SKETCH OF THE DEVELOPMENT OF THE STEUBENVILLE SHAFT MINES.

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In order to be fully acquainted with all of the interests in coal mining it is not only necessary to have theoretical knowledge, but also to have practical ideas to insure success. Knowledge is unlimited in its power and influence, but to truly know any science or any particular branch of industry is to become familiar with all of its details by actual experience.

The young man who would rise to eminence as a student of chemistry, must not only know the laws that govern it, but also know how to use the apparatus to demonstrate its truths. The individual who desires to become acquainted with the systems and modes of mining must first learn its theoretical principles and then be willing to stoop down to gather up the practical details and thus inform himself of the smallest minutiæ.

Although I am aware that our district takes but a small place in the history of mining, in our State, and that the arrangements of our mines present but little mechanical skill, yet the individual who is in search of information gathers ideas from the uncouth, and frequently builds up character from small beginnings.

The vein of coal that is now being worked in our vicinity is generally called the Steubenville vein or No 6. It is reached at a depth varying from 80 to about 260 feet.

Before the shaft coal was developed the city was supplied with coal from the hill banks. The distance, from the city to these banks, was about two and one-half miles. During the wet seasons of the year the roads were almost impassable and the supply of coal, at these times was limited, causing quite a famine in fuel.

The uncertainty of the supply besides the enormous prices to which it would rise at certain times of the year, led Mr. James Wallace, proprietor of the Ashland Woolen Mills located at the head of Market street, in the year 1856, to agitate the question of sinking a shaft down to the vein of coal that is now being worked.

A company was organized, of which he was made President. A shaft sixteen feet by eight, was staked off and is now generally known as the Market Street Shaft or High Shaft. The work of sinking commenced in the same year; and, after many delays, caused by the inexperience of the men, as this was the first shaft in our neighborhood, ehe coal was reached at the depth of 225 feet.

All of the shafts that have been sunk since that time have the same dimensions—sixteen feet by eight—ten feet of which are used for a hoisting shaft and six feet for an upcast air-shaft.

The separation is made by running a board partition down the whole depth and width of the shaft, making the hoisting pit the intake for the air-current, and the upcast the outlet. It might be as well to state here that since the mining law requiring two separate outlets came into operation, that it is observed by two or more of the pits being holed into each other, and a traveling way kept open, by the separate companies each bearing their proportion of the expenses so that the men, when necessary, can go from one pit into another. Others have sunk air shafts to meet the requirements of the law.

The shafts have all been put down without much expense, as none of the rock measures were heavily watered—the cost being not more than twenty-five to thirty dollars per vertical foot. However, in sinking the gravel shaft they encountered a heavy flow of water, but it did not proceed from any stratum of rock. The shaft is sunk, near the river, on the old river bed, going through sand and gravel, to the depth of over 70 feet, and the water percolating through the sand and gravel, from the river, gave them great trouble. Horse power was used in sinking. An upright drum was erected, having a diameter of about eight feet, on which the rope wound. The ropes used for hoisting were hemp from two inches to two and one-half inches in diameter. The buckets used for hoisting the rock out of the shaft were two feet square, made of two-inch oak bound with iron one and one-half inches wide, by one-half inch in thickness, crossing the bottom of the bucket about twenty inches apart, and coming up the side. They gradually came together at the top and were welded there, and an eye hole was punched to receive the bale, which was made of one and a quarter inch round iron. Directly over the shaft was erected a small derrick, about fifteen feet high, on which rested the pulleys to guide the rope, as the buckets descended and ascended. During the progress of sinking, the water was generally kept out by filling it, along with the rocks, into these buckets. But during a cessation of labor, at the end of the week, the water accumulated considerably, when an oil barrel was substituted for the bucket. A hole was cut in the bottom of the barrel, which was covered with a piece of leather fastened at one end with small nails, so that it acted as a valve. When the barrel descended, it would strike the body of water; the valve would open and the barrel would fill. When all of the water was got out that could be got out by this contrivance, then one of the men would go down and bail the water into the barrel until the bottom of the pit was cleared and made ready to resume sinking. There were five men generally employed at the bottom; one of them was required to mark off the place where a hole had to be drilled; to see that the pit was kept in line; to light up the blasts and to have a general supervision at the bottom.

As soon as the coal was reached, three entries were started from the bottom of the shaft. Two of them were driven from the sides of the shaft in opposite directions. The other was started from the end and driven at right angles, to the others. Each of these entries were driven fifty feet. When the two that were turned from the sides of the shaft reached the desired distance they where then turned at right angles and driven parallel to the one that was turned out of the end of the pit, to the distance of fifty feet, after which they were turned again in the direction of the shaft to hole into the entry that was driven from the upcast.

When this was effected the "holing round" was complete, leaving blocks of solid coal fifty feet square. The air now can descend the hoisting shaft freely, dividing itself at the bottom—one part going on the north side and the other on the south, uniting in the entry that leads to the upcast. In this entry is the furnace located.

The coal that was mined in driving these entries was hoisted by the same apparatus that was used in sinking. When all of this was accomplished the work of mining was suspended until the shaft could be fitted up for hoisting.

There is a great deal of work attending the fitting up of a coal shaft for hoisting. There is machinery and buildings, with a derrick, to put up; cages to build; "buntons" and guides to be put into the shaft; screens and pit cars to be provided.

The main shaft is divided equally by putting in cross timbers, generally called "buntons," 3x8 inches, the ends of which are entered into the wall and firmly wedged there with dry pine.

These timbers are put in four feet apart, measuring from centre t centre, and to which the guides that conduct the cages in their travels, are firmly bolted. The size of the guides generally used are 3½x8 inches. The cages are constructed of oak, with play sufficient to allow them to run smoothly in their ways, and are heavily ironed to give them strength, as they are frequently subjected to violent surges and always to a heavy jar when lighting on the bottom.

The landing place for the cages on top is twenty-two feet above the surface, or the level where the cars or wagons stand to receive the coal, which is abundant elevation to erect ordinary screens.

The height from the landing of the cages to the timbers that the pulleys rest on, directly over the shaft, is also twenty-two feet. The height mentioned here may vary a little, more or less, at some of the shafts and yet answer for all practical purposes.

When the machinery and all the other appurtenances that were connected with the shaft were ready, the miners were again set to work to drive the entries and to "win" out rooms, so that more men could be employed. Four entries are turned away—two on each side of the shaft, or as many as is necessary to open out the coal field.

The works are laid off on what is generally known as the room and pillar system. The entries are started away eight or ten feet wide and thirty feet apart, and driven to the distance of thirty-two feet, when a "stenton," or break-through, is turned away out of one of the entries, at right angles, to hole into the other entry, so that the air current could be carried forward to dilute the gases as fast as encountered.

The distance between rooms is forty-two feet; the room is eighteen feet wide, leaving twenty-four for a pillar.

The rooms were driven 70 feet, when a break-through was made from one room into another and the air carried forward by closing up the outside openings. The same system is in use to-day generally.

The mine is divided into what are called stations, fifteen men working at each. There are mules to haul the coal from the stations to the shaft, while boys, who are called "putters," are employed to push the cars from the miners to the station from whence the mules haul them.

It requires 606 feet breast of coal along the entries to make one station, at which the fifteen men before spoken of are employed.

The mule track is made in the middle room, having seven men on each side, which gives a short distance for the "putters" to push the cars. The stations are not all worked in a breast; one station leads another from 400 to 600 feet.

The mule track room, and the one on the right and left of it, leads the others from 30 to 40 feet, so that the "walls" or break throughs may be turned away in sufficient time to reach the next room as it comes up to the 70 feet.

The mule tracks are made about five feet high, measuring from the top of the sleeper. The height of the vein averages about four feet, so that it requires from twelve to fifteen inches of bottom to be taken up for the mule to travel. It costs from seventy-five cents to one dollar per yard to take up this bottom. Imbedded in the fire-clay there are found large boulders, the substance of which is a mixture of iron and limestone, and are commonly called nigger-heads. These sometimes lie hidden just beneath the surface, and when found in that position increases the cost of making mule tracks considerably. When the working face advances to the distance of about 230 feet, ahead of the station, the bottom is then taken up and the station moved forward.

The shafts that are located within the city limits have been in operation from twelve to twenty-six years. Some of the galleries are driven a long distance under the hills, and the work of thirteen mules is required to bring to the shaft 240 tons of coal per day. The pits are not far from each other; perhaps three-fourths of a mile on an average.

The works are driven forward very rapidly as the coal field belonging to each company is very narrow—running north and south—the great body of coal lying west. In view of this, the time is not far distant when improved methods will have to be employed to bring the coal forward to the shaft, as the cost of mule power is now considerably felt.

The system of ventilation is by furnace power; and, notwithstanding the long air courses in which the air has to travel, there is yet a vigorous current of air traversing the mine. The air-ways are large, so that the best possible results are obtained from the ventilating pressure. But it is very doubtful whether the present system of ventilation will be sufficient, in a few more years, to do the work that will be required, as many of the shafts are very shallow, and that a sufficient difference of weight between the column of air in the downcast and of that in the upcast cannot be obtained to give force, or pressure enough to move the air briskly along its courses.

If the works advance as rapidly in the next few years as they have done in the past, the force that is now employed will all be spent in overcoming the frictional resistance.

However, when that time does arrive it may be better for some companies, according to circumstances, to sink another shaft near to the face of the workings for an outlet than to change the present system, as it would probably involve more money to fit up machinery to use a fan than it would to sink another shaft.