repairs and alterations made in breaker. Baltimore fan house rebuilt.

### SUSQUEHANNA COAL COMPANY

#### Colliery No. 5

Outside.—Jig house completed. New steel bridge over breaker tracks. New compressor house, and 2-20 $\frac{1}{2}$  and 36x20x36 Ingersoll-Sergeant duplex two stage compressors. One hundred new steel mine cars.

Inside.—Rock plane, Mills to George, unfinished.

#### Stearns

Inside.—No. 4 shaft tunnels and returns completed, rock turnout for empty cars unfinished. New plane in Ross unfinished.

#### Colliery No. 7

Outside.—New lamp house completed. New timber yard completed. Remodelling No. 7 breaker, unfinished.

Inside.—New plane in Cooper seam unfinished. Slope No. 14, Ross seam.

#### Colliery No. 6

Outside.—Two thousand five hundred H. P. B. & W. boiler plant completed, and old cylinder boilers at No. 6 shaft and No. 6 slope abandoned. New rolls and screens in breaker. New railroad from No. 7 shaft to breaker, about 1 $\frac{1}{2}$  miles, completed.

Inside.—New tunnel slope No. 6 to N. shaft No. 6, unfinished.