EIGHTH ANNUAL REPORT

OF THE

STATE INSPECTOR OF MINES,

TO THE

Governor of the State of Ohio,

FOR THE YEAR 1882.

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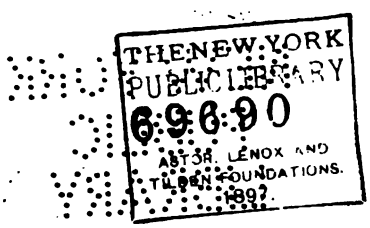
COLUMBUS, OHIO, *November* 14, 1882.

HON. CHARLES FOSTER, *Governor of Ohio.*

SIR: I have the honor to present herewith the Eighth Annual Report of the State Inspector of Mines.

Very respectfully,

ANDREW ROY,
State Inspector of Mines.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ANNUAL REPORT.

COLUMBUS, OHIO, *November* 15, 1882.

To His Excellency, CHARLES FOSTER, *Governor of Ohio:*

SIR: In compliance with the requirements of the act of the General Assembly regulating Mines and Mining, passed March 21, 1874, I have the honor to herewith submit the Eighth Annual Report of the Department of Mines, containing a description of the condition and operation of the coal mines of the State, enumerating all accidents in and about the same, and giving such other information as I have thought useful and proper, and making such suggestions as I have deemed important as to further legislation upon the subject of mining.

ANDREW ROY,
Inspector of Mines.

SUMMARY OF THE WORK DONE.

On the 18th of April, 1881, the General Assembly enacted a law providing for the appointment of an Assistant Inspector of Mines, and on the 4th of June following Jacob I. Klein, Esq., of Stark county, was nominated by me for the office, which nomination the Governor approved, and Mr. Klein assumed the duties of the office at once, visiting and inspecting mines in the various coal regions of the State, and reporting their condition to this office. On the 20th of October, while in the discharge of his duties, he was kicked by a horse, and his leg was broken in two places. His injuries were such that for seven months thereafter he was unable to do duty. For some time after the accident, I endeavored to perform all the duties of the office, but the work getting behind, Mr. Klein employed John P. Williams, of Church Hill, Trumbull county, to act for him until such time as he was able to resume work. Mr. Williams was thus employed until June 1, visiting and inspecting mines, and reporting their condition to this office. His report, marked Special Report by J. P. Williams, is herewith submitted.

Mr. Klein reassumed duty on the 1st of June, since which time he has been constantly engaged in visiting and inspecting the mines of the State, calling attention to any violation of the law on the part of mining superintendents, mining operators and miners. Nearly all the mines in the State have been visited and inspected during the year, some of them a number of times. Mr. Klein has been indefatigable in the discharge of his duty.

When not otherwise engaged in office work, I have been constantly in the coal field during the year, inspecting mines and making suggestions as to improvements in mining and ventilation, and it affords me pleasure to record the fact that year after year more approved methods of working and ventilating mines are being adopted. A large proportion of the mines in the State may be said to have now reached systematic perfection in ventilation and general security.

THE ANNUAL COAL PRODUCTION.

The mining law does not require the Inspector of Mines to collect the coal production of the mines; but it is so important to have an approximate estimate of the annual output for the purpose of comparing the loss of life to the quantity of mineral mined, that I have annually endeavored to collect and publish the product of the mines. The mining companies have generally been averse to furnishing a statement of the output of their mines, regarding the matter as private business. The following are the estimates made for the past eleven years by this office:

1872	5,315,294 tons.
1873	5,450,028 "
1874	3,267,585 "
1875	4,864,259 "
1876	3,500,000 "
1877	5,250,000 "
1878	5,500,000 "
1879	6,000,000 "
1880	7,000,000 "
1881	8,225,000 "
1882	9,450,000 "

The amount given in the Tenth Census Report of the United States for the year ending May 31, 1881, is 6,437,725 tons. The following is the summary by counties:

STATISTICS OF THE COAL MINES OF OHIO, FOR THE YEAR ENDING MAY 31, 1880.

Counties.	Tons.	Value.	Number of large mines.	Number of employes.	Number of small mines.	Number of employes.
Athens	589,195	$598,898	12	1219	14	51
Belmont	452,754	456,890	16	716	35	138
Carroll	20,692	27,227	2	43	18	49
Columbiana	541,466	596,264	18	1332	16	52
Coshocton	62,990	74,494	4	159	11	49
Gallia	19,941	20,311	1	23	16	35
Guernsey	168,480	184,400	5	314	10	34
Harrison	45,860	45,860	3	52	14	72
Hocking	176,852	176,000	4	349	3	5
Holmes	17,460	26,190	1	21	10	25
Jackson	196,452	249,385	18	587	21	72
Jefferson	388,199	350,543	13	768	10	66
Lawrence	118,929	149,105	6	300	4	6
Mahoning	347,635	693,826	15	1095	1	10
Medina	106,000	170,000	2	312	.....	.....
Meigs	388,786	469,203	11	1106	.....	.....
Monroe	1,600	2,000	.....	.....	1	8
Morgan	10,520	10,915	.....	.....	16	34
Muskingum	129,869	133,504	8	181	43	182
Noble	21,520	24,350	1	19	14	31
Perry	1,058,254	1,142,934	19	1988	8	43
Portage	26,500	60,625	2	132	1	4
Scioto	7,443	10,637	.....	.....	13	21
Stark	344,397	492,951	15	1346	31	143
Summit	130,165	224,413	7	494	4	63
Trumbull	673,206	1,383,370	14	2041	7	11
Tuscarawas	246,229	309,352	15	605	27	105
Vinton	61,908	82,882	2	190	12	30
Washington	28,800	30,200	1	30	9	19
Wayne	55,623	85,250	1	200	14	42
Totals	6,437,725	$8,281,979	216	15,622	383	1350

My estimate of 7,000,000 tons for the year ending December 31, 1880, is nearly correct, for after the census report was completed, the coal trade greatly revived, and in addition four new and important mining districts were opened, namely, the Sunday Creek Valley, of Perry county; the Dell Roy district, of Carroll county; the Wheeling Creek district, of Belmont county, and the Coalton district, of Jackson county.

The statements of the coal production, as published in the statistical

department of the annual reports of the Secretary of State, are as follows:

Mine Inspector.		Secretary of State.	
Years.	Tons.	Years.	Tons.
1872	5,315,294	1872	4,417,550
1873	5,450,028	1873	3,511,769
1874	3,267,585	1874	No report.
1875	4,864,259	1875	3,915,072
1876	3,500,000	1876	3,636,318
1877	5,250,000	1877	3,501,955
1878	5,550,000	1878	3,526,804
1879	6,000,000	1879	5,874,486
1880	7,000,000	1880	No report.
1881	8,225,000	1881	3,933,225

The published statements in the report of the Secretary of State are grossly inaccurate, and none are more so than the summary by counties for the year 1881. Take Perry county for example, which last year produced fully double the quantity of any other county in the State—it is left out of the list altogether. Stark county, also, which ranks fifth in point of production, is not credited with a single ton.

In pointing out these inaccuracies in the report of the Secretary of State, no reflection is intended against the Secretary, or any of his efficient assistants. The fault lies in the system by which the statistics are collected. The reports made to the county auditors by the township assessors are bad guess-work.

As illustrating the careless and inaccurate manner in which statistics are collected and returned by the township assessors, I copy the following from the Jackson *Standard*, of Jackson county, July 6, 1882:

On Monday we undertook to get some important statistics from the returns of the township assessors. Auditor Evans very kindly aided us, and we together wrestled with the returns for two hours, but could not understand the figures to any degree of certainty. Many places figures had been placed in wrong columns, and there were evidently grave mistakes. For instance, it is reported that Keystone

Furnace, in Bloomfield township, made in one year 6,786 tons of pig-iron from foreign ore, and 1,800 tons from native ore. We are informed that not a pound of foreign ore was used, and the furnace could not make that amount of iron.

In Washington township only 260 tons of ore is reported, whereas more than ten times that amount was produced.

When such glaring inaccuracies as the above are sent the Secretary of State, the wonder is that the statistical report of that officer is half as approximately accurate as we find it.

FATAL ACCIDENTS.

The number of fatal accidents which occurred during the year were 25. The following were the names (together with the cause of accidents) of the unfortunate men:

November 22, 1881. Edward Clarke was killed at the mines of the Craft Iron Company, by a fall of coal.

December 2. John Stineline and Peter Conlin were scalded to death in the mines of the Wadsworth Coal Company, by the explosion of an underground boiler. The boiler was used to supply steam for a pump, and was located half a mile from the bottom of the mine.

December 19. Lawrence Kern was killed in the Massillon City mine while undermining a standing shot. The coal suddenly fell, killing him instantly.

February 17, 1882. William Cobb was killed by a fall of soapstone at Heatherington mines, Belmont county.

March. Thomas O. Davis, mining boss at the Glove slope in Jackson county, was caught between the cogs of the hoisting engine, situate on top of the slope, and was so badly injured that he died 9 days after the accident.

April 8. Jacob P. Davis, killed in the mines of the Osborne Coal Company, at Mineral Ridge, by a fall of coal.

April 16. William Arrason was killed in the new shaft of the Silver Creek Mining Company. The deceased was a driver boy, and was being lowered down the pit with his mule, when the ring, which connects the bridle chains of the cage with the wire rope, broke, precipitating the young man and the mule to the bottom. This accident was a palpable violation of the mining law, as the cage was not provided with safety catches.

April 20. Vinton Allbaugh, killed in the Zaleski mines, Vinton county, by a fall of slate.

April 21. Patrick McManus was killed in the Rainey mines, near Martin's Ferry, by a fall of slate. The boss, in reporting this accident, stated that it was the only fatal accident which had occurred at that mine.

April 25. Scott Knight was killed at the mines of Ebenezer Williams, Minersville, Meigs county, by a fall of slate.

May 10. Charles Duffy, killed at the Belfont Coal Works, Lawrence county. He had fired a shot, which knocked out three props, and as he went back to see

how the shot had done, the slate fell upon him, and so crushed him that he died in three days afterwards.

May 29. Charles Wertenberg was fatally hurt by a fall of slate, at mine No. 12, of the Ohio Central Coal Company, Corning, Perry county.

June 23. Jacob Withers was drawing pillars in the mines of the Steubenville Coal Mining Company, when the roof gave way and killed him.

June 23. John Ellslager, killed at the Wheeling Creek mines, Belmont county, by a fall of soapstone.

July 17. Joseph Burch, fatally hurt by a fall of coal, at the Fox Lake mine, Summit county. He died two days after the accident.

July 19. John Benson was killed at Camp Creek mines, Stark county, by a blast. He had fired two shots, and going back on the second one before it exploded, was caught in the blast, and killed instantly.

August 15. Robert Lind, killed in the mines of the Elm Run Coal Company. The deceased was in the act of stepping on the cage at the bottom of the shaft, having given the signal to hoist away, when he was caught between the cage and the roof of the mine.

August 19. Jacob Hanner, killed in the Plummer Hill mine, near Straitsville, by a fall of slate.

August 20. David L. Shotts was so severely burned by an explosion of fire-damp in his room, at the Star Furnace Mine, Jackson county, that he died on the 27th, following.

August 25. Vincens Catalene was killed in No. 9 mine of the Mahoning Coal Company, by a fall of roof.

September 13. Hezekiah Hart was killed in Longstreth's mines. The unfortunate man was in the act of examining the roof, when it gave way, crushing him to death.

October 3. John G. Watson was instantly killed in the Pike Run mines, Tuscarawas county, by a fall of coal. He was a boy, working with his father, who was severely injured by the same accident.

October 5. Evan Evans, killed at Camp Creek mines. He was a driver boy, and while bringing out a trip one of the cars jumped the track, knocking out a prop. A mass of stone fell upon the boy, breaking his neck.

November 9. John I. Davis, killed in Weathersfield shaft, Trumbull county, by a fall of coal.

It will be observed that the great majority of the above accidents were occasioned by falls of roof and coal. Such accidents occur in the working places of the miners—in their rooms, and no one is responsible for their occurrence but the miner himself. Deaths caused by falls of roof or coal are usually regarded as the result of carelessness, but this is only partly true. Mining is a dangerous occupation, and accidents will occur, no matter how vigilant the miner may be. Still, vigilance will reduce the number, and workmen should exercise every possible care and caution.

Accidents which occur outside of the miner's working-place, may, or may not, be due to the thoughtlessness of the persons injured or killed. In the majority of cases the officers of the mine are to blame. The miner has no voice in securing the traveling roads, nor in providing good ropes, or approved safety catches. He also has no control over the ventilating apparatus, nor over the door-ways, traveling ways and drainage. It is the duty of the mining boss to attend to these matters, as well as to see that all loose coal and roof are carefully secured.

Many accidents occur for which the heirs-at-law of the deceased could recover damages in court, but prosecutions seldom arise, the workmen feeling unequal to cope with their employers in the courts. I have advised prosecuting in all cases of clear negligence on the part of the mine owners and their bosses; a man's life is worth a coal bank; the risks of mining are sufficiently hazardous, after every approved safeguard is thrown around the miner.

COMPARISON OF CASUALTIES.

The following table, prepared from the best estimates at command, gives the number of tons of coal mined for every life lost in and about the mines from the year 1874 to the year 1882, inclusive:

Years.	No. of fatal accidents.	Number of tons mined.	No. of tons mined for each fatal accident.
1874	30	3,267,585	108,919
1875	24	4,864,259	202,667
1876	13	3,500,000	269,999
1877	30	5,250,000	175,000
1878	No report.	5,500,000	.....
1879	No report.	6,000,000	.....
1880	22	6,437,725	292,624
1881	29	8,225,000	283,621
1882	25	9,450,000	378,000

The above figures are not to be considered as absolutely accurate, for the output of the mines is merely estimated. On the first of January, 1883, I will send printed circulars to every coal mine operator in the State, requesting them to furnish this office with a statement of the output of the mines for the year ending December 31, 1882. The facts furnished shall be regarded as strictly confidential, and shall be used only as aggregates from each mining county in the State.

SERIOUS ACCIDENTS.

A large number of serious accidents annually occur in the mines, which are never reported to this office, no person being charged with the responsibility of doing so. Their proportion to fatal casualties are as four to one. They generally occur in the working places of the mines, and are usually caused by falls of roof or coal, or by the premature explosion of blasts. Limbs are bruised, bones are broken, and frequently the injury is so severe as to incapacitate the miner from all future pursuit of his calling. In the monthly reports of the mining bosses to the Inspector of Mines, a table is provided for the insertion of all accidents, fatal and serious, but not one-fourth of a serious character are reported to this office. For several years after this department was created, I endeavored to collect all serious accidents, relying on the miners to forward them immediately upon their occurrence; but I could never obtain a complete list, and this year but forty cases in all are reported, while they must number fully one hundred.

DEVELOPMENT OF NEW MINES.

A large number of new mines have been opened during the year, and the capacity of the mines of the State is now fully equal to 20,000,000 tons per annum. The new works are located mainly in the counties of Athens, Hocking, Perry, Jackson, Stark, Summit and Mahoning.

The Mahoning Valley, which reached a million tons in 1873, seemed to have arrived at its maximum production in that year. Many of the mines of this district are being rapidly exhausted, but newer discoveries reward the researches of the mining adventurers, and the annual product of 1,000,000 is still maintained.

In Stark and Summit counties, vast deposits of coal have been brought to light by boring, and a dozen new mines have been opened in these districts during the year, capable of increasing the ordinary annual output fully 100,000 tons.

In the Hocking Valley district, comprising the counties of Athens, Hocking and Perry, the developments are simply wonderful, and that region may now be regarded as the "black country" of Ohio. The new mines opened in that region alone are capable of producing 2,000,000 tons, and not many years will elapse before the three counties of Athens, Hocking and Perry will produce half the coal mined in the State.

In Jackson county, the now famous Wellston, or Coalton Coal, which less than four years ago was unknown in the market, will aggregate

fully 350,000 tons, and in the course of four or five years will increase to 1,000,000 tons annually.

During the year there have been none of those great and disastrous strikes, which formerly were the curse of the mining regions of the State, paralyzing industry, and producing only pure, unmixed evil. A better feeling seems to be growing up between the miners and their employers, and every friend of industrial progress, every true friend of labor, will hail the dawn of that day when strikes will become a thing of the past, forever.

OUR MINERAL RESOURCES.

The mineral resources of the State of Ohio are practically inexhaustible. Nearly one-third of the area of the State is covered with the coal-bearing strata, containing beds of coal, iron ore, limestone, fire clay, and other rocks of value for commercial purposes. Enclosed in the coal measures are no less than forty different beds of coal, numerous beds of ironstone and limestone, offering a rich and inviting field to the capitalist of every State of the Union, and every nation of the Old World. Of the forty seams of coal, fifteen or sixteen of them are three feet and upward in thickness, while the heavier beds, like the great vein of New Straitsville, and the Sunday Creek Valley, rise to ten and twelve feet in height. Every known variety of bituminous coal is found in the State; block, splint and dry burning coals, adapted for smelting iron in a raw state, coking and cementing coals, fitted for the manufacture of coke, flaming, or gaseous coals, rich in gas and cannel coal, adapted for making gas, for the manufacture of oil, and prized as parlor fuels.

Although last year we raised fully 8,225,000 tons of coal from the mines of the State, and this year one million more will be added to the output, and Ohio stands second in rank among the coal producing States of the Union, we have scarcely yet began to draw upon her mineral treasures. At a very moderate calculation there can be no less than 85,000,000,000 tons of coal locked up in the coal measures of the State, an amount capable of supplying the wants of the whole earth, at the present rate of consumption, for the next four hundred years. The beds of ironstone interstratified in the coal bearing strata are more numerous than even the coal seams, and they are as rich in quality as they are abundant in quantity, while limestone beds are spread all over the whole area of the coal field. These mineral strata, formed millions of years ago along the marshy shores of the carboniferous world, are the

embodiment of future wealth, and power and greatness, surpassing the wildest dreams of the imagination.

In the State of Ohio, the annual production of coal is doubling itself every ten years, and in the United States, every thirteen or fourteen years; and for many years to come these figures will be maintained, if not surpassed. At the beginning of the 20th century, now less than nineteen years distant, the annual coal production of Ohio will reach 30,000,000 tons, while more than 2,000,000 tons of iron ore will be raised from the ore mines. In the United States the output of coal in the first year of the 20th century will amount to fully 150,000,000 tons, giving employment to 500,000 underground workers, 70,000 of whom will be engaged in the mines of this State.

PECULIARITIES OF THE COAL FIELD.

There are several faults met with in coal mines, which are known by appropriate names, such as slip-dikes, dislocations of the strata, horse-backs, clay veins, wants, etc. Slip-dikes are evidently the result of violent mechanical convulsions which changed the level of coal beds from a few inches to hundreds of feet. Dislocations of the strata are trap-dikes, into which intrusive matter in the form of lava has been enjected. These faults are rarely met in Ohio. Horsebacks, clay veins and wants in the coal are, however, numerous. A horseback is a roll in the roof or floor of the mine, generally coming from the roof, by which part or the whole of a coal seam is cut away for a few feet, or for many hundred feet. A horseback in the roof is evidently the remains of an ancient water channel, which ran over the coal marsh in the early stages of the subsidence of the land, and which cut down through the carboniferous accumulation from which the coal is derived, leaving a deposit of mud or sand, usually sand, in the place of the denuded vegetable ditritus. A clay vein, a thin fault of fire-clay mixed through a seam of coal, comes from the floor of the mine, the underlying clay having been pressed up into a crevice or rent in the coal marsh while the vegetable ditritus was undergoing mineralization after becoming covered by the sediments of the ocean. A want in the coal will, in this paper refer to those great areas of barren ground where a coal seam is due, but does not exist, and never did exist; and I propose in this paper to present a few thoughts as to the causes of such barren areas in the coal measures of Ohio.

The Ohio coal field, which occupies nearly one-third the area of the State, and which along the Ohio River from Bellaire to Pomeroy,

attains a thickness of sixteen hundred feet, has been so recently opened, and so limited have been the subterranean excavations, that it is largely a matter of conjecture as to the causes, as well as the extent of many of the wants or intervals of barren ground. But that great areas of barren ground extend through many if not every one of the twenty or more different beds of coal of workable height known to exist in the State is now generally acknowledged alike by geologists, mining engineers and practical men. A vast and invaluable amount of information in regard to the existence of wants in coal seams was brought to light by the late geological survey, particularly in the later volumes of the survey, for the first published reports were more hopeful than the later ones as to the amount of coal enclosed in the mineral strata of the State.

The steadiest of all the coal beds is No. 8 of the geological nomenclature—the Pittsburgh vein; next to this in steadiness, so far as developments would indicate, is the "great vein," of the Hocking Valley—No. 6 of the geolological reports. The least reliable coal, though one of the most valuable as regards quality and adaptibility to various uses, is the lower coal of the State series—No. 1, or the "block coal" of the Mahoning Valley. This coal is mined extensively near Youngstown, Massillon and Akron, and is also opened and worked to a considerable extent around the village of Jackson, in Jackson county. It is everywhere found disposed in a wavy and uneven floor, being thickest in the low places or swamps of the mine, and growing gradually thinner as it extends up the sides of the swamps or troughs, until it is either suddenly cut away by a fault, formed, in my judgment, by the shore waves of the ancient sea lashing the sides of the coal marsh, in the first stage of the subsidence of the land; or it bravely continues the ascent of the trough sides till it thins down to a feather edge.

The troughs or basins in which this coal seam is found deposited were unquestionably scooped out of an originally level plain by water agencies anterior to the deposition of the coal vegetation. Any one who goes into a mine in the Mahoning Valley (or any other district of the State) where the lower coal of the State series is being mined, may observe, where the hills have been cut down by the miners, the coal floor pitching at an angle of twenty or even thirty degrees, while the underlying beds of Cuyahoga shale, which exist in the form of thin, alternating sheets of shale and sandstone, lie stretched out in an extended and level plain. This circumstance explains not only the cause of the wavy character of the coal-bed, but accounts for the limited area in which the coal was deposited. Upon the highlands, which constituted the greater portion of the plain, the coal vegetation never grew.

Some of the workable beds of coal lying between Nos. 1 and 6 are opened and worked to a considerable extent, and, like the lower coal, these beds are often wanting where they are due—they thin down and disappear altogether in the hill-sides of the mine, exactly as the lower coal disappears. No. 6, the great vein of the Hocking Valley, the Steubenville shaft and the Salineville coal, is, as I have said, a remarkably steady coal, and by reason of its superior quality and extra height, is more extensively mined than any other seam in Ohio. There are, however, extended intervals of barren ground in this coal seam, upon which the coal vegetation never grew. These wants or barren areas are always met in what must have constituted the highlands of the old coal plain. The same conditions met in the long, narrow and serpentine swamps of the lower or Mahoning Valley coal, are repeated, though on a greatly larger scale in the great vein regions of the State.

The mines of Salineville offer the best field for studying this subject, for there the basins are sometimes as narrow as in the Mahoning Valley. The coal at Salineville, as in the Mahoning Valley, begins to lose height on the sides of a steep hill, and finally thins out and disappears altogether, reappearing in another trough, miles distant.

In the great vein region of the Hocking Valley the coal is stretched over a vast area of unbroken ground. It has, however, some wants; in one of the mines at Corning a hill has been encountered—the coal thinned down and disappeared, and beyond the basin the coal driller could find no coal by boring for a mile or more.

At Coshocton the hills in the mines sometimes rise to a height of twenty feet, the coal gradually thinning down in its ascent, losing height from the bottom of the bed, though it nowhere, so far as I have observed, disappears altogether in any of the mines of this district, but dips over into adjoining basins and recovers its lost height. As the hills are not often cut down, the opportunity for judging as to whether the strata immediately underlying the coal conform to the pitch of the coal, is not as good as in the Mahoning Valley Mines. But the fact that the coal gradually thins down in ascending the hills, and mainly loses height from the bottom of the seams, is conclusive proof that these undulations existed before the coal was deposited, and are not due to an upheaving and folding of the strata, after the coal field was built up. In one of the mines of the Glasgow-Port Washington Co., in Tuscarawas county, the floor is blasted up to a depth of eight or ten feet in one part of the main gangway. Here the coal was found dipping at an angle of fifteen degrees, while the strata below ran level—a repetition of the conditions met in every mine in the Mahoning Valley.

Other wants in coal beds are frequently met where the coal vegetation, after having been deposited, was subsequently removed by denuding forces – by currents of water in rapid motion, sweeping over the coal marsh, and cutting away part or the whole of the coal vegetation, and leaving a deposition of sand over the denuded area. These wants, as I have stated in the opening paragraph of this paper, are called horsebacks, and they are readily distinguished from the wants or intervals of barren ground which I have described.

It is my opinion, formed from observation, that a number, if not all, of the coals of the lower coal measures of the State, will be found resting in swamps, or troughs, or basins, which were once river beds, or lakes, or arms of the sea, and that great stretches of barren ground will be encountered in mining.

The Pittsburgh coal, the lowest bed of the upper measures, is very extensively mined around Bellaire and Pomeroy, and is remarkable for its continuity, and its freedom from faults of all kinds. A few clay veins are occasionally met, but seldom any horsebacks, except occasional saddle-like rolls in the floor of the mines, which rise up into the coal for a foot or eighteen inches, resembling the shape of a horseback. No barren areas, or elevated plains, where the coal vegetation never flourished, are met. The coal is found, wherever it is due, stretched out in an unbroken sheet. It is highly probable that all the coal-beds of the upper measures will be found occupying more extended areas, and be less subject to wants, than those of the lower series.

SKETCH OF THE GLASGOW-PORT WASHINGTON WORKS OF TUSCARAWAS COUNTY.

The black band iron ore of Tuscarawas county, which overlies coal No. 7, forming the roof of the coal, ranges from a few inches to thirteen feet in thickness. It lies well up in the hills, and is everywhere accessible by drift mining. The black band ore of Scotland is from eighteen inches to two and a half feet in thickness, and lies deep under ground, necessitating the sinking of costly shafts to reach and mine the ore. In Scotland the seam is very persistent, and it is mined with extraordinary vigor in the counties of Lanark and Ayr, forming the basis of the iron trade which has made Scotland so famous as an iron-producing center. The ore is associated with a seam of splint, or block or dry-burning coal, fitted for the smelting of ore in a raw state, the coal lying

60—70 feet below the ore; hence, it is the usual practice in that country to raise both coal and black band ore through the same shaft.

In Tuscarawas county, Ohio, although the ore rises to the marvelous thickness of thirteen feet at times, the seam is not continuous where it is due, being deposited in pockets, with an unusual height of ore in the center, which thins down to a feather-edge on the sides of the basin. These pockets never exceed a few acres in extent, and not one acre in a thousand holds the ore where it is due. In Ohio (as in Scotland), the ore belongs to the coal measures, and, as I have said, forms the roof of coal No. 7; this seam being usually about three feet thick in Tuscarawas county. The coal, however, is at this point one of the poorest in quality in the whole range of the Allegheny coal field. Eighty feet below coal No. 7, No. 6, the equivalent of the great vein of New Straitsville and Shawnee, is due; and in the vicinity of the black band district of Tuscarawas county, as in Perry county, the coal is of magnificent thickness, ranging from five to nine feet. To the eye it is a black, lustrous, and commanding looking coal, but, when critically examined, is found to be so largely impregnated with sulphur as to unfit it for furnace use, either in a raw state or as a coke.

The existence of the black band ore of Tuscarawas county was long known to the furnace men of the Tuscarawas Valley, who, for a number of years, had been using it in connection with the ore of Lake Superior, making a very superior brand of iron, known in the markets as "American-Scotch." The inferior quality of the coals was also well known to the iron manufacturers of Dover and Massillon, who never thought of using them in the furnace.

In 1871, two Scottish practical miners, residents of the United States, having heard of the black band ores of Tuscarawas county, visited the region. Having formed a highly favorable opinion of the district as an iron-producing center, they revisited Scotland and induced a number of the business men of Glasgow to look into the matter. An engineer was sent to Ohio to examine the properties, who verified all the representations of the practical miners, and the result was the formation of a company, known as the Glasgow-Port Washington Iron and Coal Company, which was duly incorporated under the acts of 1862–67—laws of England.

The company purchased twelve hundred acres of land, about one and a half miles north of the Pittsburgh, Cincinnati and St. Louis Railroad, near the village of Port Washington, in the heart of the black band region, and supposed by the company, from the representations made to them by their engineer, to be very largely underlaid with a

deposit of black band ore, from two to thirteen feet in thickness, and with a bed of iron-making coal from five to nine feet in height. The company were greatly elated with their American property, and, as they expressed it, "would coin money among the feet of the Americans."

Two blast-furnaces were erected on the property, only one of which was ever blown in. These furnaces were well and substantially constructed, and were at that time the largest and the most skillfully erected blast-furnaces ever built in the United States. They were completed in August, 1874, at a cost, including blowing-engines and boilers, of three hundred and ninety-four thousand dollars. Each stack was 75 feet in height, 17½ feet bosh, the cubic capacity being 11,500 feet. Each furnace had two hot-blast stoves of 19 feet diameter, 20 feet in height, with 36 Ω-pipes. The two blast-engines had steam cylinders three feet diameter and five feet long, with air-cylinders four feet diameter and eight feet in length. The furnaces were each supported on eight columns ten feet high. A fire-brick establishment was also built at the works, at a cost of thirty-seven thousand dollars, but nothing was ever done in this establishment, as a suitable clay could not be found on the property for the manufacture of fire-brick. A branch road was built from the furnaces to the Pan Handle Railroad, at a cost of $60,000. The whole outlay of the company, before the furnace went into blast, exceeded half a million dollars.

The furnace blown in in August, 1874, was kept running for nearly two years. It was a losing concern from the start. The coal on the company's property has, both in a raw state and after being converted into coke, proved a miserable failure. Connellsville coke had to be used, at a cost at the mines of $4.70 per ton. A tract of land, containing limestone, was purchased too far away from the furnace, and on trial the limestone was found unfit for flux. One hundred and thirty acres of coal lands were also bought in Westmoreland county, Pa, which, in practice, was discovered that it cost more to mine and ship the coal to the furnaces than was required to purchase Connellsville coke. The prices paid for mining the ore and preparing it for the blast-furnace were also high beyond all reason.

The furnace remained idle from 1876 until January, 1880. During all this time the managers were engaged with commendable energy in searching for coals and limestones which would make iron. Three holes were drilled down through the coal measures into the underlying Cuyahoga shale, in search of the Brier Hill or Massillon coal, during the

fall of 1877. Each of these holes was commenced on the horizon of coal No. 4, and although they had good material nearly all the way down, only a mere trace of the lower coal was met on the horizon where it was due. This coal, which is disposed in small troughs or basins on the margin of the coal field, is supposed by our geologists and mining engineers to be absent everywhere in the central and eastern parts of the coal measures of the State—a conjecture which, so far as the researches of our mining adventurers have yet extended, has been found to be practically correct. The following is the journal of the coal driller:

DRILL No. 1.

Earth	2	Fire-clay rock	14.6
Loose rock of clay	8.8	Dark gray slate	11
Limestone	.11	Gray slate	9
Light gray slate rock	24	Dark gray slate	5
Dark brown slate	9	Iron ore limestone	.6
Brown slate	9.11	Dark gray slate	2.9
Limestone	.7	Light gray slate	5
Fire-clay	6	Gray slate	9.9
Light gray slate	9	Bogy gray slate	7.9
Gray slate rock	15	Black chip slate	1.6
Brown slate	2.1	Gray slate	6
Gray slate	28.1	Dark brown slate	19.3
Limestone	1	Gray slate	16.8
Limestone strong with iron	1	Light gray slate rock	16.8
Limestone	2	Gray slate	6
Coal	.6	Light gray slate rock	13
Fire-clay	.6	Poor gray slate	5.5
Gray slate	18	Gray slate rock	14
Seam of rock	1.3	Poor gray slate with blue streaks	12.9
Gray slate rock	7	Fire-clay	4
Fire-clay	5		332.

DRILL No. 2.

Earth	10	Coal and sulphur	.7
Muddy slate	9.5	Black slate	1
Gray slate	11.5	Fire-clay	5
Black and gray slate	22.10	Gray slate	12.3
Limestone	1	Limestone	2.11
Gray slate	3	Brown slate	22.6
Fire-clay	3	Coal	.3
Gray slate and gray rock	28.2	Gray slate	22.2
Fire-clay rock	11.4	Bogy gray slate	53.7
Brown slate	6	Coal	.1
Very hard gray rock	2.8	Gray slate	58.1
Limestone	2.9	Black slate	1.6
Gray slate	7.4	Light gray slate	7.8
Limestone	.10		
Limestone with ore	1.1		310.3
Limestone	1.10		

DRILL No. 8.

To solid material	28	Coal and sulphur	.6
Fire-clay	6	Gray slate	79.1
Gray slate	35.3	Sand rock	11.7
Limestone	5.7	Gray slate rock	11.9
Gray slate	5.9	Sand rock	10
Limestone	3.8	Dark gray slate	3.6
Black slate	.9	Brown slate	4.6
Coal	.5	Dark gray slate	4.6
Light gray slate rock	8.9	Brown slate rock	7.3
Gray slate	8.6	Gray slate	17.11
Limestone	1.2	Flag rock	6
Gray slate	24.2		
Brown slate	18		323.8
Gray slate	21.1		

Failing to find the lower coal of the state series, which is so often a splended furnace coal, fitted for furnace use as it comes from the miner's pick, the managers turned their attention to experimenting with coals Nos. 4 and 5, which were found on the property, varying in height from 2½ to 3½ feet. Coal No. 5 showed well, and although it failed to give satisfaction when tried in the furnace, I am of the opinion that if properly cleaned and sorted, this coal could be used successfully in the furnace. Dr. Hays, the chemist in Pittsburgh, to whom samples of the coal was sent for analysis, said of it: "It is better than New Castle coke (England), being almost identical with it as regards sulphur, and containing 3 per cent. less ash. It is certainly the best coke which I have yet received from your vicinity." The Cambria Iron Company, of Johnstown, Pa., to whom a sample was sent for trial in the blast-furnaces of that company, reported that "they found its physical structure for furnace use to be good, and that with judicious management a good iron could be made from the coke; that in celluler structure the coke is a first-class furnace fuel." I visited the property of the Glasgow-Port Washington Company in 1878, and saw the coal as it laid on the bank newly-mined by the miners, and it impressed me as a coal of good quality. It contained iron pirites, but they were distributed throughout the seam in horizontal layers, and with proper care could have been removed by the miners in excavating the mineral, or by an inspector after the coal was sent out of the mine.

With the revival of the iron trade in the fall of 1879, preparations were made to blow in again, and in January, 1880, one furnace was put in blast, and earnest preparations made to blow in the other, but it was never done, the decline in prices having come before the managers got ready to in. This second trial lasted about a year, and, as in the

fomer run, the company lost money heavily. The new coal upon which the hopes of success were built failed to give satisfaction, and Connellsville coke was again exclusively used. So well satisfied was the manager that the new coal would prove satisfactory, that he caused to be constructed, at an enormous outlay, a tram-road and inclined plane from the furnaces to the mines, two miles in length. The manager, himself a chemist, made repeated analysis of the coal, in addition to the analysis of Dr. Hays, of Pittsburgh, and the practical tests by the Cambria Iron Company in their blast-furnaces at Johnstown. The furnace went out of blast in May, 1881, and in the spring of 1882 the works were sold to a firm in Pittsburgh, the Scotch Company having sunk, in their American enterprise, nearly one million dollars.

FIRES IN MINES.

The Bustard shaft, situate one mile above the city of Steubenville, was the scene of a mine fire during the month of May, which, although happily resulting in no serious accident, was for a few hours the subject of much apprehension. The fire was caused by a boy named Jacob Starr, who, when filling his oil-lamp in the oil cabin situate near the bottom of the pit, ignited an oil can containing five gallons of oil. The can burst, and the flames set both the wood-work and the coal seam on fire. The boy, who was uninjured, hastened to the top of the shaft and notified the Superintendent of the condition of affairs below. The Superintendent, Mr. Thomas McNamee, at once descended the pit. He was nearly overcome by the smoke and gas before reaching the open door situate 60 feet from the bottom, which he closed, preventing the smoke from passing forward into the working-places of the miners. The air and smoke now moved to the east pit, and the workmen in the interior of the mine had a comparatively clear passage way to the bottom. But for the timely closing of the door in question, the whole force of the mine, 54 souls, would have been speedily and inevitably suffocated. As it was, a number of men were nearly overcome in the passage outward. As soon as the men were drawn to day, the mouth of the shaft was closed and hermetically sealed up, so as to prevent the downward passage of air, and the flames soon died out. John Bustard, Esq., the President of the Coal Company which operates the mine, on passing through the workings with his foreman a few years ago, observing the danger to the miners in case of fire occurring in or near the bottom of the hoisting shaft, directed the erection of the door, as it might prove of use in case of emergency.

Another underground fire occurred in the old mine at Straitsville, during the summer, having been caused by the ventilating furnace setting fire to the pillars of the mine. Some destruction of property occurred, and considerable time was expended in subduing the fire, but no accidents occurred.

INUNDATIONS OF WATER.

On the 3d of August, about 2 o'clock P. M., a water-spout burst in the vicinity of Moxahala, a few miles above the mining town of Corning, in Perry county. The bridges, trestle-works, and several miles of the Ohio Central Railroad were swept away, while eleven houses in Corning were raised from their foundations, and some of them carried several hundred yards away. At mine No. 11 the water rose four feet above the entrance of the slope, or traveling-way. There were 140 men in the shaft at the time, but by the energetic exertions of the mining boss, Mr. John Sines, who closed the door of the slope, and packed it tight with bedding belonging to himself, the water was dammed back. Word was sent to the miners below to repair to the hoisting-shaft with all possible dispatch, and be drawn up to day. It was feared the water would burst in the door and submerge the mine before the underground people were drawn up, but no accident occurred. The situation was critical.

A SUBTERRANEAN RIVER.

The Lake View mine is situate in Coventry township, Summit county, and is opened on the Akron or Massillon coal, the lower bed of the State series. It is the most south-easterly mine in Summit county, and is evidently opened near the end of the coal basin. The shaft, which was opened in 1880, is 100 feet deep, and is located within half a mile of the reservoir which feeds the Ohio canal. In the south-east entry the workmen, while shearing a shot, cut into a hollow space in the coal, from which a stream of water issued in a great stream, and drove the workmen away. For three weeks the water flowed without abatement, when the mining boss directed the miners to return and enlarge the shearing. When this was done the water burst forth in such volumes as to alarm the miners, who fled to the bottom of the pit for safety, and were drawn up to day. The pumps in the mine were overpowered, and the whole subterranean excavations were filled with

water in a few hours. A new pump, of the Cameron steam manufacture, having a 20-inch steam and a 12-inch water cylinder, capable of discharging 2,000 gallons of water per minute, was applied, which, together with two smaller pumps and the "Blake" in use at the mine when the water burst in the entry—four pumps in all—overpowered the current.

On returning to the mine, the entry where the water burst in was found strewn along the whole length of its way with gravel and boulder-stones, many of the latter weighing upward of 100 pounds. They were rounded by attrition, and belonged to the older geological formations. The Cuyahoga river, in all probability, had flowed in this channel, perhaps thousands of years ago.

There was nothing remarkable in striking into an ancient river bed in a coal mine opened so near the surface as the Lake View shaft; but the sudden and vast inflow of water was remarkable indeed, and might have been attended with the most dreadful consequences to those employed in the mine. The mine boss is a careful man, and a first-class miner, capable of meeting and surmounting such difficulties.

SHAFTS WITH SINGLE OPENINGS.

There are two companies doing business under the name of the "Ohio Coal Company"; the mines of one firm being situate near Cambridge, in Guernsey county. The other works are located near Antiquity, in Meigs county, on the Ohio river. This latter mine is a shaft opening, 200 feet in perpendicular depth, and has but one means of ingress or egress. Finding more than 10 persons employed underground at once, contrary to law, I sent the following note to the Superintendent:

ANTIQUITY, O., *April* 3, 1882.

Robt. Stobert, Esq., Supt. Ohio Coal Co.'s Shaft, Antiquity, O.:

DEAR SIR: I visited and inspected the mine of the Ohio Coal Company, situate at this place, to-day, and found that there was but one opening or means of ingress and egress, and that there were more than 10 persons working at once. I must ask you to reduce the underground force to 10 persons until a second opening is provided, in accordance with the requirements of the mining law.

Very truly yours,

ANDREW ROY,
Inspector of Mines.

Mr. Stobert immediately reduced the working force to 10 men. The ventilation in this mine was also none too good, the fault more of the depressed condition of the coal trade than a lack of mining knowl-

edge on the part of the Superintendent, who is an intelligent and skillful mining expert.

The Rush Run shaft, in Jefferson county, which has but one opening, and which the owners informed me last year they were about to abandon, has been sold to another company, who are operating the mine with a small force of men as required by law in the case of mines having but one means of ingress or egress.

A shaft opened at La Grange, in Jefferson county, has also but one opening, and works a force of only 10 men. This is the deepest shaft in the State. It is well sunk, on a valuable piece of coal property, and is capable of producing a large quantity of coal, but is too dangerous to work with but one means of egress.

At Church Hill, in Trumbull county, two mines—the Garfield shaft and the Sampson and Morris shaft—have but one opening. They are comparatively new mines, but must have excavated more than 15,000 square yards each. Some months ago I formally notified the owners of the necessity of two outlets, and if work is not soon commenced on the second opening, I will find it necessary to institute proceedings in injunction against both of these mines.

EXPLOSIONS OF FIRE-DAMP.

I have to record another fatal explosion of fire-damp, this being the second occurrence of the kind since the mining law went into operation nine years ago. The accident occurred in the Star Furnace mine, in Jackson county, on the morning of August 20th. On Saturday night previous to the explosion, the furnace was dampened down, as is the usual custom in all mines, and the mining boss, who is a skilled practical miner, foreseeing the probability of an accumulation of gas in the working-place of David L. Shotts, notified him not to enter his room until after it had been examined with a safety-lamp and pronounced safe. On Monday morning, however, the mining boss was called upon to attend to some pressing business, and in consequence the ventilating fire was not renewed for an hour later than usual, and the working-place of Shotts was not examined with the safety-lamp at all. The unfortunate man, himself dreading danger, but with that daring peculiar to miners, ventured cautiously forward among the gas, which ignited from his naked light, and burned him so severely that he died in six days after the accident.

I examined this mine upon the death of Shotts, and found a good current of air playing along the room face where he was killed. The

ventilating furnace was then in full blast, and had this been so when Shotts entered there would have been no explosion. This accident, like those numerous ones resulting in explosion, in fiery mining districts, of which the public reads so much, was caused by negligence. Had the mining law been complied with it could not have occurred. On the other hand, if gas is allowed to accumulate in a mine, no amount of warning to miners to keep out of the dangerous district seems to avail anything. Some thoughtless or reckless workman is sure to venture into the forbidden region and fire the gas.

UNDERGROUND HAULING MACHINERY IN MINES.

The mines of the Shawnee Valley Coal and Iron Co. have been improved during the past year by the erection of a substantial hauling engine and wire rope. The mine is a drift, opened on the face of the coal, and dips 30 feet in 3,000 feet. The engine cylinder is 12 inches diameter, and 20-inch stroke, built at Norwalk Iron Works, Connecticut. The rope is ¾-inch Norway iron wire, 6,000 feet long. The coal is hauled about 3,000 feet, 24 cars per trip. The rope passes three butt entries, from which coal is hauled. These entries are double in starting, but the two come together to facilitate hitching. The mine cars hold 30 hundred, screened coal, and three trips per hour are averaged, equal to 108 tons of lump coal. This does away with 12 horses, which, with drivers, would cost $30 a day. The cost now is $7.50 per day, only three men being employed with the machinery. The mine is getting out 700 tons of lump coal a day, which will be increased to 1000 tons a day as soon as sufficient mine cars are made. The company commenced putting in this machinery in January last, when the trade fell off, and brought out the first coal in three weeks. There was some difficulty and delay at first in getting the machinery to work well. There are three curves on the road, the first being 37 degrees. The cars come round this curve without any trouble, now. This arrangement is admirable.

This mine has always been well ventilated, and is well laid out. Mr. Thomas Phillips, the mining boss, is a true miner; always at his post; does everything decently and in order, and thoroughly understands the art of mine ventilation. I never receive any complaints of bad air from this mine. While other mine bosses dread the appearance of the Mine Inspector, knowing their mines will not bear inspection, Mr. Phillips, whose mines require no inspection, is displeased because the Inspector does not call upon him oftener.

The new mines at Murray City, in the Hocking Valley, have

approved machinery for raising coal, unsurpassed in excellence in the State or elsewhere. The mine is a slope opening, with a graded slope two inches in ten inches. The machinery for raising the coal consists of an endless rope operated by a stationary engine on top of the slope. The cars are raised and lowered by becoming attached to the wire rope by an automatic clamp. A detailed description of this mine will be given in my next report. The mine has just been opened.

THE STATE LINE COAL COMPANY

is presided over by Mr. James Mullen, and has for several years been operating one of the largest mines in the State, shipping in the neighborhood of 100,000 tons of coal yearly. The works are under the supervision of Mr. Hugh Laughlin. They have 700 acres of coal territory, and are securing additional tracts. During the past year they have gone through the front hill and made an opening into the back hill or "South Side," as it is called. Mr. John Sutherin, a well-known mining boss, has charge of the underground work, and has already about 130 men at work in the new opening, adding more as fast as the entries can be driven. The main entry in the front hill is driven straight back for over a mile. Two large engines are set at the mouth of the drift, and the revolving wheel for the endless wire rope that is used, is set about a mile back in the entry, the coal being gathered and brought forward from the entries with mules to the stations. All the entries, both right and left in the old hill, have been worked out, except the tenth and eleventh right, in which over 100 men are at work. Some of the coal in these entries will average four feet eight inches in thickness, but the general average of the coal will not be more than three feet seven inches throughout the mines, for mining which the miners receive 80 cents per ton for screened coal. The coal is rather hard to mine in the new bank, as considerable sulphur is met with in bearing in, but as the work generally runs steadily the year round, no trouble is experienced in getting plenty of miners. Mr. Laughlin has one of the best constructed and most successful slack washers in operation at the tipple ever seen about a mine. Everything that comes from the mine is taken care of, losing nothing but the fine dirt. It is operated by the engine running the rope. A large locomotive is also kept by the company to do their shifting around on the switches. From 325 to 375 men are now employed. About three-quarters of a mile from the drift mouth a slope has been driven up into the No. 7 vein, which averages three feet of good coal. Entries have been driven through this coal to daylight, but no coal is being mined at present. The fire-clay for the

pottery is taken from this mine. The day is probably not far distant when this coal will be worked and brought out down the inside slope, and forward with the endless rope to the present tipple.

The mine of the Prospect Hill Coal Company, operated by Mr. James Sutherin, and has done better work the past season than for a number of years, running almost steady. The mine now worked is opened into the upper seam, or No. 7 coal, which averages about three feet in thickness. The coal is brought forward by an endless wire rope, running back far into the mine. Novel machinery has been constructed for operating the rope. A small single shaft engine is set at the pit mouth, which is not reversible, but it is so fitted up with drums on the shaft that they are reversed so as to bring out the full trips and take in the empty ones as speedily as the coal can be gathered. A new shaft for ventilating purposes has been sunk. Mr. James Sutherin, Jr., has charge of the underground work, employing about eighty-five men. They also have a slope entrance into the four-foot or lower vein, which was extensively worked years ago, but has been idle for some time. Mr. Sutherin contemplates opening it up again this fall. The outlook at present is encouraging for steady work at this mine during the summer.

The new slope of the Ohio Southern Coal and Iron Company has been fitted up with costly and elaborate hauling machinery, although it has been found in practice not to work well. The principle is, however, correct, and in the hands of a skilful mechanical engineer must prove a success. The mine is a slope, 100 yards in length, dipping one foot in three. The hoisting machinery consists of a powerful engine, geared to 1 foot in 14. The coal is raised through the slope by means of an endless steel wire rope, $1\frac{1}{8}$ inches in diameter, which passes around an 8-feet sheave situate at the bottom of the slope, and around 11 sheaves situate in the engine-house on top of the slope. Four of the sheaves are 10 feet in diameter, and 7 of them 4 feet in diameter. It was the purpose of the company to raise the cars by means of an automatic clamp, attaching itself to the endless wire rope, but the projectors could not get the arrangement to work, and the plan was abandoned, the mine cars being now drawn up the slope by a short chain hooked to the cars at one end, and fastened at the other to the wire rope.

The main entry of this mine extends directly forward from the bottom of the slope, and is driven 12 feet wide, with the object of taking a double track along and extending the wire rope along the main entry of the mine, and this will be done some day. The theory is correct, and it must work in practice.

When this mine was first opened out, coal-cutting machinery was applied, but as the rooms were generally wet—a concomitant of all new mining districts where the coal has to be sunk for—the machines did not work well, and were soon abandoned. This coal company has so far been unfortunate in its mechanical appliances to mining.

At the Norris slope, in Guernsey county, an endless rope, similar to that at the Ohio Southern Company's mine, is provided for raising and lowering the mine cars. An effort was made to operate by means of an automatic clamp, which did not work well, and Mr. Morris conceived the idea of inventing a clamp himself, which would do the work designed.

NEW VENTILATING FANS.

Two new fans have been erected in the Mahoning Valley—one at the Leadville shaft, the other at the shaft of the Church Hill Coal Company. Both are forcing fans, blowing the air down through the mines. They were designed by Mr. Robert Hunter, of Youngstown, an ingenious mining boss. Mr. Hunter claims that a forcing fan, everything being equal, will produce as much air as an exhaust fan, a claim which few, if any, mining engineers who have given the subject much attention, will accede to. These fans, however, serve every purpose for which they were erected, the monthly reports of the mining boss at Church Hill showing a current of 17,000 cubic feet per minute, and the Leadville reports showing equally satisfactory results. The first cost of constructing and erecting these fans was greater than in providing a ventilating furnace, but once set in motion, the cost for running is small, and the saving in a single year over the expense of maintaining a furnace will pay for them. Fan ventilation ought to, and will, before many years, be generally applied.

WASTE IN MINING—PRESERVATION OF MAPS OF MINES.

A vast amount of coal is annually wasted in the mines of this State by bad practice. Faulty systems of laying out the workings are adopted; the mines are not properly and periodically surveyed, and the underground workings are in too many cases laid out without art and without science, and fall in before half the territory is worked over. It can be safely stated that, since the beginning of the coal trade in Ohio, 50 per cent. of coal has been sacrificed by unskillful and wasteful modes of mining. In other words, for the 70,000,000 tons of coal which have been

raised from the mines during the past fifty years, 70,000,000 tons have been abandoned beyond the possible hope of recovery, because of the want of proper mining engineering skill. And I believe this statement must be equally true of every coal producing State of the Union.

It is of vital importance that some system be devised for the preservation of accurate maps or plans of mines for the use of those who may come after us. After a mining tract has been worked over and abandoned, the excavated area, as is well known, becomes filled with water or nephitic gases. In the near future, these old workings are forgotten and newer mines will cut through into them, destroying life, and entailing great expense, for which there can be no possible excuse. A properly constructed plan, known to be accurate, should be required by law to be deposited and recorded in the office of the county surveyor of the county in which the mine is situated.

The present law requires the owner or agent of every coal mine to deposit with the Inspector of Mines an accurate map or plan of the working of such mine, showing the area excavated and the location and connection with such excavations of the lines of adjoining mining property, and further requires that every four months thereafter a statement or plan of the progress of the workings up to date shall be filed with the Inspector, so prepared as to enable the Inspector to mark the same on the original copy. If this provision were enforced, it would serve every purpose; but it is not enforced, because there are not mining engineers enough in the State to make the surveys and the additions thereto, and if there were it would require the employment of several engineers in the Mine Inspector's office to mark the additions in the original maps. It is not necessary in the present state of mining, and may never be, to require mine owners to furnish a statement and plan of the workings of mines every four months to the Inspector of Mines.

CERTIFICATED MINING BOSSES.

At the last session of the General Assembly a bill was introduced in the House, by Mr. Love, of Columbiana county, to amend the mining law, which provided, among other things, for "certificated mining bo-ses." By the provisions of the bill, all applicants for the position of Inspector or Assistant Inspector of Mines and of mining boss, were required to appear before a board of examiners, to be appointed by the Governor for the purpose; pass a satisfactory examination, and receive a certificate of competency. Mining bosses who had had two years' experience previous to the passage of the bill, were exempted, so far as

the position of mining boss was concerned. The bill was referred to the Committee on Geology, Mines and Mining, and was not reported back during the sitting of the General Assembly. The friends of the measure will, no doubt, insist on a vote being taken during the ensuing session of the General Assembly, and in order to ascertain the views of those in interest, I made considerable inquiry among the leading mine owners, practical miners and mining bosses in the State as to the merits of the bill. Mining bosses of education, practical experience and superior ability favor the passage of the bill almost unanimously. They insist that it will elevate the status of mining, lead to improved systems of mining and ventilation, and be of lasting benefit to all concerned in mining operations; that by reason of the employment of ignorant and inexperienced men, coal is lost by wasteful modes of mining, miners are injured and killed, ventilation is defective.

Among the leading miners, there was diversity of opinion. Many thought that the provisions in regard to the qualifications of the Mine Inspector and his Assistant were too high, and that these offices should be placed within the reach of any practical miner, without regard to scientific attainments. They thought mining bosses should be examined as to competency, but that competency should include only practical experience as a miner, and a knowledge of the manner of working and ventilating mines according to approved practice. Some of the younger men among the miners approved fully of the provisions in regard to the qualifications of the mining bosses and the Inspector of Mines; that knowledge in the practical and scientific departments of mines was rapidly advancing, and the standard of qualifications should be raised accordingly.

Among mine owners there was diversity of views also, the majority rather opposing than favoring certificated mining bosses, on the ground that such a law would create a monopoly of bosses; that a mine owner was more competent to select a proper person for mine boss from among five hundred practical miners than from among five or six men, who, having brushed themselves up in the theory of mining in order to pass the Board, were less competent than scores of others who understood their business thoroughly, but knew little or nothing of books. A number of mine owners were quite indifferent to the matter, having bosses who had been with them for years, and whom the proposed law would in no wise affect.

It may be premature to enact a law at present requiring mining bosses to undergo examination and receive certificates of competency previous to assuming charge of mines, as those in interest do not de-

mand the passage of such a law. But the necessity for such legislation is none the less certain and sure. In all the reports of this office the question of certificated mining bosses has been discussed, and the advantages of such a system pointed out. The question is not a new one. In all the Continental States of Europe, every mining boss is not only required to possess a certificate of competency, but is required to graduate at a mining school, before being eligible for the position of boss. In England, since the passage of the Coal Mines Regulation Act of 1872, every underground boss is required to have a certificate of competency from a board of mining examiners. And it is the advantages which have been derived from such legislation in those countries which suggested similar legislation in this country. It is true that our mining population—thanks to our free schools—is more intelligent than similar populations in Europe, and it is also true that our mines are neither so deep nor so dangerous to life as European mines; hence, the same necessity does not exist for trained specialists as mining bosses; yet, if by proper and correct legislation, we can diminish the cost of mining, save minerals from wanton waste, and increase the safety of underground work, it is our duty to do so.

At a meeting of the Bituminous Mine Inspectors of Pennsylvania, held in Pittsburgh in November, 1881, it was agreed that each Inspector should, when issuing his annual circular for statistics to the operators, inquire their opinion as to the advisability of requiring mine bosses, who have not had three years' experience, to pass an examination and secure a certificate of competency. This agreement was carried out, and the results as gathered from the annual reports of the Inspectors, published in the report of the Bureau of Industrial Statistics for last year, are as follows:

Wm. Wilcox says: "In answer to the question in the circular, 'Are you in favor of the passage of a law by our Legislature requiring all those not having had charge of mines three years, successively, to pass an examination before competent persons, appointed for the purpose, before taking charge of a mine in the capacity of mining boss?' I received reports from eighty-nine operators, and thirty-seven of them said 'yes,' and twenty-three said 'no.' A few said 'it is not necessary;' the balance made no answer. I suppose the question is not properly understood, or I am sure both operators and superintendents would favor it. There is a general complaint, by both operators and superintendents, against men who are incompetent occupying this position. All desire to secure the services of good men; but where are they to come from? Have we any schools graduating a class of competent men every year?

Providing the required amendment was made to the mining law, examinations could be held once or twice a year. They could be commenced low at first, to give all a chance, and increased every year, until, in a few years, we would have as good a set of men in charge of the mines as those of the British Isles of to-day. A law of this kind would work a marvelous change in the underground workings of our mines. That any mine operator can be opposed to having an intelligent person at the head of affairs, is more than the writer is willing to believe."

J. J. Davis says: "Of the circulars returned, sixty-four per cent. contained answers in the affirmative, sixteen per cent. sent negative answers, and twenty per cent. returned no answer."

"In England, in the mining law adopted in 1872, there is a provision for this purpose. This law is entitled 'The coal mine regulation act, 1872,' in which the following is found:

"Section 27. For the purpose of granting in any part of the United Kingdom, to be from time to time defined by an order in writing, made by the Secretary of State, certificates of competency to managers of mines for the purpose of this act, examiners shall be appointed by a board, constituted as hereinafter mentioned. A Secretary of State may, from time to time, appoint, remove, and re-appoint fit persons to form such a board as follows, namely: Three persons, being owners of mines, to which this act applies in the United Kingdom, and three persons employed in or about a mine, to which this act applies, in the said part of the United Kingdom, not being owners, agents, or managers of a mine, and three persons practicing as mining engineers, agents, or managers of mines, or coal viewers in the said part of the United Kingdom, and one inspector under this act; the persons so appointed shall, during the pleasure of the Secretary of State, form the board for the purpose of the said examinations, in the said part of the United Kingdom."

Thomas K. Adams reports: "I issued a circular containing a question, asking the operators of mines, whether they were or were not in favor of an amendment to our mining law, requiring all mining bosses to be employed hereafter, and who have not acted in that capacity for three years in succession, to pass an examination upon the theory and practice of mining, before a State examining board. The operators answering, a majority of them are in favor of such an amendment. Among those opposed to it, a few have written, stating their objections. They argue that the operator is fully qualified to make the selection of a mining boss; that the examining boards would be organized for

political purposes; that many men who have no education make good bosses, while many others who have a good education and could excel before an examining board, could not conduct the workings of a mine profitably and properly. It is not proposed that the amendment should infringe upon the rights of the operators to make their own selection of mining bosses, but that they shall be men who are in every way competent to carry out the requirements of the mining law. The law requires mining bosses to measure the quantity of air weekly in the mines, and to make a report to the inspector in their district once a month, but that cannot be done if they do not possess the necessary qualifications; hence, the necessity of such officials being in possession of a certificate of competency. Neither do we believe that the examining boards will be organized in favor of any political party, if the proposed amendment should become part of the mining law. There are mining bosses, who, being men of great natural ability, coupled with long experience and practice as miners, that perform the duties of their positions with marked success, but even these would certainly be better qualified to fill their important stations, if, through education, they had obtained a better knowledge of those attainments requisite for a first-class manager. The objection that there are many men who would stand a successful educational test before an examining board, and still make impractical bosses, goes for naught, when we consider that under no circumstances would the operator be compelled to engage them.

That such an amendment would eventually be of great benefit and advantage to the operator there can be no doubt, while to the miners, it would be a stimulus to acquire a thorough knowledge of their calling."

Roger Hamson gives the following: "It was with the idea that our legislators might see fit, in the near future, to make an amendment to the ventilation act of 1877, that, in my circular to the operators of this district, I put the following question as to whether they were in favor of such a law, 'requiring all mining bosses, who had not been employed as such for three years, successively, to pass an examination, showing that they are capable of working a mine on correct mining principles, and thoroughly understand their business.'"

On looking over the answers to this question, I find that 98 per cent. answered in the affirmative, and 2 per cent. in the negative.

The effect of such a law would be to bring to the front a class of men who would be able to carry out the law in a better manner than it is now carried out, and it would be to the interest of the operator, as to the employed, to have intelligent men to oversee their mines, and work them to the best advantage."

Mr. Richard P. Rothwell, in a paper read before the American Institute of Mining Engineers a few year ago, discussed this question as follows:

"Our mine managers should be obliged to pass strict examinations, and no one should be allowed to undertake the responsible duties of this place without a certificate of competency, given by a qualified board of examiners. Nor is it sufficient that the managers alone should be better educated; the miners themselves should be taught the causes and preventives of the dangers they meet with in their work. Special, free, instruction upon these points might be furnished at every colliery, and this could doubtless be accomplished by encouraging the giving of popular lectures, by practical miners and engineers, on subjects of interest to the miners, and by the giving of small prizes to those who pass the best examinations on subjects of daily practical application in their calling. I am well aware of the difficulty of exciting any interest among the majority of our miners in anything that is not actually their 'bread and butter.' They care little for the dangers they encounter, and do not appreciate the importance of knowing more than how to swing a pick or use a drill, and but little even of these accomplishments. Nevertheless, I believe that the leaven of a small percentage who would profit by such instructions would finally leaven the whole mass, and the practical results of the increase in knowledge would be apparent in greater care and better mining, even by those who had not taken any part or interest in the lectures. Greater knowledge always makes better workers, and the mine owners would find in this a good return for the small expense incurred. No startling results are expected from this suggested plan. A pretty intimate acquaintance with our mining classes, long ago dissipated the expectation of bringing about a millennium in the mining regions by means of education and instruction such as we have here suggested, but I nevertheless believe the modest results anticipated would abundantly justify the trial of some such plan as this."

MINING SUITS.

In my last annual report, under the head of "speaking tubes, safety catches," etc., I had occasion to state that in a number of shaft mines in Jackson county safety gates to guard the entrance to the shafts, and safety catches and covers overhead on the cages had not been applied as required by the statute. Finding continued disregard of the law in applying safety catches, I addressed letters to the offenders, notifying them that I would not hesitate to resort to the courts to compel obedience to the law if it was not voluntarily respected. Accordingly, in the early part of August, I employed Messrs. Moore and Atkinson, attorneys-at-law, Jackson, Ohio, to notify the parties that unless they were earnestly at work by September 1, prox., making the needed improvements, proceedings in injunction would be instituted against the mines.

The following letter was addressed to the mine operators in question, by Messrs. Moore & Atkinson:

JACKSON, O., *August* 15, 1882.

GENTLEMEN. Hon. Andrew Roy, State Mine Inspector, has directed us to institute proceedings in injunction against your company for non-compliance with Revised Statutes, section 299, etc. Mr. Roy, we understand, does not desire to be extreme, so that if by September 1, prox., you have commenced earnestly to put your mine in legal condition, there will be no litigation. Should there be continued neglect, the statute will be enforced.

Yours, truly,

MOORE & ATKINSON.

The parties in interest promptly replied to the communication of Messrs. Moore and Atkinson, promising to go to work forthwith, and cause all the needed improvements to be made. I thereupon directed the attorneys to proceed no further with the cases.

ANONYMOUS LETTERS.

Letters are sent me every year without signature, making complaint of the violation of the mining law. These letters are honestly written, and are invariably couched in respectful language, the writers not seeming to be aware that anonymous communications are generally and justly regarded in all the relations of business as undeserving of notice. The writers of these anonymous letters give, as the reason for withholding their names, that if the boss should find out they had written the Mine Inspector they would be summarily discharged. There is some reason for fearing discharge in case a badly-ventilated mine should be reported to the Inspector by a miner, because a person who cannot keep his mine in good order is incompetent for the position of mining boss; he is aware of his own incompetency, and seeks to conceal it from his employer by representing that good ventilation requires increased cost, and that the only proper way to deal with grumblers and fault-finders is to promptly discharge them.

I have publicly, and in all my reports as Inspector of Mines, assured the miners that they need have no hesitation in writing me in case the mining law is not respected, assuring them that such correspondence will be considered confidential.

The following is the last anonymous letter which has been received at this office:

WADSWORTH, MEDINA COUNTY, OHIO, *February* 16, 1882.

ANDREW ROY, ESQ., *State Inspector of Mines:*

DEAR SIR: I have had the notion to write you many times for the last four or five months, concerning Humphrey and Coleman's mine, which is near this place, as

you are aware. The ventilation is shameful; the air is not carried through the works at all, and the boss does not know how to carry it, it would seem. You are aware that if one of the miners complains of anything, he is told to take out his tools; then it is a job to get another place. So a person where he is working, who has a right to complain, must do it concealed so as to have a chance for making a living. It is too bad that a man has got to work where there is no air, and that continually. Please attend to this at your earliest convenience. This writing is done in behalf of many. The mine is far from complying with what the law calls for. Come and see for yourself, please.

Yours, truly,

AN OLD MINER.

MONTHLY REPORTS OF MINING BOSSES.

The provision of the law which requires the mining boss to measure the currents of air in circulation, was one of the wisest of the amendments to the mining law enacted by the General Assembly in 1881. A number of bosses fail to send in their reports, not having instruments with which to measure the current, or not understanding the manner of taking measurements with the anemometer. Whenever called upon, I have explained the use of this instrument, and given examples of the method of calculating the amount of air in circulation. Any person who understands the first four rules of arithmetic can learn to measure the air of mines so as to make a sufficiently accurate calculation in ten minutes.

About the beginning of August the following circular was sent to all the bank bosses in the State:

OFFICE OF INSPECTOR OF MINES,

COLUMBUS, OHIO, *August*, 1882.

To the Mining Bosses of Ohio:

I desire to call attention to the fact that a number of mining bosses are neglecting to send monthly reports to this office, as required by the amended section of the mining law (Revised Statutes of Ohio), which reads as follows:

SECTION 301. All safety-lamps used for examining coal mines, or which are used in any coal mine, shall be the property of the owner of the mine, and shall be under the charge of the agent thereof, and in all mines, whether they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine, shall be so hung and adjusted that they will shut of their own accord and cannot stand open, and the mining boss shall keep a careful watch over the ventilating apparatus and the airways, and he shall measure the ventilation at least once a week, at the inlet and outlet, and also at or near the face of all the entries, and the measurements of air so made shall be noted on blanks, furnished by the mine inspector; and on the first day of each month, the mining boss of each mine shall sign one of such blanks,

properly filled, with the said actual measurements and forward the same to the mine inspector.

The penalty for neglect or refusal to comply with the above section, is a fine not more than fifty dollars, or imprisonment in county jail not more than thirty days, or both; and bosses will have themselves to blame for any trouble that may arise in future.

The Inspector will send to the address of every mining boss in the State, at the beginning of each month, a blank and an addressed envelope, prepaid. Should such not come to hand promptly, they will be forwarded to any address desired, on application. Bosses who have no anemometers, should see that their employers furnish such instruments at once.

The Inspector trusts that this notice will be sufficient, and that in no case will he be obliged to resort to the courts to compel obedience to the statute.

ANDREW ROY,

Inspector of Mines.

MONTHLY REPORTS OF MINERS' COMMITTEES.

The mining law now authorizes the miners employed in any mine to appoint two of their number to act as a committee to inspect the mine and machinery, and to measure the ventilating currents, once in each month, said committee, within ten days after such inspection, being required to make a correct report thereof to the Mine Inspector. This is a wise provision, but miners do not generally avail themselves of it, there being no ground of complaint in many mines, while in many others the committees appointed neglect their duties. Miners ought to take advantage of this provision of the law, and keep the Inspector informed of the condition of affairs underground. At best the Inspector and his Assistant cannot make the rounds of all the mines in the State oftener than once in each year. They should not be blamed for defective ventilation in mines, when the workmen employed in such mines, authorized by law to examine their condition and report the facts, are satisfied to suffer without protest.

There have been many communications sent to this office by miners, making inquiry as to whether mine owners are not required by law to furnish miners' committees with the necessary instruments (anemometers) used in measuring the currents of air. The following is the clause (amended section 305, Revised Statutes), upon which the miners base their claims: "The owner, agent, or manager shall afford every *necessary facility* for making such inspection and measurement." It was assuredly not the intention of the Legislature, as it was not that of the advocates of this section, that mine owners would be required to furnish

miners' committees with instruments, and this is also the view which the Attorney-General takes of the matter, whom I have consulted in regard to the meaning of the statute.

There are three different ways of measuring underground air-currents in practice, only one of which requires the use of an anemometer, one of the other methods being by flashing gunpowder in the current, and noting with a watch the speed with which the smoke moves along the airway; the third plan being to travel along the airway and hold a lighted lamp or candle in a perfectly perpendicular position, noting the time required to pass a given distance. The cubic area of the air-course, in both methods, is ascertained in feet, which, multiplied by sixty, the number of seconds in a minute, and divided by the number of seconds required for the moving current of air to traverse the measured distance, gives the amount of cubic feet of air in circulation per minute in that part of the mine. There are men in every coal mine in the State sufficiently skilled in the use of figures to take measurements by either of these methods. It is more simple to use an anemometer. The cost of a four-inch plain Biram's anemometer, reading to one hundred feet, is but $20, and the miners should club together and purchase instruments for every bank in the State. The cost to each workman would not exceed fifty cents.

"THE SCREEN QUESTION."

On the 25th of October, a State Convention of miners met in Columbus, and among other business transacted appointed a committee to visit the capitol during the forthcoming session of the General Assembly, to urge the passage of a "screen law."

The rule obtains, at the great majority of mines in the State, to screen the miners' coal before it is weighed, the space between the bars of the screen being usually 1¼ inches. For several years there has been a growing complaint among miners that they should receive pay for nut coal as well as lump, seeing that the operators sell both grades. The operators, on the other hand, insist that they pay a proportionately larger price for the lump coal, and in this manner pay for both; that if they were to pay two prices—one for lump and one for nut—they would have to take so much per ton off the lump and put it on the nut, and the result would be the same after all. Both interests are armed with many arguments in favor of the justice of their claims, and the General Assembly will be called upon to investigate the matters in dispute, and to legislate upon the subject. The question should be fully and fairly

investigated, and it seems to me that the proper way to reach a just conclusion would be for a commission, appointed by the Governor to visit the various mining districts of the State, and examine personally into the system of weighing and screening in practice. Hasty legislation would be ill-advised, doing little or no good.

"INSPECTORS OF WEIGHTS."

Another grievance of which the miners complain, and for which they will ask legislation, is the appointment of some proper person, acting by authority of the State, for the purpose of testing the accuracy and correctness of scales, when called upon. Letters are sent to this office nearly every month, by miners, containing complaints that the scales do not weigh fairly, and asking if there is not a Sealer of Weights and Measures in the State, to whom they can apply to have the scales tested and adjusted. The mining law gives the miners employed in any mine, as well as the persons interested in the royalty of the same, the right at all proper times to examine the scales, machinery, or other apparatus used for determining the quality of coal mined, and also the right to appoint a competent person to act for them, who shall at all proper times have the right of access, examination and inspection of scales, weights, etc., and of seeing all coal weighed. At the majority of mines a person, called a "check-weighmaster," employed by the miners, is constantly present at the scales as the coal is weighed; but the ground of complaint is, that the scales may not be weighing fairly, even if a check-weighman is present, and that a Sealer of Weights and Measures, authorized for the purpose by law, may be called upon to test and stamp with his official seal all such weights and measures.

The following address was delivered before the Miners' State Convention, held in Columbus October 25, by the Inspector of Mines:

MR. PRESIDENT AND GENTLEMEN: At the last session of the General Assembly a bill was introduced in the House of Representatives by Mr. Love, of Columbiana county, to amend the mining laws of the State. This bill provided, among other things, that all applicants for the position of Inspector and Assistant Inspector of Mines should be required to appear before a mining board, pass a satisfactory examination and receive a certificate of competency in order to be eligible to these offices. Objection was made to the bill by miners that the requirements of candidates were too high and learned, and that the passage of such a law would disfranchise a very large number of competent practical miners. These objections coming from practical miners induced Mr. Love, after consultation with myself, to hold the bill in committee until the miners of the State in convention assembled should pass upon its merits.

Another provision of the bill required all mining bosses to be practical men of at least two years' experience, and to have certificates from a mining board testifying to their competency. This measure was recommended by all the mine inspectors of Pennsylvania in their late annual reports, and was ably advocated at a meeting of the American Institute of Mining Engineers by Mr. Richard P. Rothwell, the talented editor of the *Engineering and Mining Journal* of New York. A similar law, as you all know, has obtained in England since the year 1872 with very gratifying results. I call the attention of this convention to this question, and invite discussion on the proposition.

The several other amendments which Mr. Love's bill sought to incorporate into the mining law related to increasing the safety of gangways of mines by providing manholes at suitable distances in which travelers could seek refuge as trains of cars pass to and fro. Provision was also made rendering parents and guardians of boys liable to penalty for taking boys to work in mines in violation of the law.

A law was enacted a year ago last winter, authorizing the appointment of bank committees on the part of the miners to inspect the mines and the machinery of the same once a month and to report the facts to the Mine Inspector. Advantage has not been as generally taken of this law as I had wished. Bank committees have been appointed at nearly every mine in the State, it is true, but they neglect to make the inspection; or if making it, fail to send a report to the Inspector of Mines. I would urge upon the miners increased attention in this matter.

Many accidents occur in mines for which the company or their managers are not responsible. Many others occur, due to want of proper care on the part of mine owners, and for which such owners are liable in damages. But suits are seldom instituted against employers. This is wrong. Workingmen seem to have a horror of going to law with employers, being impatient of the law's delay, and possessed of a feeling that a poor man would not get justice in court against a rich man. While rich men will take advantage of the law's delays, they are the parties who are least likely to get justice; for juries composed of the common people, if they err at all, are more apt to err in the severity of their verdicts against rich corporations than against the widows and orphans of poor men. I would recommend the miners of the State to employ an attorney by the year (as corporations do) to look after their interests, and with his advice to sue for damages in all accidents occurring in mines. This will do more to enforce safety than a dozen inspectors; for when juries award compensation for damages and hold up employers in the light of criminals, such employers will make haste to make things safe and secure. At Leetonia, a few years ago, suit was instituted against the Grafton company for neglecting to make the gangway of the mine safe, resulting in accident. The jury awarded $4,700 damages. Immediately afterward, not at that mine only, but at all the surrounding mines, the coal companies employed three local inspectors to each mine to go around the traveling ways every morning before any of the workmen entered and take down all loose material. I could cite other cases, but it is unnecessary.

I would earnestly urge upon your convention to do no rash thing which may precipitate a strike. Strikes have had their day, and have done no good, but only pure, unmixed evil. If you have grievances to redress, which come under the legislative department, ask for the necessary legislation. If you have grievances which the legislature cannot remedy, settle them by arbitration with your employers. In

any event, avoid a strike. Let it be the last argument, never to be resorted to till every other means fail.

I advise you to continue the good work of providing reading-rooms and libraries in the mining valleys. Knowledge is power. There is no reason why representative miners should not be in the General Assembly or filling offices in the State departments, or occupying the gubernatorial chair itself. All that is required is the necessary knowledge to discharge the duties of these offices, a self-confidence that you can do so, and an ambition to fill them.

There is another matter which I wish to notice, namely, the agitation by the industrial masses of the United States to have a national department of labor established by the general government. The head of this department should be a cabinet officer, like the secretary of war, or the secretary of the interior. A department of peace, forming a part of the general government, in contrast with the department of war in this country, where government is founded not on the divine right of kings, but on the natural rights of man, would seem to be a necessary and missing link in the grand scheme of self-government. This new department should be known as the Department of Industry, and would be a just recognition of the great industrial masses of the nation, whose victories in peace are not less renowned than those of war.

CHECK-WEIGHMASTERS.

At the Sippo mine, in Stark county, a check-weighmaster was employed by the miners and persons interested in the royalty of the mine jointly. During the month of May, the mine shut down, and on resuming work a new check-weighmaster was appointed by the miners. The persons interested in the royalty of the mine re-employed the former check-weighmaster on their own account, who, on presenting himself at the weigh-office for duty was ordered by the officers of the company out of the office. The opposition to this official on the part of the company arose, as they alleged, from his unnecessary and unwarranted interference with the business of the mine, and that they had no objection to two check-weighmasters, but would not on any account allow this party about their works. The persons interested in the royalty of the mine insisted on their right to employ a check-weighmaster, and that the party they had engaged was a competent person. I was called upon for advice in the matter. Not being clear in the right of two persons having access to the scales of a mine under the law, I asked the opinion of the Attorney-General in the matter, addressing him the following communication:

STATE OF OHIO, OFFICE OF STATE INSPECTOR OF MINES,

COLUMBUS, O., *June* 15, 1881.

Hon. Geo. K. Nash, Attorney-General:

DEAR SIR: I desire your opinion as to whether section 305 of the Revised Statutes, laws of Ohio, 1881, page 129, gives the miners working in a coal mine, and the persons interested in the rental or royalty of such mine, each the right to employ a competent person to act for them in seeing the coal weighed; in other words, whether two persons may be employed—one by the miners, and one by the persons interested in the rental or royalty of the mine.

Respectfully,

ANDREW ROY,

Inspector of Mines.

The following is the answer of the Attorney-General:

ATTORNEY-GENERAL'S OFFICE,

COLUMBUS, *June* 17, 1882.

Hon. Andrew Roy, Mine Inspector, Columbus, O.:

DEAR SIR: Under section 305 of the Revised Statutes of Ohio, as amended April 13, 1881 (Laws of Ohio, vol. 78, page 129), the miners collectively and the landowner, or owners, interested in the rental or royalty, may each appoint a competent person to act for them in determining the quantity of coal mined. In other words, two persons may be appointed for the purpose—one to act for the miners, and one to act for the landowners interested in the rental.

Very truly yours,

GEO. K. NASH,

Attorney-General.

In the month of October, complaint was made to this office by the miners employed at the Akron and Cambridge Coal Company's mine, near Cambridge, that they had appointed a check-weighmaster, in accordance with law, and that the managers had refused to allow him access to the scales. They therefore "demanded" that the Mine Inspector enforce the law of the State. Upon receiving notice from the miners of the existing condition of affairs, I directed Mr. Kline, the Assistant Inspector of Mines, to visit the mine and ascertain the cause of the trouble, and, if the facts were as stated, to notify the superintendent of the mine that he must respect the law of the State. I also wrote the superintendent of the mine in regard to the matter, who informed me in reply, that he did not now, nor ever did, refuse the miners the right to put on a check-weighman at the mines, provided he were selected from one of their number, but did refuse to allow them to put on a stonemason, who had not mined coal for a year—a man whom the citi-

zens said was not an honest man. The superintendent concluded his letter as follows: "I don't think our miners want a check-weighman now, as I have not heard a word since Mr. Klein was there."

THE LIEN LAW CO-OPERATIVE SOCIETIES.

Miners, as is generally known, work by the ton and not by the day, and in a sense are contractors, although skilled laborers. Several communications have been received during the year by intelligent miners, setting forth that under the existing laws of Ohio, they are debarred the right of a first lien on the product of their labor, while mechanics and common laborers are amply protected by law, and cases are cited wherein miners have been unable to recover pay when their employers failed. It was undoubtedly the intention of the Legislature to include miners in the laborers' lien law, and if by a technicality they are excluded, the law should be amended to include them.

A law for the protection of co-operative societies is required. At present the question of co-operative industry is being agitated by the workingmen of the State, and it is claimed that there are no laws upon the statute book affording such societies the requisite protection.

CONDITION OF THE MINES.

During official visits to the mines, myself and assistant take notes of the condition of the mines, mainly in regard to ventilation, that being the main cause of complaint on the part of the miners. Bad air prevails in mines, because it costs money to drive airways, make stoppings, and erect doors. The miners care little for other needed reforms in mining, in comparison with ventilation. In speaking of the law they often call it the "ventilation act", and the Inspector is termed the air inspector. In the following pages the mines are described as they appeared at date of inspection. Many of them have been improved since the visits were made. As only one or two visits can be made to any mine during the year, the boss who desires to have a good report made of the work under his control should have everything in order at all times.

CORNING.

There are seven shaft mines at Corning, and one at Buckingham, known as Nos. 3, 5, 7, 9, 11, 13, 15 and 19. Six of these mines are owned

and operated by the Ohio Central Coal Company—the other two, Nos. 5 and 7, being operated by independent companies. The mines are opened on coal No. 6, the equivalent of the Straitsville and Shawnee coals. Four drift mines were opened during the present year, by the Ohio Central Coal Co., in an upper or hill seam, known in the geological reports as the Bailey's Run coal. These mines are named Nos. 2, 4 and 12. This last mine, which is also called the "twins", from the fact that it is a double opening, is the only shipping mine opened on the Bailey's Run coal, Nos 2 and 4 having been abandoned after trial entries were run in the hill a few hundred feet.

The 6 shaft mines operated by the Ohio Central Coal Co., have fan ventilation. The entries are all double, and the workings are extended under the direction of a mining engineer, all the entries and rooms being run by the lines of the surveyor's compass. Before this plan was adopted, the actual ground plans of the mines disclosed a rather unsymmetrical picture. The top of each pit is provided with an approved safety-gate. but there are no covers or safety-catches on the cages, none being required by law, since all the workmen use the traveling-way as a means of ingress and egress.

Owing to the vast volumes of air put in motion by the action of the ventilating fans, and the approved system of driving double entries, and making breakthroughs from entry to entry, and from room to room every forty yards or less, there is no excuse for having bad air in any of the mines. Defective ventilation can only exist by neglect on the part of the mine officials to promptly close up the last breakthroughs as newer ones are made, or by putting men at work too near the face of the butt-entries at breaking off rooms inside of the last breakthrough. This last practice was done in some of the mines, and on calling the attention of the Superintendent to the fact, he issued an order for the discontinuance of the practice.

Shaft mines No. 5 and No. 7, as I have said, are operated by other firms than the Ohio Central Coal Co., No. 5 being operated by W. P. Rend & Co., and No. 7 by the Sunday Creek Coal Co. Both mines are laid out on the double entry system, and both are ventilated by furnace power. In Rend's mine, the furnace was foolishly located at the top of the upcast instead of the bottom; hence, much of the effective power of the furnace is required to lift the column of air in the upcast. The furnace, however, is a good one, and is covered with a roomy brick stalk forty feet in height, so that when a brisk fire is maintained quite a vigorous current of air is set in motion. The miners of this mine, during the early part of the summer, complained to me that the air was

..ot good over part of the workings, and on investigating the facts I found that the cause of the complaint arose from too many men being put to work near the face of the entries—turning-off rooms—before the breakthroughs were made. The mine, which had been badly laid out when first opened—placing the furnace on the top of the upcast being a sample of the management—was in the interior workings beginning to look better.

No. 9 has an approved circular stairway in the second shaft opening, for ingress and egress of the miners. The ordinary practice is to put a ladder in the escape shaft of mines, this opening seldom being used for ingress and egress, but rather as an emergency opening in case of accident to the hoisting pit. As none of the Ohio Central Co.'s pits have safety-catches on the cages, and all the pits are provided with gangway slopes, except No. 9, which has a stairway, the miners are not allowed to enter the mine by the hoisting pit at all.

The deposit of coal at Corning promises to be limited in quantity. In several of the mines horsebacks have been encountered, which cut away part or the whole of the seam—the coal rising on a hill-side, and gradually thinning down. Entries have been run into these horsebacks, and bore holes have been made from the surface down to the coal level, and quite an extent of barren ground has been met where coal is due. This is, however, a local trouble, for at Buckingham, where a new mine has been recently opened, a vast and inviting field has been struck.

The new mine at Buckingham is called No. 19, and is situate on the west branch of what has been recently named the "Buckingham Valley." The shaft is only 27 feet deep, with a 30-feet lift to the landing, making a hoist of 57 feet. The machinery of this mine and everything in connection with the mining plant is superb in structure, and skill and judgment have been exercised from the beginning. The timbers in the shaft are 10x12 inches; the cage guides are made out of 32-pound round-top T-iron; the engine is of 60-horse power, lifting 4,500 pounds of coal; the hoisting ropes are 1¼ inches diameter, and are made of steel; the dumping arrangements are so constructed that three kinds of coal can be loaded into the same or separate cars, as may be required, namely, lump, nut, and run-of-mine. This arrangement is got up in the following manner: A slide apron is placed on top of the screen-bars when run-of-mine is wanted. When lump and nut are wanted together, an extension apron is lowered on the nut coal screen and the lower end of the nut coal bars. These screens can be put in place or removed in three minutes' time.

JACKSON COUNTY.

No. 1, of the Southern Ohio Coal and Iron Co., is situate at Coalton, in Washington township. This mine, as also No. 2, was opened by Patterson Brothers in 1879, since which time the Southern Ohio Coal and Iron Co. was organized, who own these mines and several others described in this report. The mines of this company at Coalton are drift openings. The main entry of No. 1 runs south on the face of the coal. Three west entries, known as the first right, the second right, and the third right, and two east entries, the first and second left, extend on the butts, and are each about 100 yards apart, rooms being opened on both sides, which meet in the middle as they are finished up. The entries are sometimes eight feet wide, sometimes double this width, as fancy or whim seems to have impressed the boss or superintendent. The pillars left between rooms are aimed to be two to three yards in thickness, but in the first right a crush has already overrun this part of the work, necessitating the opening of a new mine. This is not the last crush which will overrun the mines of the Coalton district, as the disposition seems to be general on the part of bosses to leave too weak pillars for the support of the superincumbent strata.

I inspected the mines of this company at Coalton twice during the present year—the first time by request of the new mining boss, Mr. John McMillan. The roads were then in very bad condition, and part of the mine had been worked without much regard to system—the result of too many mining bosses, there having been three at these mines before Mr. McMillan came, while the mine had not been opened longer than three years. The roads are now in good order. This mine has a good air-shaft and ventilating furnace, and 15,000 cubic feet of air per minute is put in circulation when the fire is kept up. The air comes in at the new mine (opened during the present year) passes through to the head of the first right, thence to the second right, being conducted forward toward the face of the entry by an airway driven along the side of the entry; thence it passes through the left-hand room to the third right, thence to the main south entry, thence to the two east entries, and at last reaches the ventilating furnace, where it is rarefied and delivered into space. Owing to the necessity of having trap-doors on the mouths of rooms, the current of air is not carried to the face of the entries with any vigor, most of it being lost by leakage on the way.

No. 3, CORSE.

This mine, which belongs to the Southern Ohio Coal and Iron Co., is opened on the Wellston coal, and is situate in Milton township. The

opening is a slope, 120 yards in length, dipping one foot in three. The slope is 20 feet wide and 5½ feet high, and has a double track. The mine is comparatively new, work having been commenced on the slope June 6, 1881, and coal reached October 4, following. The main entry runs south 73½° east on the butts of the coal. This entry, which at the date of inspection (July 14) was 500 feet in length, is 12 feet wide, and has a double track all the way. The entry dips its whole length at the rate of 4½ feet to the hundred—an unusual dip—but it will probably soon reach a swamp, when the dip will reverse itself. There are two double-face entries, one of these being opened on the north, and the other on the south side of the main east entry. These face-entries run at right angles with the main entry. The mine has an air-shaft, which is 135 feet in perpendicular depth. On the top of the shaft there is a stalk 32 feet in height; at the bottom of the shaft a ventilating furnace is constructed, 5 feet in width, 3½ feet in height above the bars, and 23 feet in length, all the material in this structure being solid sandstone. Twelve to fifteen thousand cubic feet of air per minute was moving in the mine.

ELIZA.

This mine lies in Milton township, and is owned by the Eliza Furnace Co. The opening is a shaft 76 feet in depth, which was sunk in 1876. A blast-furnace stands along side of the shaft, which is fed by the coal as it comes out of the mine. Owing to the noise of the blast furnace the human voice cannot be distinctly heard and understood, and a speaking tube had to be put in the shaft so that conversation could be held between the people on top and bottom. This mine, when first opened, was well laid out underground, but during the year 1879 was operated without any underground boss, and the miners, most of whom had had little or no previous experience underground, worked as they pleased, and would have ruined the mine in the course of a year or two. It has been for some months in charge of a practical miner as foreman, and the workings are beginning to assume some kind of symmetry again.

The mine has not been worked steady since it was opened, and only three or four acres have been excavated. The coal is of excellent quality, and is used exclusively in the blast-furnace. The hoisting engineer is a boy, 16 years of age, who has been employed in this position for the past four years. He does very well when alone, but if boys come around the engine-house, his mind, the mining boss informs me, is

apt to be diverted from his work. No accident, however, has occurred on his account. As the mine has done very little work during the past four years, being operated the most of that time with less than ten men, and so did not come under the requirements of the mining law, no complaint was ever made to me on the boy's account. In my judgment, however, no person under 18 years of age should be allowed to hoist.

There are four entries in the mine—one of which runs north on the face of the coal, and the others east and west on the butts of the coal. A good air-shaft, properly and advantageously located, which is 84 feet deep, was sunk in the beginning of the year. At the date of inspection the ventilating furnace had not been built, and the air was provided by means of the exhaust steam from the water pump. The current was too feeble for the wants of the mine; but the air, such as it was, was well distributed.

FLUHART'S.

This mine, which is situate in Milton township, is owned by Theo. Fluhart & Co., and is a shaft, 87 feet in depth, and was recently sunk, ground having been broken in June, 1881, and coal reached on the first of August, following. The hoisting engine is one of Crane Brothers' Patent Hoists, and has but one flued-boiler. The engine and boiler are located at the end of the pit. At the date of inspection, in July, only 2,300 tons of coal had been excavated, mainly from entries. The work was well laid out underground, all the entries, face and butt alike, being double. There was only one means of ingress and egress, and the ventilation was defective, owing to the return airways not being "holed." A steam pump, placed at the bottom of the shaft, gave motion to a current of air capable, if properly circulated, considering the limited number of men then employed, of supplying the wants of the mine until an air-shaft and ventilating furnace were provided. The shaft was divided into up-cast and down-cast compartments by a wooden partition or brattice.

WELLSTON SHAFT, No. 1.

This mine, which is situate in Milton township, was opened in 1874. It is a shaft 55 feet deep. The main entries of the mine run east and west from the bottom of the shaft. These entries were started double, and were the only entries opened in the mine until a few months

ago, the rooms being headed off by roads run through the breakthroughs every seventy or eighty yards. This is the plan of working a mine which has been given the name of "no system," and is the rudest and worst in practice; it is usually adopted with a mistaken idea of economy —to save the expense of driving entries; but it invariably turns out the most expensive way of getting coal, and frequently ends in the destruction of the whole of the underground workings before the coal is half worked out. For a few months—a year or two, perhaps, it is cheaper to mine coal this way than any other. The plan of working has been changed, so that double entries are opened every hundred and sixty yards, a pillar four yards in thickness being left between the parallels. Rooms are opened and run north and south, meeting in the middle, as in the ordinary practice of double entry workings; pillars between rooms are three yards thick.

The present mining boss of this mine is a graduate of the School of Mines in Clausthal, Hanover, one of the numerous schools for the education of practical miners, established by law in Germany. By the laws of Germany, no man can be a mining boss unless he is a graduate of one of these schools, and as a requisite of admittance the applicant must have worked at least six months previously in a coal mine The subjects of study are mine surveying, mapping of mines from actual surveys, mine working, elementary chemistry, geology, and mineralogy. Two days in every week the student is also required to work in the mines.

Wellston Shaft, No. 2.

This mine, which is also a shaft, is 74 feet in depth, and is situate 3,000 feet south of shaft No. 1, both of which are owned and operated by the Wellston Coal and Iron Company. Shaft No. 2 was sunk in 1881, and has done very little shipping to date. The workings of both shafts are through on each other, and both are ventilated by one furnace, located in the old mine. The ventilation of both mines was good.

At shaft No. 1, two blast-furnaces are erected, only one of which is in blast, which is supplied with coal from the mine. The native ores of the county, with one-fifth Lake Superior ore, are used in the manufacture of pig-iron. Shaft No. 2 is to be used for shipping exclusively, and shaft No. 1 for supplying the blast-furnaces with coal. Both mines are under the supervision of one mining boss.

The mines of this company was visited twice during the year, the last time in October, on complaint of the miners arising over bad air. I found the east entry of mine No. 1 in bad condition. The boss

acknowledged it was not as it should be, and promised to fix it up all right within ten days.

MILTON.

This mine, owned and operated by the Milton Furnace and Coal Company, is a shaft opening, 74 feet deep. It is situate in Milton township, and is the oldest opening in the Wellston, or Coalton, or Hill coal, which is the same vein under different names This shaft was sunk in 1873. There are three separate openings, all shafts; the first being the hoisting shaft, the second the escape shaft, in which a good and substantial stairway is placed—the first stairway in a coal mine in the State, though there were numerous ladders—the third shaft is the air shaft, at the bottom of which the ventilating furnace is placed. The main entry of the mine, or what was meant for the main entry, starts west from the bottom of the shaft, and runs in this direction for 700 feet, when it turns southward, angling across the face slips of the coal, the new line of direction being nearly south-west. This entry was started double, the parallels having a pillar 15 feet in thickness between them. Near the bottom of the pit the south entry is started, which, with a mistaken view of economy was widened out to room width, eight yards. After being advanced a few hundred yards, however, it was reduced in width to eight feet, and advanced at this width for several hundred feet, when it was widened out to 12 feet. It has lately been again narrowed down to eight feet, which is the width it should have been started at, and held the whole length of the way. There are five butt entries opened on the west side of the south entry, the inner one of which is double, and one on the east side, also double, the other four being single. These entries are all 12 feet wide, and, except in the double entries, the rooms were all worked to the south on the face of the coal. They were started at 12 feet in width, but opened out to 24 feet, a pillar 10 to 12 feet in thickness being left between the rooms, which is pierced through every 30 yards for air.

The average thickness of the coal of this mine is about three feet ten inches. Along the main hauling roads and entries a foot of roof is blasted down to give height to the mules, but in the rooms no roof is cut, and small mules enter and draw out the loaded cars. The rails of the mine when first laid down, and which are still used in the rooms, as well as on the butt entries, were made out of scantling 2x3 inches, laid flatways, nailed to cross ties, made out of inch plank. Along the hauling roads strap iron was laid on the scantling, but in the rooms the bare

wood forms the track. Within the past two years T iron, 12 pounds to the yard, has been laid on the main hauling roads. The mine cars hold from 12 to 15 bushels; on the strap-iron track two or three cars were all a mule could haul, but since T iron has been substituted five and six cars are brought out at a trip.

At the bottom of the vein there is frequently a few inches of bone coal, which is very hard to undermine, and as the top of the bed is quite tender, the miners adopted the top of the coal as the "undermining." They soon acquired the art of cutting a shot four and five feet in depth, holding the pick-handle in one hand in striking back into the deep cutting. More powder is used in digging coal this way than would be required if the coal was undermined in the bottom, and 33 per cent. of slack and nut are made in mining, but on the whole the diggers do better cutting on top, and they would not willingly go back to the bottom to cut a shot.

The air-shaft of this mine, which was sunk in 1878, fell in during the spring of the present year, and several weeks of hard work, at great expense, were required to clean out the debris and retimber the pit. The timbers gave way, and as there was 40 feet of loose material in the shaft, the lower 12 to 15 feet of which was composed of blue running clay, the whole shaft was filled from top to bottom. The furnace had to be taken out at the bottom of the pit, so that the debris could be hauled away and deposited in abandoned rooms. The new furnace, built after the shaft was cleaned out, is one of the best constructed in the State, being six feet wide, three feet high above the bars, and two feet below the bars. When a vigorous fire is maintained, the current of air created rises to 20,000 cubic feet per minute. The whole underground force of the mine never exceeds 50 in number. The air is well distributed throughout the workings, and in a dry working-place it is a pleasure to work in this mine.

In sinking the shaft the main object of the owners was to get coal to run the blast-furnace of the company which was built along side of the shaft. The furnace used about 1,200 bushels (50 tons) of coal per day, which required a working force in the mine of 25 diggers, not all of whom work every day, while the furnace never rests, not even on Sunday. In purchasing and constructing the hoisting and dumping apparatus of the mine, economy was aimed at rather than elaborate arrangement. This is to be regretted; for, being the first mine opened in the Wellston district, it served for a model to those which followed, and none of the mines subsequently opened are properly constructed on top.

COMET.

The Comet is in Washington township, and is a shaft 72 feet deep, which was sunk in 1880. There are two main entries, one extending south and the other north from the bottom of the shaft. Four butt entries are being opened—two on the west, and two on the east. The entries of this mine are all single—the rude old style manner of laying off the workings of a mine. There is, however, a good ventilating furnace in the mine, and an abundant air current.

This mine has two separate openings—the hoisting shaft and the air-shaft; they are situate within a few feet of each other. In case of fire occurring in the hoisting shaft, the stalk of the air-shaft would become involved in the flames. As the mine did very little work for the first two years after the pit was sunk, 15,000 square yards were not excavated until the summer of the present year. When this area was cut, I notified the company by letter that they would require another outlet, the second one being too close to the main shaft. The owners of the mine are now putting down an escape-shaft, which is nearly finished.

THORNHILL'S SHAFT

Is situate in Washington township, is owned and operated by F. Thornhill, and is, as its name indicates, a shaft, 70 feet deep. It was sunk in 1881, and is hardly fairly started up yet; but all work underground has been well and skillfully done. The entries are all double, and are well laid out. This mine, that of Theo. Flurhart & Co., and the new shaft (No. 2), of the Wellston Coal and Iron Company, are all laid out on the same plan. The moment one descends such a shaft he sees at a glance that the true miner is directing the subterranean excavations. This is the only shaft in the Wellston district which fully and cheerfully complied with all the provisions of the mining law in starting up—safety-catches, safety-gates and covers for the cages being provided for the commencement of operations. There is but one opening to the mine to date (July 20), but not more than 2,000 square yards have yet been excavated, and the proprietor has assured me that two openings will be made as soon as required by the statute.

DRIFT NO. 1—JONES & MORGAN.

This mine, situate in Washington township, is operated by Jones & Morgan, who own three mines in the Coalton district. This opening is a drift, the other two, which are situate higher up on Pigeon Creek,

being slopes. Drift No. 1 was opened in 1878, and has one face entry running south, and five butt-entries, all running west. They are all single, and are each eighteen feet wide. The butt-entries are about 100 yards apart; rooms are opened in each side, and meet in the middle, being started at twelve feet, but immediately extended to twenty-four feet in width; pillars six to eight feet in thickness, are left between rooms, which are cut through every twenty yards for air. This mine is more perfectly ventilated in all its parts than any mine in Jackson county, or, for that matter, in the State. The following is the plan in practice: All the entries, as I have said, are eighteen feet wide. At the face, however, an excavation nine feet wide is kept ahead for two or three yards. As the coal is only a little over three feet in height (this being the general thickness in all the mines of the Coalton district), two feet of the roof shale is shot down to make height for the mules. The roof is shot in the narrow part of the entry as soon as the coal is cut away; then the other wing of the coal, nine feet in width, is mined out. This is done so that the roof may not be broken by the shots, to a greater width than eight or nine feet. The roof shale, instead of being hauled outside, is built up in a wall between the hauling road and the right-hand pillar, a hollow space being left near the pillar for the passage of air. By this arrangement the air is made to play on the very face of the entry; hence, at points where in other mines the air is always sluggish, it is purer in this mine than in any other part of the workings. The pack walls must of course be made air-tight to insure a continuous stream at the entry faces. I examined every entry in this mine, and found the walls tight and the air issuing in a stream out of the orifice or hollow space at the face of each gallery. Doors are placed in the mouths of the rooms on one side of the entry. For a small mine, with a limited area of coal territory, this plan is a commendable one, as it insures systematic perfection in ventilation, and lessens the cost of haulage; but if the workings of a mine were extensive, and the coal area large, I would be afraid of a crush sooner or later, as this width of entry and narrow ribs would be inadequate for the support of the superincumbent rocks.

Slope No. 3—Jones & Morgan.

This mine is in Washington township, and is operated by Jones & Morgan. This opening is a slope, 47 yards in length, dipping 11 inches to the yard. It was sunk in 1881, coal having been reached in September of that year. There are two face entries in the mine—the south

entry, extending forward from the bottom of the slope, and the north one, wheeling back and running in the opposite direction. Four butt entries have been opened—three in the west, and one in the east. The entries are all single, and are eight feet wide, except the south face entry, which is twelve feet in width. The rooms are made seven yards wide, with pillars two yards in thickness between rooms, which are cut through every twenty yards for air. There are two openings to the mine, the second one being the air-shaft, at the bottom of which the ventilating furnace is located. The workings are dry and the air good, except at the inmost rooms. The mining boss is a very intelligent man, capable of directing the operations of a more extensive colliery, and of opening a mine on a more approved plan.

Union Mine.

This is a level free opening, owned and operated by E. S. Kelley. It is located in Washington township, and was opened during the summer of 1878. The main entry runs north on the face of the coal; there are three butt entries—one on the west, and two on the east of the north entry. Rooms are opened on both sides of the butt entries, and are made twenty-four feet wide, the thickness of rib between rooms being eight feet. The entries are all single, but the air is kept well up toward the face by doors placed in each room mouth. To prevent leakage of air through these doors, partings are laid through the breakthroughs of every third room, one parting to the right and the other to the left, and the mouths of the other two rooms are closed up and made air-tight. Rooms are not started on the return side of the entry until breakthroughs have been made and doors or stoppings erected in the rooms on the opposite side. By this arrangement, it is possible to have sweet air in the interior rooms, and in the entries themselves, at all times. I have found this mine thoroughly ventilated in all its parts, during every visit I have made to the Coalton district. There are two openings, an air-shaft and ventilating furnace in the mine.

Mohler's Mine

Is operated by Thornhill, Mohler & Co., is a drift opening, and is situate in Washington township. The mine was opened in 1878; it has been worked without much system. A small furnace, only three feet wide and scarcely two feet high above the bars, is employed to ventilate the workings, as also the workings of Thornhill's drift—these two mines

being in communication with each other—at present all the coal from both openings being delivered through the Mohler mine. Owing to the unsystematic manner in which the underground work of this mine is laid out, it would serve no purpose to attempt a description of the excavations. It is but just to add, however, that a ravine cuts out the coal in the mine, to avoid which it was not possible to preserve taste and good practice in laying out the workings. The rooms have been worked, according to the usual method practiced in the Coalton district, seven to eight yards wide, with narrow ribs two to three yards thick, which are cut through every few yards for air. The mine is not as well ventilated as it might be, for want of an adequate furnace and air shaft.

THORNHILL'S DRIFT.

Owned by the Thornhill Coal Company, which now forms part of the Mohler mine, is located about 200 yards west of the Mohler opening. In reality there should never have been but one mine, as the territory of both does not exceed 100 acres, and the output of both never reached 150 tons in the palmiest days of either mine. The manner of mining is similar in both mines. Since the beginning of January, both properties have been put in charge of a practical miner, who, in reconstructing the workings, aims to leave larger pillars—an improvement greatly needed in all the mines of the Coalton district, as owing to the tender character of the coal larger pillars are needed than would suffice with stronger beds. A prevailing fault in all the mines is leaving too weak pillars. I would not like to be responsible for any of the mines of the Coalton district, if the present practice continues, five year hence. Crushing of the overlying strata will sooner or later overtake the workings. An extensive mine will not stand up, unless fully one-third of the coal is left in the advancing stage of working, for the support of the superimposed rocks, and this is not done.

DARLING, No. 1

Was opened in 1878; it is a level free mine, operated by Pimlott and Hall. This mine (as is Darling No. 2 operated by the same firm) is located in Washington township. The main entry runs south on the face of the coal. Four east entries running on the butts have been opened. They are about 60 to 70 yards apart, and rooms are opened on one side only—the south side. The rooms are eight yards wide, pillars two to three yards in thickness being left between rooms, which are cut

through in narrow cross-cuts every 25 or 30 yards for air. All the last entries will go through on the workings of mine No. 2, the opening of which is situate 350 yards east of No. 1. There is an air-shaft and ventilating furnace on the south entry, near the face of the entry, which have been provided since my last report was made. There is now good air in all the workings of both mines. The furnace is a foot narrower than is desirable, but it makes a vigorous current when the fire is kept up. All the entries of this mine are driven 12 to 15 feet wide, the roof slate is gobbed away on one side of the hauling road, a hollow space being left between the pillar and the pack-wall to get the air up to the face of the entry, the plan being the same as obtains in the mines of Jones & Morgan—few entries, of moderate length. This is a desirable method where simple entry driving is in use, as the air is made sweet at the very face of the entry, usually the worst ventilated part of a mine. The plan of opening rooms on one side of the entry only, does away with the necessity of having doors in the mouth of every room, and hence facilitates getting the air up to the face of the entry without leakage. The pack-walls soon settle, however, and air spills and is lost before the entry goes far forward.

DARLING, No. 2,

Is in reality part of No. 1, and was opened for the purpose of shipping by the Narrow-guage Railroad, as no switch could be got into No. 1 from that road. The main entry runs south, and two east entries have been opened on the butts, which are simply an extension of the first two butt entries opened in mine No. 1. The air enters mine No. 2 (a trap-door in the main entry of No. 1 shutting off the current). traverses the two east entries, then passes through into mine No. 1, ventilates the workings, and finally reaches the furnace, and is discharged through the air-shaft.

J. H. WILSON & SON.

This mine is worked on the same principle as that prevailing in the Coalton district. A new opening was made during the year. The mine is laid out after the manner of the old one, except that at the time of my visit there had not been furnace ventilation applied. As, however, only a hundred yards of works had been opened up, and two openings had been provided, the current was sufficient.

Another mine has been opened by this company a few miles north

of the Coalton opening. It is a small slope, and is not yet fairly under headway.

The mines of Rittenhouse & Co. are described in the report of Mr. Williams. Like all the Coalton mines, the workings are quite limited in extent, owing to the fact that this is a new district, and that none of the mines work a large force of men.

The Emma mine is also described in the report of Mr. Williams.

The foregoing are among the older and more extensive mines of Jackson county. During the past twelve months a large number of new openings have been made, mainly between Coalton and Jackson, on the line of the Ohio Southern Railroad. They are reached by short branch roads. On the Ada switch branch, one mile south of Coalton, six mines have been opened—four slopes, one shaft and one drift, and during next year will ship extensively. The drift mine has been shipping for over a year, and has been twice rented and inspected. On the north side of the Ohio Southern, three branch roads are laid to mines, several of which have been shipping for two years. They are mostly small mines, but all come under the mining law. The seam of coal in which the Wellston and Coalton mines are opened gradually loses height to the westward. It is upward of four feet at Corse, and as it is followed to the west it seems to gradually thin down, until, in the hills surrounding Jackson, it is only eighteen inches.

Huron Shaft.

This mine is in Jackson township, and was opened in 1874. The shaft is seventy feet deep. The coal is used exclusively in the furnace of the Huron Iron Company, who own the mine. This mine laid idle for three years during the panic, and the workings—none too well laid out—fell in over part of the mine. A new hauling road had to be made in re-opening. There are two entries working at present—the George Davis and the Sunfish entries. They are both on the butts of the coal; are both double, the thickness of pillars between parallels being ten feet. Rooms are eight yards wide and eighty yards long; ribs nine feet thick. The air shaft of this mine, which was originally sunk as a trial pit before the hoisting shaft was opened, is too confined, and the flow of air is not as strong by one-half as it would be with a larger upcast. The inequalities, or dips in the floor of the coal, make it impossible to have symmetrical work, as the dip has to be used as a hauling road wherever practicable. The low places or swamps are not often continuous, as in the Mahoning Valley, but are simply rounded or oblong depressions,

which will not admit of drainage. The air of the mine was well distributed, but the current was rather feeble. A new airs-haft will soon be sunk.

KYLE'S SLOPE,

Which is situate near the village of Jackson, is 45 yards in length from the mouth to the bottom of the coal, the dip being 10 inches to the yard. The main entry goes south from the bottom of the slope. One entry is opened on the east and one on the west of the south entry. As the mines, which extend north and south from these butt entries are advanced 60 or 70 yards, they are cut off by laying the track along the heads of rooms in the last breakthroughs. This is a system of opening a mine which lessens the cost of getting the coal for a year or two, as the expense of driving entries is saved, but it is like buil ling a house on a foundation of sand. There is a strong draft of air in this mine when the furnace is well kept up, and it was reasonably well distributed. The coal is of excellent quality for furnace use. The mine seems to be free from heavy hills or hollows, and the roof is generally good. It is a pity that, through a mistaken idea of economy, the workings of the mine should be laid out on so rude a system. This mine was opened in 1875, and is owned and operated by Kyle, Shotts & Co.

STEUBENVILLE DISTRICT.

The annual reports of the Inspector of Mines, as regards this district, run in a groove. Each year finds the same systematic perfection in ventilation, and the same plan of carrying on the workings. Although these mines have been in operation for 20 years, the same ventilating furnaces first applied are still used for giving motion to the air, and they still excel all other furnaces in the amount of draft created. They, however, have a natural advantage over other districts—the pits are deeper at Steubenville than anywhere else in the State, and, as is well known to intelligent mining bosses and competent practical mining engineers, the deeper the shaft the greater the ventilating power of the furnace, the power being in fact as the ratio of the depth. The air of mines in its passage through long and intricate galleries, is retarded in its progress by the friction which it encounters rubbing against the sides, top, and bottom of the airways. The mining bosses at Steubenville obviate this difficulty by driving airways 12 feet wide, and by splitting the circulating current into several columns. The advantages

of splitting the air are now well understood. According to Mr. Atkinson, who is the acknowledged authority on ventilation: A constant ventilating power, which will produce 16,198 cubic feet of air per minute in one column, will produce 70,844 cubic feet per minute divided into five equal and similar columns. Hence it is, that one mine records 7,500 cubic feet of air per minute, while another mine, having no better furnace and no shorter airways, records double or treble that quantity.

The Steubenville district, which produces more fire-damp than all the other regions of the State combined, is the only district where this gas is generated, which has no explosions. Miners have been burned at Salineville, at Robbins', at Corning, and at Jackson within the past year or two, yet any of the mines of Steubenville produce more gas in a day than the districts named produce in a month. Nor is the cost of this safety greater at Steubenville than elsewhere. The whole secret of the success of the Steubenville mine bosses is revealed in the fact, that they understand the nature of their enemy, and provide means to destroy him—to dilute and render harmless the gas. Although fire-damp may not be seen in a mine for a month or more, still nothing is left to miscalculation or to accident; no person is allowed to enter the mine any morning under any circumstances until the fire-viewers have made the rounds of the mine, and thoroughly explored every working-place with safety-lamps. I record the above facts with no feeling of partiality for the bosses of Steubenville, but for the benefit of those bosses having charge of fiery mines, who, when an accident occurs, attempt to shift this blame to other shoulders. *If gas is not allowed to accumulate, there cannot be explosion.*

Pike Run Mines.

The mines of the Tuscarawas Valley Coal Company, situate near Uhrichsville, Tuscarawas county, are well ventilated, the two mines at present in operation—Pike Run, No. 1, and Rock Hill—being ventilated by exhaust Champion fans. This company deserves great credit for the care taken in having their mines made safe and salubrious. Neither labor nor expense have been spared to conform to the requirements of the law, both in letter and spirit. John L. Davis is the mining boss, an old and experienced man, who is always prompt with his monthly reports; sends immediate notice of all accidents, and desires full investigation into the cause of the same. The mines are worked on the double entry system, and well managed. Pike Run, No. 2, which is ventilated with a good and substantial furnace, was idle during the

summer, owing to the falling off in the demand for coal. The Assistant Inspector of Mines, on first visiting these works, said they were the best ventilated that he had ever seen.

Coshocton Mines.

Five mines are operated around Coshocton, but at the time the district was visited by the Assistant Inspector in September, were idle, the miners being on a strike. This district is unfortunately situated for trade, and has made little progress the past ten years. The Union mine is the leading one of the district. The mines, owing to the presence of iron pyrites in the coal, make foul air, and require extra attention on the part of the bosses in consequence, which has never been bestowed upon them. It has required frequent prompting on the part of the Inspector of Mines, ever since the mining law went into operation, to get the managers to expend any money to improve the ventilation. The mines are all drift openings, and the quality of the coal is good, but the district has never been able to make much headway as a coal-producing center.

Mineral Point.

The mines at Mineral Point, Tuscarawas county, were visited in May. There were three mines in operation, all of which were inspected. The coal is only 2½ to 3 feet in height at the Summit mine, but is of good quality. This mine is ventilated by a furnace; the air-shaft is forty feet deep.

The Block Vein mine co. had recently sunk an air-shaft, and were making preparations for a furnace for ventilation. Only ten men were at work in this mine at the time of inspection.

The Newberry mine is worked on the single entry system, but the air was good Only ten men were employed.

The Valley Road (Cleveland, Akron and Canton), recently opened, has been the means of developing quite an extensive coal field along its line in Tuscarawas and Stark counties. As these mines have not got fairly under way yet, they have not been visited. They promise to become quite a factor in the coal production of the State.

Dell Roy.

The mines of this new district are situate in Carroll county, and are opened on the Salineville vein of coal. The district was visited in the

early part of the year, and several of the mines were found not up to the requirements of the mining law. The attention of the managers was called to the fact, and arrangements were at once set on foot to improve the ventilation. These mines, six in number, are all drift openings. They have been troubled with horsebacks, which in the center of the hills come down and cut away the coal, the usurping material being a massive deposit of sandrock. At Sherrodsville, six miles south of Dell Roy, however, the seam of coal seems to be entirely free from this disturbance. The coal of this district is of good quality; the bed is of good height, and an important trade is destined to spring up in Carroll county in the near future.

Lawrence County Mines.

The mines of this county are opened in coal No. 5, and are level free. They were visited during the summer, but were all idle except two at the time. Bad air was found in one of the mines, which had no artificial means of producing ventilation, but on the attention of the owners being called to the fact, means were taken to comply with the law. A new mine, opened by Thomas L. Harris, mining boss, was examined with much interest, everything about it having been done in a workmanlike manner. For many years this district, isolated from other mining centers, seemed to be asleep, but Mr. Harris was wide-awake, no region in Ohio or elsewhere being able to show superior skill in the manner in which he had opened the new mine. The New Castle mine was not visited.

The Union mine, which is situate three miles east of Sampsonville, is operated by the Union Coal and Iron Co. The mine is a drift opening, and the coal is used in the blast furnace of the company in a raw state. The ventilation in this mine was found very defective. A new air-shaft was needed at the far end of the mine, and a good furnace also, which the managers agreed to provide.

This mine is opened on coal No. 6, a seam which generally retains its dry-burning qualities wherever it has been mined. It is situate in the north-east corner of Lawrence county, distant twenty miles from any other mine which comes under the requirements of the mining law. The coal is quite thin, only the lower part of the great vein being present. The miners receive one dollar a ton for digging, two tons being regarded as a good day's work.

POMEROY MINES.

The mines of this region were visited and inspected by Mr. John Williams, acting assistant, in the months of March and April. They will be found described in detail in his report.

The mine of Even Williams, which I inspected sometime after the visit of Mr. Williams to the district, was found well ventilated and otherwise in good order. The main entry runs east one mile, thence it wheels to the north for nearly another mile. All the coal is worked out along the territory traversed by the main entry for a mile or more, and the miners were found at work well back towards the face of this entry, two miles from the mine mouth. The entries are all double; the workings are carefully managed, Mr. Williams, the owner and operator of the mine, being himself a practical miner from early boyhood. Superior means for providing ventilation are applied.

BUCHTEL MINE.

The mines of the Akron Iron Co., at Buchtel, are models of ventilation. The furnaces are large, roomy, and well constructed. The furnace at the Half-moon mine, which moves 26,000 cubic feet of air per minute, is eight feet wide, four feet high above the bars, and twenty-four feet long; the arch is double, and the sides are provided with rectangular chambers for the purpose of admitting the passage of cool air to prevent the mine pillars being set on fire. The rooms in the mines of the Akron Iron Co. are driven thirty feet wide, leaving pillars or ribs ten feet in thickness; two tracks are laid in each room, and the pillars are withdrawn as soon as the rooms are finished up, their length being 100 yards. The entries are all double—a plan now adopted by every mining boss who understands his business.

If the pillars left between rooms were made a little larger, it seems to me better ultimate results could be secured. No harm can come from having pillars abundantly strong.

ORBISTON MINES.

The Hocking Iron Company's Mines at Orbiston were found in excellent condition as to ventilation; 33,000 cubic feet of air per minute can be set in motion by the furnace, if desired. Mr. Palmer, the mining boss at the date of inspection (May 12), was found busy trying to perfect an automatic trap-door. The furnace of this mine, like the majority of well-regulated furnaces in mines, has two side chambers for the passage

of air, Mr. Palmer, who is not acquainted with mining books, having found by experiment that more air can be moved by a furnace constructed in this manner than with one where the whole column of air passes over the fire. I made measurements in this mine by both processes, and found 2,000 feet more moved when the side chambers were open than when all the air passed over the fire. This practical fact has long been understood among mining engineers, although the cause has not, perhaps, been satisfactorily explained.

Hocking Valley Mines.

The mines of Sand Run and Carbon Hill are also well aired, the mining committees of these mines frequently accompanying the mine boss in taking the air measurements. The manner of laying out the workings has been changed from the single to the double entry system.

The Longstreth mines in which the Lechner Coal Cutting Machines are at work, has a good furnace, and the rooms where the coal-cutters are employed are provided with the compressed air liberated from the "iron miner," which escapes from the air-cylinder in the form of a vapor. The plan adopted in this mine, of working rooms 60 feet wide, is not, in my judgment, a commendable one. No roof will always stand that width of working, and sooner or later the immediate advantages of this plan will be counterbalanced by a fall or squeeze of the overlying rocks.

Lick Run mine is located in Athens county, one and a quarter miles south of Lick Run Station, and is managed by W. A. Shoemaker, and by Robert Evans, mining boss. This mine is worked on the single entry system; there is a good air shaft and a furnace, and plenty of air, but none at the face of the workings. It can be all made right with a few dollars, for it only takes one door and two breakthroughs to make good air. The boss agrees to do this at once.

This mine has always been kept in bad order. It is worked on a lease, which runs from year to year, and, like a rented farm, is allowed to run down. A new mine boss has lately taken hold, who promises to improve the condition of the workings, and unless something is done, I know of no remedy but to enjoin it.

Lick Run, No. 2, is in the same hill as No. 1, and is badly managed for air; by shutting up the old drift and hanging a door it can be made good. This mine has an air-shaft and a good furnace, but the air-course is very small; by cleaning it up it will supply thirty men, for there was 2,800 feet of air at the air-shaft when I was there, and not a move

at the face of the workings. Mr. Evans, the mine boss, has agreed to put the mine in good shape in about two weeks.

Laurel Hill mine is located on the C. & H. V. R. R., at Lick Run Station, and is well managed by Mr. W. M. McCloud, who took hold of the mine about one month ago. First, second and third east, and first west, are all drawing back. Mr. McCloud is taking coal which was left by others, and is opening a new territory, which he is working on double entry system. At the time Mr. McCloud took hold they could not load more than five cars a day, and now they are loading seventeen cars per day without any trouble.

Brooks' No. 19—Two mines—are managed by H. C. Mitchell, mining boss. One mine has a furnace, but they have not been firing it up very much, and depend on the natural ventilation. There was but very little air at the place of the workings; they are driving to meet a new air-shaft in Snaky Hollow. I told them to disconnect the two mines, build a new furnace at the new shaft, start up the old furnace, and then they would have a good current of air at both places.

Johnson mine is located about one half mile southwest of Nelsonville, along the C. H. & V. R. R., and is a new mine, managed by Jos. Slater. They have an air-shaft, and were putting up a furnace. It is worked on the room and pillar system; rooms, 26 feet in width; entries, 9 feet. The furnace will be 5 feet wide, 3½ high and 12 feet long.

The L. D. mine is situate about one mile south of Nelsonville, is a new mine, and is well managed by H. J. Fulton, mining boss, and L. Steenrod, Superintendent. It is worked on the room and pillar system; they have just finished a new air-shaft. I have ordered them to put a small furnace in for the present, and a stack of 25 feet, so it will make the current of air travel the same way all the time. Ship all coal on the Columbus & Hocking Valley Railroad. Roof good in part of the mine.

Poston mine is located east of Nelsonville, along the Columbus & Hocking Valley Railroad, managed by Mr. C. Mellinger, mining boss, and C. L. Poston, superintendent. It is well ventilated by furnaces; they have a locomotive running inside of the mine, but the smoke don't come in conflict with the workings. The mine is worked on the room and pillar system. One thing is practiced in this part of the valley—running the entries ahead of the air-course; they ought to have double entries. Only in this way can they have good air at all times.

Floodwood shaft is situate in the county of Athens, at Floodwood village, on the Columbus & Hocking Valley Railroad, and is managed

by Thomas Shephard. It is all worked on double entry system; shaft 40 feet in depth, 10x20, and have good machinery. They have (July 27) just completed a new furnace six feet wide, four feet high and twenty-five feet long, open on both sides and on top for cool air to pass through. It is one of the best furnaces in the State. Roads are good. Pillars between entries are 45 feet. They are building two new blast-furnaces, and have built two hundred new houses, all alike, five rooms to each house.

Floodwood drift, B. B. Sheffield & Bro., is located near Floodwood, on the C. & H. V. R. R, and is managed by B. B. & N. B. Sheffield. Inside and outside they ventilate by furnace. As they are not working full time, they hadn't any fire in the furnace, but as far as I could see their works are well aired. Inspected July 27.

Carbondale mine is located at Carbondale, and is managed by Chas. Smith, Superintendent and mining boss. It is not too well managed, but there is a great improvement from a year ago; roads are in good condition, and the air is much better in the drift; but the slope mine is still bad. Inspected in July.

Tuscarawas County.

Nemissilla mine is located about 2½ miles south-west of Trenton, is a new mine, and are about holing into the air-shaft, then they can work more than 10 men. Worked on the block system.

Henry Miller's mines are all in the Goshen Hills, about three miles below New Philadelphia. Two of them will work more than 10 men as soon as they get ready. All worked on the room and pillar system.

Hert's mine is located about one mile south-west of Trenton, and managed by Nickles Hert; ventilated by a small furnace, the furnace being a great ways off from the place of working. The air is not as well conducted to the face of the workings as it should be. Mr. Hert promised to build a new furnace, which will make a great improvement to the air.

Goshen Coal Company's mine is worked on the room and pillar system. This company has an anemometer, but it is used for two or three mines, and being a long ways apart they have been only measuring the air once a month.

Goshen mine (Helmick & McFarlane), located at Goshen Hill, three miles below New Philadelphia, is about as well managed as any in this county. I have ordered a few changes; the furnace is not at the

right place, and the air is traveling along the main road when it ought to be in the air-course.

Walton Ridge mine is located about five miles below New Philadelphia, and ships its coal by canal to Cleveland. It is worked by Christ. Nungeser, Superintendent, and Gotlieb Offolder, mining boss. It is worked on the room and pillar system, and is well ventilated by furnaces, all but a few places, and it can be made good by setting one door outside of the last break-though.

The mine owned by Andrew Herning is located about 1½ miles southwest of Trenton, Tuscarawas county, and is managed by Andrew Herning. This is one of the worst mines in the State for air; they have an air-shaft which has an opening of about one foot six inches at the bottom. This mine has from eight to twenty men at times, as have the most of the mines in the county; there was no current found in the mine. As the boss was away, I left orders with his son to widen out the shaft and build a furnace, so that when they work 10 men and upwards they can fire up, and have air for men to work with comfort.

The Niles and New Lisbon Railroad.

This road, which extends from Niles, in Trumbull county, to New Lisbon, in Columbiana county, runs along the line of dip of the coal strata. The Mineral Ridge mines are opened on the lower coal—the Washingtonville and Leetonia, on No. 4 of Doctor Newberry's enumeration. Between Washingtonville and Mineral Ridge a number of new mines have been opened during the year, on the seams lying between Nos. 1 and 4. The coal is of good quality; but rather thin.

From Leetonia to New Lisbon several mines are in operation. This district was visited twice during the year, but the mines were not inspected. Mr. Klein, the Assistant Inspector, was also on the way to inspect them, when, owing to sickness in his family, he was called home. He is at present in that region. Some of the mines, such as those of the Cherry Valley Iron Company, need no inspection, being always kept in excellent condition, but this cannot be said of all of them, though the worst are now equal to the best of former days.

Mahoning, Trumbull and Portage Counties.

Nearly all the mines in the above counties are opened on coal No. 1, the lower bed of the geological series. Along the line of the Niles and New Lisbon Railroad, in Mahoning county, the coals overlying No. 1

have recently been opened, and in the near future an important coal trade will be developed from these upper mines. The coals are, as a general rule, thinner than No. 1, and less valuable in a commercial point of view as well, but as coal No. 1 becomes exhausted the Mahoning Valley will draw upon the overlying beds to supply, as well as may be, the want created by the drained swamps. The following report of the mines of these counties is compiled from Mr. Klein's reports to me, and from personal inspections by myself during the year.

Osborne slope, situate near Weathersfield, is an old slope, and has been standing idle for a good many years. It is now operated by Evan Morris; Richard Perkins, mining boss. They have been working for about two months. They have an air-shaft and a small furnace, but it don't do any good. I have given orders to sink a new air-shaft at the far end of the mine, which they agreed to sink at once. There is not any air at the far end of the workings, as the mine has been worked on the single entry system. There are so many doors and breakthroughs that all the air is lost before it gets to the places where the miners are at work.

The Tippett shaft is located within ½ mile of Mineral Ridge, on the N. Y., P. & O. R. R., and is now operated by the Todd & Wells Coal Co. The mine has been idle for seven years, and is now about ready to start up under the new management.

The Osborne slope is located at Mineral Ridge, Trumbull county, and is drawing pillars; will finish up shortly. The miners have been on a strike all summer, and had just started to work at the time the mine was inspected, at the beginning of the present month.

The John Henry mine is in Mahoning county; is a shaft, and is operated by W. T. Williams at this date (November 1), and is well ventilated by an exhaust steam pump. They have just finished their new air-shaft, and are putting in ladders, 10 feet in length, with landings, for men to travel up and down; shaft is 113 feet in depth and six by eight in width. The mine is worked on the ordinary system obtaining in the Mahoning Valley, which, as I have formerly described, is not well adapted to double entry working, owing to the narrow swamps in which the coal is found disposed.

Todd & Wells' shaft is located at Mineral Ridge, in Mahoning county, and is managed by Tubal Williams, mining boss; worked on the single entry system. They have made a great many improvements in the last 6 months, built up a new hoisting apparatus, and have sunk a new slope for a traveling way. The mine is in good condition, and well ventilated by exhaust steam. This is one of the oldest mines in

the Mahoning Valley, opened on the mineral Ridge coal, and seems to have a long future in store.

The Cambria shaft is located near Mineral Ridge, and is ventilated by exhaust steam, and is in good condition. It is worked on the single entry system. They have improved the hoisting apparatus, and things are in good condition inside and outside as well.

The Peacock slope is an old slope, and has been idle for a number of years. The company is now taking out some of the pillars and some of the coal that was left at different points. There is no system of working, and the mine is troubled in one part of the works with the foul air coming from the old workings.

Hitchen's slope is located at Mineral Ridge. It is worked by one of the old miners of the Ridge, and is taking out some of the coal that was left by some of the other companies, and has been working from twenty-five to thirty miners all summer, but working but five at present. Ventilated by furnace.

Warner's drift is located at Mineral Ridge, Trumbull county. It is a drift opened into the old Ashland slope, taking out what coal was left, and will not last long. It is ventilated by some of the old openings, and doing the best they can.

The Weathersfield shaft, formerly one of the most extensive of the Mineral Ridge mines, is nearly exhausted. The miners are at work drawing pillars, and will finish the mine in a few months.

The Love mine is located about two miles north of Hubbard, and is ventilated by exhaust fan. This mine will be finished by spring, all the work now done being on pillars.

Jacob's shaft is located about two miles east of Hubbard, and is ventilated by exhaust steam, and worked on the entry and air-course system. It is a new shaft, 100 feet in depth, and is 7x13 feet wide; it is well ventilated, and is managed by Thomas H. Williams, mining boss. They will have the second opening finished in about six weeks, which will be a slope for a traveling way for men and mules, then it will be one of the most complete mines in Trumbull county. The mine was inspected in October.

Shady Side shaft, located near Vienna, is just newly sunk through the coal (October) and will be in running order soon. It is managed by Thomas E. Thomas, mining boss, formerly of the High shaft of Church Hill.

Fosterville mine is located in Mahoning county, and is drawing pillars. They have been drawing back for a year or more and finishing up as fast as they can. This is the deepest mine in the Mahoning Val-

ley, and was remarkable for numerous horsebacks which cut out the coal in the swamp. The geologist desiring to study the termination of the block coal deposit in its southward progress, would have found here many useful facts. The mine was well managed, and had approved machinery.

Manning shaft, in Mahoning county, four miles southeast of Youngstown, is a new shaft just completed. They were fixing up the bottom of the shaft at the date of inspection in October. The shaft is 155 feet in depth, and 8x18 feet. Everything is in good order, and good machinery. Everything is strong, well-placed, and firm. This mine is in charge of an experienced mining boss.

Shaft No. 3, of Andrews Bros., is located two miles south of Youngstown; is worked on the double entry system, and is ventilated by exhaust steam; it is well managed by Alexander McIntosh, an old mining boss. The basin is very narrow in this mine, and the hauling roads in consequence are quite extensive. The coal is brought around a large hill in the mine.

The Leadville shaft, the wettest coal mine in America, remarkable for misfortune, has done little since my last report was printed. The immense machinery and the abundant flow of water have been previously described.

Brookfield mine is located about one mile east of Brookfield, in Trumbull county, and is operated by the Sharon Iron Co. They haul their coal with an underground engine. The mine is worked on the entry and air-course system, and is ventilated by an exhaust fan, and is holed through into the Cleveland shaft, which is also owned by the same company. The coal of both mines is now hauled through the tunnel.

This mine, Wilson's shaft, is located along the A. M. L. E. R. R., about one-fourth of a mile north-east of the Diamond shaft, and about one and three-fourths of a mile east of Palmyra, and is managed by E. T. Bowen, Superintendent and boss. It is well managed, and is ventilated by furnace at present. In warm weather the hoisting shaft is a down-cast, and in winter it is an up-cast to keep the shaft from freezing. Air good; roof good, and are driving an air-course to shorten the current of air about 300 yards.

This mine, the Black Diamond shaft, is located south of Palmyra, and is managed by W. I. Murdock, Superintendent, and Abel Dore, mining boss. It is worked on the entry and air-course system; it is ventilated by what they called a bonnet. The air is very good when the wind blows, but when the wind ceases the air current in the mine

stops the same as a wind-pump. They are going to put up a fan as soon as possible. They ship their coal on the Narrow Gauge road, known as the A. M. L. E. R. R. Roof good.

Witch Hazel shaft is situate one-fourth mile north of Youngstown, and is worked on the double entry system, or entry and air-course system. The shaft is 192 feet in depth, and seven by fourteen feet; and everything was found in good condition and according to law; all but the safety-gates, and they will put them on in a day or two. The air is not all confined, as it should be, but will be in a few days. Mr. Evan S. Edwards is doing things up in good style; he is a practical miner of many years' experience.

Church Hill slope is located near Church Hill, Trumbull county, and is managed inside by T. J. Williams. They are drawing back all their works in the slope. This was one of the most valuable coal mines in the State, giving employment to 300 underground men and boys. The workings were opened out in a series of swamps, the coal usually rising over the hills without break in its continuity. The mine usually produced 100,000 tons of coal per annum, and is still a first-class mine. It will take a number of years to exhaust the remaining deposit of pillar coal.

The shaft, which is a continuation of the Church Hill slope, is about one mile southeast of Church Hill, and is well managed by Thomas J. Williams. It is all laid out in good order, and is ventilated by fan. The air is blowing like a hurricane almost all over the mine. The fan is a great improvement; it is a home-made fan, and cost about $700 for engine and fan. The fan is ten feet in diameter and three and a half feet in breadth. It was running eighty-five revolutions at the time of inspection (October), and there was 16,500 feet of air at inlet and outlet. I would count it one of the best ventilatdd mines in the Mahoning Valley. It is worked on the entry and windway system, the same as most of the mines in this Valley. This shaft is 180 feet deep, and was sunk in sixty days. Hercules powder was used in blasting. The machinery for raising the rocks was applied before the work of sinking commenced.

The High Shaft mine is located one mile east of Church Hill, Trumbull county; mining boss, William Jones. This mine has but one opening. It is well ventilated by exhaust steam, and is worked on the entry and windway system. The coal has proven very poor as to quality, so far, which has caused delay in working the second opening. Mr. Sampson informed me this morning that he was going to drill several holes, and see if it was worth while making the second opening. The proprietors of this mine have been officially notified by letter that

there should be a second opening provided as soon as 15,000 square yards are excavated. They are abundantly able to sink another shaft, and must either do so or reduce the working force to ten men, if they desire to obey the law.

Kline mine is located about one and one-half miles south of Church Hill, and is ventilated by furnace. They are drawing pillars all over the mine, and will finish soon. This mine has a good furnace, and is very extensive It was opened as a slope.

The Garfield shaft is situate four miles north-east of Church Hill, and is well managed by Mr. Thomas Phillips, a good, practical miner, as bank boss. The coal a year ago was admirable in quality, but since then they have had quite a change—have struck horseback after horseback; all these entries have proven to be failures, until now, Mr. Phillips thinks he will strike a basin of coal in about seven yards, where there is a drill-hole with five feet of coal. This has been a model mine in all respects, and one of the best laid out mines in this valley—it is worked on the entry and windway system.

This mine has, to date, but one opening. Between coal and rock 15,000 square yards have been excavated. A second opening should be made or the force reduced to ten men.

No. 9 shaft of the Mahoning Coal Co. is in Trumbull county on the branch of the N.Y.&P.R.R., 1½ miles of Sodom, and is well managed by Mr. C. Herbert, mining boss, and R. J. Wick, Superintendent. It is well ventilated by furnace; employs about 240 men and boys in and around the mine. Coal is getting very thin, averaging about three feet four inches all over the mine. The mine is worked on the entry and windway system, and is in charge of a mining boss, who has ever faithfully endeavored to comply with the requirements of the mining law. The mine is owned and operated by the Mahoning Coal Company.

Tuscarawas Valley Mines.

The mining boss of Willow Bank, No. 5, in his monthly report for September, remarks: "Our men complain that the current of air is too much, and ask that breakthroughs be left open. Such being the case, we think there must be something wrong with our instrument, as we are aware the record does not show such a state of affairs." The monthly report of this mine records an average of 9,000 cubic feet of air per minute as flowing through all the entries of the mine, and a little more than 12,000 cubic feet entering the intake and discharging at the furnace, the number of persons employed in the mine being one hundred

and fifty. The anemometer is, however, not out of order. There is nothing unusual in men complaining of too much air when the breakthroughs are first made. The plan adopted at Steubenville under such circumstances is to keep the last two breakthroughs open for a few days until the miners again got ahead in the fast beyond the immediate sweep of the circulating current of air.

Windsor mine is located two miles northwest of Massillon, and is managed by Frank Pocock; mining boss, William Penman. It was worked on the double entry system, but is now holed through into the Sippo mine, and mining what is left of that mine. Ventilation good, and they have the use of the Sippo furnace since they passed through into the Sippo mine.

Navarre shaft mine is located on the T., V. & W. Railroad, one mile east of Navarre station, and is managed by Jos. Collier, mining boss. It is worked on the double entry system, and is ventilated by an exhaust steam shaft, 113 feet depth, by 8x16 feet, and by an air-shaft 100 feet in depth, by 6x6 feet, all in good order. Roof very poor, so far.

The Mountain mine is in the county of Stark, within one mile of Millport, and is managed by the mining boss known by the name of George Swiere; he is a young man, and has had but two years' experience. The mine is well ventilated by a large furnace; it has not had good air until this boss took hold of it, but ever since then there is no mine in this part of the State that is managed more successfully.

The Valley mine is a new mine, near North Industry. They are not ready to ship yet, but will be soon. Managed by Mr. J. F. Evans.

The Lawrence shaft is located near North Lawrence, and is managed by Messrs. Geo. Duval and Geo. Hand. This mine, which was inspected June 12, was badly managed as regards air. I went to each and every place that was working, and the air was very sluggish. I measured the current at the head of the entry, where the air passes from the works on the right-hand side of the entry to the left, and all I could get was 1,200 feet—there should have been no less then twelve thousand feet. I went through the air-course, and part of it is hardly large enough for a man to get through, and the full current is required to pass through there. The mining boss was not there at the time, and the Superintendent went through the mine with me. I informed him of the mismanagement. There is not one of the breakthroughs shut up between rooms. The only way to better it with little expense, would be, to sink a new air-shaft at the far end of the workings.

Greentown mine is located along the Canton Valley Railroad, about one-half mile south of Greentown Station. This mine was idle when I

visited it, and had been for some time, and don't know how soon it will start again. Richard Worliston is the mining boss.

The Valley mine is located three miles north of Canton, on the Valley Railroad, and is managed by J. F. Evens, Superintendent, and James McLinday, boss. This is one of the oldest mines in the State. It has been used for a peddling bank for more than fifty years, and was known as the Money Bank, being named after an old Frenchman. It is now owned by a new company, and they have made a shipping bank out of it. They ship about forty tons a day when they are at work. The miners were on a strike when it was visited.

Zerby mine is situate along the Valley Railroad, near North Industry, and is managed by William Hardgrove. It is a new mine, and was opened this summer. They have not got their side-track in yet, but soon will have it, and then they will run a good many men. Inspected August 12.

Fox Run mine is located along the Valley Railroad, one mile south of North Industry, and four miles south of Canton. It is a new mine, and has not been opened out yet, August 12. Intend to do a good business this fall and winter. It is managed by Ferd. Ruffty. They have an air-shaft completed, and everything in good order.

Willow Bank No. 5 was inspected in June, and was found none too well ventilated. An air-shaft was needed, and directions given to have it sunk. Since the date of inspection, the air-shaft has been completed, the air greatly improved, and a large force of miners, nearly 200 in number, are employed in the mine.

Fox Lake mine is located about 2½ miles west of Canal Fulton, and is managed by Evan Evans, Superintendent and mining boss. They have just completed five sets of stairs to walk out and in. This shaft being the lowest, it is a down-cast, and the other shaft is the up-cast, ventilated by exhaust steam; and, as they are only running one small pump, they have not force enough, and fall short of the quantity of air required, but there is no complaint. Mr. Evans informed me that they would put a fan at work as soon as they could. This mine is worked on double entry system, and the air goes direct to the miners in their rooms; roof good all but one entry.

Camp Creek mine is situated 6 miles south-west of Massillon, on the T. V. & Wheeling Railroad; and managed by Joe Collier, Superintendent and mining boss. It is worked on the double entry system. The air is well conducted to the working-places; ventilated by exhaust steam. This mine had been running four sets of double entries until a

few months ago, when they struck a horseback, and it is circling around and cutting off the coal.

The Pigeon Run mine was inspected June 20th, and found in very good condition as far as air is concerned. Mr. Roderick, the mine boss, and Mr. Klein traveled over all the workings of M. Morris, the former boss, which they found in bad shape. He had taken out the pillars of numbers 1, 3, and 4 butt entries, and left very po r pillars along the entries. This caused the roof to break and bring in the surface water, and left coal in the back part of the mine. Now it is a hard matter to keep the water out, and hard work to get what coal is in the far end of the mine. Mr. Roderick is doing the best that a man can do under the circumstances. This was originally one of the best laid out mines in the State.

Grove shaft is located about two miles southwest of Massillon, and is known as the Grove Mine; it is managed by Mr. David Naysmith, who has made a great many improvements in the air since he took charge, and is still improving it. It has been worked on the double entry system. They are taking out pillars on one side of the shaft.

Phillip Thomas, No. 1, has no furnace; has three or four openings, but in one part of the mine the air is very sluggish. Mr. Thomas stated that he was willing to put up a furnace at once, and be governed by the law. He said he would do as the law required, and was glad that there were laws to go by.

Phillip Thomas mine, No. 2, is located near Cuyahoga Falls, and is operated by Mr. Phillip Thomas. The inlet is good, but the air-shaft has fallen in, as also a great many of the rooms. This is an old mine, and will not last very long. They are drawing back a good part of the works.

Burnett Slope, Summit county, is located two miles northeast of Doylestown, and was started last fall. Length of slope, 197 feet; pitch, one foot to the yard. The entries are all double, with air-shaft and furnace all complete. Depth of air-shaft, 63 feet; 6x6 in width. Furnace, 12 feet long, 4 feet high, $3\frac{1}{2}$ wide. It is one of the best ventilated mines in the Tuscarawas Valley.

Dennison slope is located about one mile south of Dennison (Sherman P. O.) The slope was sunk last year, and is worked according to law. The entries are all double. The air is carried to the working-places. Ventilated by exhaust steam.

Silver Creek mine is located about one and one-half miles north-east of Doylestown; is ventilated by exhaust steam, and worked on the double entry system. Inspected June.

The Silver Creek drift will be finished up in about three weeks. They have a few pillars to draw at the north mouth of the drift, and that will wind up the workings.

Diamond slope was idle most of its time this summer. It is now owned by W. B. Colman, and managed by Jos. Gordon, mining boss, and is in better condition than it has been for the last year.

Summit slope is an old mine, and has not much more to do. They have driven up to a fault in five entries. Coal, four feet in thickness, but they have not any roof—nothing better than blue clay and sand, similar to Lake View. The air is very good, excepting one entry. This mine has five openings—three inlets and two outlets. One part of the mine is ventilated by exhaust steam, and the old part by furnace. It has been worked mostly on the double entry system.

New Chippewa mine is situate about two miles west of Clinton, and is well managed by Mr. Schmidt. It is ventilated by a furnace, five by five feet; air shaft 123 feet in depth, and a stack of sixteen feet—139 feet in all. All the works are run on the double entry system. The coal is all shipped to the Cleveland market. About 200 tons per day are mined.

The New York mine is located about one mile east of Middlebury. Ventilation natural. The surface is so shallow that rooms cave in. It is nearly impossible to keep a furnace running, for they make air-holes in a few hours any time. Coal very soft, and roof-clay very soft, and a great deal of water.

Small Mines of Perry County and the Muskingum Valley.

A large number of mines are operated in Perry and the Muskingum Valley on coal No. 6, the equivalent of the great vein. This magnificent seam, which at Shawnee and New Straitsville rises to 9 and 10 feet in height, dwarfs to 4, 3, and 2½ feet to the north and east. The mines work a small force of men, the majority of them less than ten, and none of them more than 20 to 30. Until the new law went into operation, they were relying on the natural forces for ventilation, the plan in practice for getting air consisting in driving through the hill. Where the seam is too low to admit of hauling with mules, the diggers do their own digging and hauling, many of them employing dogs to assist in pulling out the loaded cars.

In very few instances was there much attention given to ventilation. The air was generally bad. The only fresh air the workmen got was when they came outside with their loaded cars. But for this saving circumstance, they would soon have become cramped in limb and

prostrated in energy. In the month of September I directed Mr. Klein, Assistant Inspector of Mines, to visit all the points where more than 10 men were employed at once, to carefully inspect every mine as to the manner of working and ventilation, and direct that a compliance of the law be had The following report is compiled from the reports of Mr. Klein to me:

The Tunnel Hill drift is located on the C. & M. V. R'y, three miles east of New Lexington, and is well managed by M. Meanan, Superintendent and mining boss; it is worked on the block system, and has natural ventilation; they have worked through the hill, and will have another hole through in about eight days, and then will have a constant draft through the mine.

The Jones mine is located on the C. & M. V. R'y, at McLuney, in Perry county, Ohio, and is managed by Mr. William Lucas; it is worked on the block system. and has five openings, but the air was bad when the mine was inspected in September. The manager agreed to build a furnace and stack at once, and to close up all the openings but two, then they will have a draft all through these works. This coal is low, and the roof has to be taken down in the entries, so that they can use a mule in the main entry to haul their coal out. Roof good.

This mine, the Consolidated Drift, is located two and one-half miles northwest of new Lexington, on the C. & M. V. Railroad, and is managed by W. H. Hammond, Superintendent, and the inside of the mine by John Adams, boss. The mine is worked on single entry system, and had natural ventilation, which was not good. They have an air-shaft just about complete. Directions were given to build a furnace at the bottom of the shaft, and put a stack of about sixteen feet in height on the top, and to set several doors in the mine, then they would have plenty of air.

This mine (Block Hill) is located on the B. & O. Railroad, on the south side of the tunnel; is a new mine, and are just finishing a new air-shaft. This mine was started on the first of April. It is about one hundred yards to the face of the main entry, and one hundred and fifty feet to the face of the cross entry, where they have their air-shaft. I ordered them, in case they ran ten men or more, to build a furnace and put up a stack to improve their current of air.

This mine, No. 1, Tague's, is located on the C. & M. V. Railway, near the tunnel, and is idle at present, but the owners intend to start to work as soon as they can get sale for coal.

This mine, Tague's No. 2, is located near McLuny, and is owned by M. & P. Fagen & Co., but is idle at present.

Tague's, No. 3 mine is located on the C. & M. V. Railway, about a half mile west of Crooksville P. O., Perry county, Ohio, and is well managed by Mr. James Stewart, an old miner. He has made some good improvements since he has assumed charge. This mine has natural ventilation, and is worked on the block system.

This mine, Hiram Cowell, owner, is located on the east side of the city of Zanesville; is worked on the single entry system; is a shaft of sixty feet in depth, and is driven through the north side of the hill. Natural ventilation. Are only working six miners at present. Coal very low—only 2½ feet in thickness.

There are a large number of mines in Muskingum county, but, like those described, are generally small drift openings, sometimes working more, sometimes less than ten miners.

The Stelover mine is located on the east side of the city of Zanesville, and is ventilated by a small basket in the air-shaft, but it is not large enough to give the amount of air required by law. Mr. Stelover has agreed to put in a small furnace and close up all the breakthroughs on the left-hand side of the entry, which, I think, will make it all right. I only found 940 feet at the inlet, and could not get a turn at the face of the workings. All the coal is hauled out with dogs, and is used at the glass house. Twenty-seven miners and forty dogs work in this mine.

This mine, Wheeler's Drift, is located on the east side of the city of Zanesville, and had but seven miners at work when it was inspected. It is worked through the hill at five different points, which openings are all closed up but two to give the air a straight passage. Natural ventilation. Coal low—2½ feet in height. Coal is all sold to teams at the mines at six cents per bushel.

The Brilliant Drift is located on the B. & O. R. R. Branch, at McCuneville, Perry county, and is worked by J. E. Payne, Superintendent and mining boss. It is worked on the single entry system. Coal, 3½ feet high; air good.

Dixon's mine is located on the B. & O. R. R. Branch, and is owned by J. C. Hamilton, of Shawnee, and managed by John M. Forman, Superintendent, and Samuel Cottman, mining boss. This mine is driven through the hill, and has about as good air as can be expected by natural ventilation. The coal is of good quality, but very low, only three feet in height; the hills are very shallow. They work one of these hills out in a short time, and then they drive into another.

The O. K. mine is located on the Muskingum Valley R. R., near Maholm Postoffice, and is owned and managed by W. D. Clark; Wm.

Matthews, mining boss. The mine is driven through the hill. Natural ventilation. The mine is full of water at the present, and they cannot work many men on this account. Could not get through, for the water is up to the roof in the center of the mine.

The Black Diamond mine is located on the R. R. running from Newark to Shawnee, at Maholm, in Perry county, and is managed and owned by E. D. Simpson. It is an old mine, and had no air when he took hold of it, but he has things in about as good shape as any along that road. Mr. Simpson will strike an air-shaft in a few days. He will then put a furnace at the bottom and have things in order.

Forquer's mine is located on the B. & O. R. R., near Maholm Post-office, and is managed by J. D. Forquer. The inside manager is Wm. Emrick. This mine is driven through the hill, and is worked on the single entry system. The ventilation is very poor at this time of the year. I have ordered them to build a small furnace and a stack in their air-well, which will furnish sufficient air to keep a constant draft. Mr. Forquer agreed to do this at once.

Daugherty's mine is located along the B. & O. R. R., near Maholm, and is owned and managed by F. Daugherty. They have no mining boss. There is a strike, at present, at the mine, on account of the screen being too large for the size of the coal. They have natural ventilation, but I could not get a draft at any part of the mine. I have ordered Mr. Daugherty to build a furnace and have him work according to law.

Raney's mine is located on the Ohio river, on the P. & C. R. R.; is worked on the double entry system, and is in good condition; a good current of air traveling all through the mine. Ventilated by furnace; roads good; good roof.

Scott's mine is located on the B. & O. R. R., four miles east of Cambridge, in Guernsey county, Ohio; is worked on the room and pillar system; is ventilated by furnace and exhaust steam, and is well managed by John Scott, Superintendent, and James C. Wilson, mining boss. The air is well distributed, the mine is well drained, and has good roads.

Cambridge drift is situate on the B & O. R. R., about three miles east of Cambridge; is ventilated by furnace; is worked on the room and pillar system, and is well managed by E. J. Williams, and Marion Gildeon, mining boss. The air is good in all parts of the mine. They are now working in the second hill, and intend to put a small engine in the first hill to haul the coal instead of hauling it with mules, as they now do.

REPORT OF JOHN P. WILLIAMS.

CHURCH HILL, OHIO, *June* 1, 1882.

Hon. Andrew Roy, Inspector of Mines:

SIR: On the 25th of March I received two letters from Columbus—one from you, and one from Mr. Klein, Assistant Mine Inspector—requesting me to come immediately to Columbus, to act as Assistant Mine Inspector for a few weeks for Mr. Klein, until such time as he was able to perform duty again. I complied with said request, and started for Columbus on the 26th, and on the 27th started on duty. I now have the honor of submitting to you my report while on duty. My work ended on May 15, 1882.

MEIGS COUNTY.

I started for Pomeroy on the 28th of March, and the first mine I visited was the Pomeroy Coal Company's, called the Dabney mine. This mine is worked on the double entry system, and has been in operation for about 48 years, but, as I understood, had no artificial means of ventilation until 1881, but on my visit it was in very good order on the whole. They employ 82 miners and 22 day-men, and had 11,000 cubic feet of air in circulation, very well distributed, as far as the workings were shown me. The name of the mining boss is Isachar Jones.

On March 31st I visited another of the Pomeroy Coal Company's mines, called the Peacock. Mr. James Jones, the mining boss, was sick on my visit, but Mr. Thomas Middleton, the Superintendent, and the deputy boss showed me around the mine. This mine is worked on the double entry plan, but the air was very feeble in the faces of some of the entries, which could have been remedied by putting proper stoppings under the doors, and I recommended it done. This mine employed, on my visit, 95 miners and 25 day-men, and had 12,500 cubic feet of air in motion, and was well distributed, with few exceptions.

On April 1st I visited the Charter Oak mine, operated by S. W. Pomeroy, the mining boss being Thomas Hedley. This mine crosses through the first hill, in a northern direction, the main entry being 3,200 feet in length; the Buckeye mine crosses the above mine in this hill, to reach a piece of coal that laid on the eastern side of said main entry. S. W. Pomeroy got an injunction, restraining them from hauling their coal across said entry, but the matter was finally settled in court satisfactory to both parties. This mine strike; the second hill, called the Excelsior, it runs in a north-western direction for 2,600 feet, then it runs 3,000 feet in a southern line, when you come out to day light once more; their mine is kept in good order throughout.

April 3d, I visited the Syracuse slope, operated by W. E. Edwards; it employs about 45 miners and 9 day-men; there was about 6,500 feet of air in circulation, but

the majority of it turned up to the furnace before it went near the working-places; for instance, about 50 feet ahead of the door that turned up to the furnace, I found but a fraction over 3,000 feet, while I found at the furnace 6,500 feet. I went to investigate the cause, and found that there was room enough for a large quantity of air to pass under said door, and this is too much the case through nearly all of the drifts at Pomeroy. They have a fire-clay bottom to contend with, which makes large holes in the middle of the road as the horses travel, but it can easily be remedied with scantlings, etc. Mr. Henry Williams, the mining boss, informed me that he would see that this was applied immediately.

Syracuse shaft is operated by the Syracuse Coal Company, the name of the mining boss being Thomas Mainwaring. He is a very intelligent man, and keeps the mine in very good order. On April 2d, when I visited the mine, I found 16,000 feet of air in motion, and very equally divided. The mine is worked on the pannel system; they work about 75 per cent. of the coal as they extend forward, and I think they will be able to get about 10 or 15 per cent. of the balance. They have about 600 yards of double track along the main entry, and it is the intention of Mr. Mainwaring to extend it the coming summer, so that there will be no unnecessary interference between drivers. The mine employs about 80 miners and 30 daymen.

COLUMBIANA COUNTY.

April 11, 1882. The first mine I visited in this county was the new slope operated by the Ohio & Pennsylvania Coal Company, the name of the boss being James Black. On my visit, although the mine was a comparatively new one, I could not find sufficient ventilation to move the anemometer at or near the working faces —the air all turned back at the bottom of the slope to the up-cast shaft. The mine is worked on the double entry plan, and employed, on my visit, 22 men.

Empire Mine, April 11, 1882. I next visited this mine, and found it also in very bad condition; the anemometer would not move in any place in the mine, only at the inlet. They have a furnace at this mine, but no fire in it on my visit; and it was impossible to get at said furnace for water. The mine has been conducted on the single entry, but was just started up on the double entry system. The great trouble at this mine (the same as at many others) is, that there is not sufficient care taken to put up proper stoppings as soon as they are needed in the crosscuts, or spoutholes, as some term them. There was plenty of air at inlet, but it was not distributed for the above reason. They employed thirty-seven men on my visit.

April 11, 1882. I next visited the new shaft, operated by the Salineville Coal Company, and superintended by Mr. George Sharp, the name of mining boss being Ralph Woodward. This mine is worked partly on single entry and partly on double entry; it had plenty of air at inlet, but it returned back in under the doors to the up-cast before it went near the faces of the workings. Mr. Sharp informed me that he would see that things were remedied as soon as possible. They employed about seventy men on my visit.

Hussey Mine, April 12, 1882. This mine is operated by the Ohio and Pennsylvania Coal Company, and superintended by Mr. James Black. The mine is worked on the single entry, and it is a wonder to me how it is worked at all with any one;

the anemometer would not move in any place in the mine, and yet they employed thirty-eight men. They claimed to have three separate outlets; but all of them were closed up on my visit, and all the ventilation that was there was what the cars made by being hauled through the mine.

Hayes Mine, April 12, 1882. This is another of the Ohio & Pennsylvania Coal Company's mines, but it is in a little better shape than the previous ones visited. It was in very good order as far as it was shown me. It is worked on the single entry plan, and employs about forty men. They have very good roads in this mine, and also a very good furnace, capable of circulating 20,000 feet of air; and there should not be any complaints of bad air in the mine, if the airways are kept forward and proper stoppings put up. The name of Superintendent is James Black, and mining boss, James Watkins.

April 12, 1882. The Anderson mine is owned by Crannage & Anderson, Cleveland, Ohio, the mining boss being Gomer Lewis. The mine is worked on the single entry, being unable to work it on the double entry, owing to the coal dipping so much on one side. They employed about fifteen men, and the mine was ventilated well.

Farmer's Mine, April 12, 1882. This mine is operated by the Manufacturers' Coal Co., Cleveland, Ohio, and superintended by Mr. J. M. Smith. This is the best ventilated mine in the Salineville district; it is a drift opening, and runs in a south-western direction for 3,337 feet, nearly on a bee-line. They then strike an air-shaft that was sunk a few months since, 162 feet deep. There is an elevation of sixty feet from mouth of drift to where it strikes the said air-shaft; they have no furnace, but they had plenty of air without one. They employed thirty-five men on my visit, and had 11,500 cubic feet of air in circulation.

Anderson Mine, No. 2, April 13, 1882. This is a new opening, and owned by Crannage & Anderson, Cleveland, Ohio, and bossed by Gomer Lewis. They employed twenty-five men on my visit; the ventilation was very bad, but they were driving an entry towards Anderson mine, No. 1, to serve as an outlet. They were within forty feet of being through on my visit.

Hayesville Mine, April 13, 1882. This mine is owned by the Raney Coal Co., Cleveland, O., and superintended by Mr. John Hyers The mine was well ventilated, with exception of one entry, and that was stopped at present until the airway was up to the face of it. This mine has experienced a great trouble lately, owing to the farmer that owned the land where their air opens, stopping said outlet up, but they have overcome said trouble by sinking a new one, and consequently there is no complaints of bad air, and no cause for it. They employ about twenty-five men.

Old Shaft Mine, April 13, 1882. This mine is owned and operated by the Ohio & Pennsylvania Coal Co., Cleveland, Ohio, name of mining boss being H. E. Yingste. This mine generates fire-damp in two entries, and the miners had to use safety lamps to work with. The mine is conducted part on single and part on double entry, and employed about forty-five men. They had only 2,800 feet of air in circulation on my visit, and it was impossible to make it any better with the present means of ventilating; they had a small exhaust pump in their up-cast, which was not kept running half the time, owing to not having enough of water. Unless they get some other means of ventilating soon, the men are bound to suffer greatly.

Foster Mine. This mine is operated by the Columbiana Coal Co., the name of Superintendent being Jesse Thornton, and mining boss, Daniel Tolsom. There was a great deal of complaint about this mine not being ventilated, and not without cause. On the 13th of April, 1882, when I visited the mine, the anemometer would not move in any place only the main entry; there it would register 200 feet per minute, with an area of thirty feet, but the air was not circulated through the workings. The mine is worked on the single entry plan. They don't pay any attention to the mode of carrying the air onto the faces of entries. They employ about forty miners and five daymen.

Osborn Mine, Nos. 1 and 2, April 14, 1882. These mines are operated by the Osborn Coal Co., name of Superintendent being Wallace Osborn, and mining boss, John Smith. In both of these mines they employ about seventy miners and five daymen. The mines were well ventilated on my visit, and I was informed by one of the miners that they are generally kept that way. I believe it is the intention of both owners and managers of these mines to comply with the law in all respects.

TRUMBULL COUNTY.

Blaine Shaft, April 16, 1882. I visited the Blaine shaft and found it very well ventilated, although under a great disadvantage to do so, owing to so many horse-backs to contend with. The mine is owned and operated by Morris, Sampson & Co., the Superintendent being David Morris, and mining boss, Thomas E. Thomas. They employ fifty-five miners and five daymen.

JACKSON COUNTY.

Emma Mine, Coalton, Ohio, April 24, 1882. This mine is owned and operated by the Emma Coal Co., of Jackson, Ohio, the Superintendent being Moses Jones, and mining boss, Thomas Douglas. The mine was in fair order on my visit, but could not measure the air, owing to the anemometer being broken. They employed twenty-three miners and six daymen.

Darling Mine, Coalton, Ohio. This mine is owned and operated by Pimlot & Hall, John F. Hall being Superintendent, and Daniel Griffiths, mining boss. The mine was worked on the single entry plan, and was in very bad condition. They have a good furnace, but no fire in it on my visit. They employ fifty-two miners and nine daymen.

Garfield Mine, Coalton, Ohio, April 24, 1882. This mine is owned and operated by Rittenhouse Coal Co., Mr. Rittenhouse being Superintendent, and W. H. Gilfman, mining boss. The mine was in good order. They employ twenty miners and four daymen. The mine is worked on single entry.

Thorn Hill Mine, Wellston, Jackson county, April 25. This mine is operated and owned by Thorn Hill Coal Co., the mining boss being Thomas Duffy. The mine is worked on double entry, and was in good condition. They employed twenty miners and three daymen. This is a new mine, and was not fairly opened out yet.

Comet Mine, Wellston, Ohio, April 25, 1882. This mine is operated by the Comet Coal Company, the Superintendent being Adam Scott; mining boss, James Palmer. They employed 25 miners and 3 daymen, and the inside workings were in very good order. No safety-catches, nor gates on top of shaft, but were about to apply them.

New Straitsville, Perry, county—Old Mine Branch, April 26, 1882. This mine is a branch of the old mine to reach a piece of coal that cannot be got from the old mine. It is owned by Martin, Ewing & Co., but Mr. John Roberts had a contract on it on my visit. Mr. Roberts managed it himself. He employed 32 miners and 2 daymen. The ventilation was very feeble on my visit; they had no furnace, but promised to comply with the law as quickly as possible.

PERRY COUNTY.

Old Mine, Straitsville, Perry county, April 26, 1882. This mine is operated by the Straitsville Mining Company, the Superintendent being Ed. Martin, and mining boss, Almer Simons. This mine was in very good condition. They have a locomotive hauling the coal out of the mine, consequently they have to keep good ventilation. The mine was not working on the evening of my visit, and the furnace was left out, but I found 14,500 feet of air per minute at outlet, and the miners informed me there was no necessity for better ventilation than they had. They employed on my visit 65 miners and 4 daymen.

Troy Mine, New Straitsville, April 27, 1882. This mine is owned and operated by the Thomas Coal Company, Columbus, Ohio, and superintended by Charles Gibbert; the mining boss being Owen Charles. They employ 130 miners and 16 daymen. There was a general complaint of bad air among the miners, and not without cause; they had a good furnace, but had no fire in it, and the stack of said furnace had been blown down a few days previous to my visit. The mine is worked on the double entry system mostly, and it is nothing but carelessness that the ventilation is so bad. I talked with Mr. Gibbert about it, and he informed me that he would see that everything would be fixed as soon as possible so that there would be no complaints.

Troy, New Mine, April 27, 1882. This mine is operated and managed by the same parties, and it is in a very bad condition. They have nothing but natural ventilation, and a very small quantity of that. The anemometer would not move in any place in the mine, and yet they employ 100 miners and 8 daymen.

Consolidated Mine, New Straitsville, Perry county, April 27, 1882. This mine is operated by the Consolidated Company, of Straitsville, Ohio, their Superintendent being George Brashears; and mining boss, Peter Galagher. This mine is far behind the requirements of the law, and there is great suffering for want of sufficient ventilation. They have a furnace, but it is in the wrong place, and I recommended an air-shaft put down in the face of their main entry (that being abandoned), and the air split so that it would run up each side of their workings. They employ 100 miners and 19 daymen.

Central Mine, New Straitsville, April 28, 1882. This mine is operated by the Straitsville Coal Company, Straitsville, and superintended by Josiah Wells. The mine is worked on the double entry plan, and is kept in good order throughout. They employ 65 miners and two Lechner machines, which have proved a success. On my visit there were 22,000 feet of air per minute in circulation, and the men are well satisfied with the way the mine is ventilated.

Chicago Mine, New Straitsville, April 28, 1882. This mine is operated by W. P. Rend, and superintended by Thomas Wetherburn. This mine is worked on the

double entry plan, and employ 55 miners and 9 daymen. There was 17,000 feet of air in motion on the morning of my visit, and the miners informed me that they never worked in better air.

Tucker's Mine, New Straitsville, April 28, 1882. This mine is operated by Mr. William Job & Co., Straitsville, Ohio, and superintended by Mr. Job, the mining boss being George Snape. There being no work on the evening of my visit, I did not go only about 50 yards in the mouth of their drift, which serves as their inlet, and the anemometer would not move there, and I thought it folly to go any further. I was informed by the miners and boss that their main entry was within 30 feet of being through the hill, where they had another opening commenced. I was invited by the boss to visit the mine in about three weeks, when, they think, they will have the mine in good shape as regards ventilation.

Upson Mine, Shawnee, Ohio, May 1, 1882. This mine is operated by the Upson Coal Company, the name of Superintendent being Mr. Walter Upson; mining boss being Rees Williams. The mine is worked on the double entry plan, and the old part of the mine was ventilated very good, but the air was very feeble in the new part of the mine. The furnace that they have is too small to ventilate the whole mine, and they have commenced to build a new furnace in the new part of the mine, which will serve for both parts of the mine. They employ about 100 miners and 13 daymen.

XX Mine, Shawnee, Ohio, May 1, 1882. This mine is operated by the Newark Coal and Iron Company, the name of Superintendent being R. H. Dutton, and mining boss, John Baily. This mine was in very bad condition throughout; the anemometer would not move at or near the faces of the entries. They have an air-shaft but no furnace. They employ 70 miners and 7 daymen.

Shawnee Valley Mine, May 2, 1882. This mine is operated by the Shawnee Valley Coal Co., the Superintendent being Thomas Phillips, and mining boss, Lewis Jones. The mine is conducted on the double entry, and is one of the best ventilated mines in the Valley. They have a stationary engine at the mouth of this mine, which hauls the coal out of the mine by means of an endless rope, over 1000 yards. There is over thirty feet of a dip from the mouth of the drift to where it extends furtherst, which would make it very difficult to haul the coal out with horses or mules. Mr. Phillips deserves credit for the way he manages his mine, and other mine bosses would do well to adopt his method. They employ 160 miners and 25 others, and had nearly 28,000 feet of air per minute in circulation.

Pleasant Valley Mine, May 3, 1882. This mine is owned by the New York Coal Company, and superintended by Samuel Butts; the mining boss being William Wallace. I don't believe there is a man in the country that can say on what system this mine is worked; it is in all shapes and forms. I tried the anemometer, but could not take any measurement, the air being baffled so, owing to so many inlets and outlets. They employ thirty miners and two daymen.

Twin Sisters, Shawnee, May 3, 1882. This is another of the New York Coal Co.'s mines, and is managed by the same parties, but it is in a little better condition. They were working on the single entry plan, but have just started on the double entry and the ventilation was very good, with exception of one entry, and they were driving an air-course to ventilate that one, which would be through in course of a

week or nine days. They have a good furnace, lately constructed, since Mr. Klein's visit. This mine employs seventy-eight miners and seven daymen.

Hickory Wiff, Shawnee Ohio, May 4, 1882. This is another opening of the New York Coal Co.'s, and a regular mud hole; they employ about twenty-one men, and the ventilation was very bad. I ordered the Superintendent and boss to stop one of the entries until the air was up; it being almost impossible to keep light to see anything.

Furnace Mine, Shawnee, May 4, 1882. This is another of the New York Coal Co.'s mines; it was ventilated pretty good, but I could not get at an accurate measurement, owing to there being so many inlets and outlets. They are drawing the pillars of this mine, and in a few months it will be abandoned. They employed forty-one miners and two daymen on my visit.

Furnace Mine, Shawnee, May 4, 1882. This mine is owned and operated by the Licking Iron Co. Name of Superintendent, J. H. Hopperman; mining boss, William Richards. This mine was in very good condition on the whole; it is a drift opening, which serves as an inlet for the Shawnee Valley. This mine has a very bad roof, composed of soapstone. They employ thirty-five miners and five daymen, and work on the double entry.

COSHOCTON COUNTY.

Union Coal Mining Co., May 8, 1882. This mine is operated by this company, the Superintendent being L. W. Robinson; and mining boss, George Snyder. The mine was ventilated pretty good, but was in a bad condition otherwise. They have a fault in this mine, that runs in a northeastern direction across the mine. About 150 yards before you strike said fault, the roof, which is composed of soapstone, gets full of slants and slips, which makes it very dangerous. There was a man met with a very serious accident on the 2nd inst., by neglecting to prop said roof in time after being duly notified to do so. They have also a swamp in this mine, which dips twenty-five feet, and runs in the same direction as the fault. The coal on the north side of the mine is nearly all under water. They are cutting a ditch, thirteen feet deep, through from the other side of the hill to drain said coal. They employed twenty-five miners and six daymen on my visit.

ATHENS COUNTY.

Rock Mine, May 11, 1882. This mine is a drift opening, owned by W. A. Shoemaker, Columbus, Ohio, the mining boss being Robert Evans. The mine was in very bad condition, the second east entry being 170 feet ahead of the air; also, the main rock entry the same. I ordered both to be stopped. The mine is kept very filthy—nothing but mud and water to be seen along the roads. It is a wonder how they get coal out at all. The roof is composed chiefly of sandrock; but the soapstone makes its appearance once in a while. They had a furnace, but it was almost an impossibility to get at it for water. They employed thirty miners and three daymen.

Cave Mine, May 11, 1882. This mine is a drift opening, about 350 yards from the said Rock Mine; it is operated and managed by the same parties. The roof

this mine is composed chiefly of soapstone, with the sandrock making its appearance once in a while. In regard to ventilation, it was one of the worst I visited; the anemometer would not move anywhere. The mine is worked by the single entries, 100 yards apart, and they have to wait until the rooms from No. 1 entry are driven through to No. 2 entry before they get any air at all. They employ twenty-one miners and three daymen, and it is a wonder how they work there at all.

Half-Moon Mine, May 12, 1882. This mine, which is owned and operated by the Akron Coal and Iron Co., and superintended by Wm. Black and son, is one of the best arranged mines in the State; it is conducted on the double entry system, with double rooms, and two roads on each rib-side. The rooms are thirty feet wide. The ventilation was so good in this mine that they had to leave the doors that turned the air up the entries open, when the workmen were breaking rooms off, because of its being too cold. They have a furnace, double arched, four and one-half feet high above bars, and eight feet wide, with a vacuum of eighteen inches between arches. They have also rectangular air-passages on each side, the whole construction being mechanical and substantial in its character.

I did not make any report of Arbiston nor Longstreth's, as you were along, and can do it better yourself.

Respectfully submitted.

JOHN P. WILLIAMS,
Act'g Ass't Inspector of Mines.

FINANCIAL STATEMENT

Of Traveling and Contingent Expenses, from October 1, 1880, to November 15, 1882.

Date.	On what account expended.	Amount.
March 14	Postage (L. D. Myers, P.M.)	$20 00
23	Ice (Allen and Riddle)	5 30
22	Janitor (H. S. Falor)	28 50
23	Traveling expenses (J. J. Klein)	46 50
23	Janitor (H. S. Falor)	6 20
April 6	Traveling and contingent expenses, deficiency appropriation (Andrew Roy)	293 69
5	Janitor (H. S. Falor)	5 60
May 3	Postage (L. D. Myers, P.M.)	20 00
3	" "	4 02
3	Traveling expenses (Andrew Roy)	39 50
26	Janitor (H. S. Falor)	5 60
June 6	Traveling expenses (J. J. Klein)	124 10
15	Janitor (H. S. Falor)	5 60
15	Traveling expenses (Andrew Roy)	113 17
28	Postage (L. D. Myers, P.M.)	15 00
July 12	Traveling expenses (J. J. Klein)	99 39
12	" (Andrew Roy)	34 25
14	Janitor (H. S. Falor)	5 60
Aug. 9	Traveling expenses (Andrew Roy)	44 65
31	" (J. J. Klein)	77 91
31	Janitor (H. S. Falor)	5 60
Sept. 8	Postage (L. D. Myers, P.M.)	20 00
15	Janitor (H. S. Falor)	5 60
26	Traveling expenses (Andrew Roy)	39 00
Oct. 13	" "	52 50
13	" (J. J. Klein)	82 10
26	Janitor (H. S. Falor)	5 60
Nov. 13	Traveling expenses (Andrew Roy)	31 25
	Total	$1,226 38

LAWS RELATING TO MINES AND MINING.

INSPECTOR OF MINES.

(As revised and amended.)

SECTION 290. The inspector of mines shall be appointed by the governor, by and with the advice and consent of the senate, and shall hold his office for four years; and no person shall be appointed unless he is possessed of a competent knowledge of chemistry, geology, and mineralogy, and has a practical knowledge of mining engineering, and of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp.

SEC. 291. Before entering upon the discharge of the duties of the office, the inspector shall give bond to the state in the sum of five thousand dollars, with sureties, to be approved by the governor, conditioned for the faithful performance of his duties; the bond, with his oath of office, and approval of the governor indorsed thereon, shall be forthwith deposited with the secretary of state.

SEC. 292. The inspector shall give his whole time and attention to the duties of his office, and shall examine all the mines in the state as often as his other duties will permit, to see that the provisions of this chapter are obeyed; and the inspector may enter, inspect, and examine any mine in the state, and the works and machinery belonging thereto, at all reasonable times, by night or by day, but so as not to unnecessarily obstruct or impede the working of the mine, and to make inquiry into the state and condition of the mine, as to ventilation and general security; and the owner and agent of such mine are hereby required to furnish the means necessary for such entry and inspection, of which inspection the inspector shall make a record, noting the time and all the material circumstances; and the person having charge of any mine, whenever loss of life occurs by accident connected with the working of such mine, or by explosion, shall give notice forthwith, by mail or otherwise, to the inspector of mines, and to the coroner of the county in which such mine is situated, who shall hold an inquest upon the body of the person or persons whose death has been caused, and inquire carefully into the cause thereof, and shall return a copy of the finding and all the testimony to the inspector.

SEC. 293. The inspector, while in office, shall not act as an agent, or as a manager, or mining engineer, or be interested in operating any mine; and he shall annually make report to the governor of his proceedings and the condition and operation of the mines of the state, enumerating all accidents in or about the same, and giving all such other information as he thinks useful and proper, and making such suggestions as he deems important as to further legislation on the subject of mining.

SEC. 294. The inspector shall have an office in the state house, in which shall be carefully kept the maps and plans of all mines in the state, and all records and

correspondence, papers, and apparatus, and property pertaining to his duties, belonging to the state, and which shall be handed over to his successor in office.

SEC. 295. There shall be provided for the inspector all instruments and chemical tests necessary for the discharge of his duties under this chapter, which shall be paid for on the certificate of the inspector, and which shall belong to the state.

SEC. 296. The owner or agent of every coal mine, shall make, or cause to be made, an accurate map or plan of the working of such mine, on a scale of not less than one hundred feet to the inch, showing the area mined or excavated, and the location and connection with such excavation of the mine of the lines of all adjoining lands, and the name or names of each owner or owners, so far as known, marked on each tract, a true copy of which map the owner or agent shall deposit with the inspector, and another copy of which shall be kept at the office of such mine; and the owner or agent shall, every four months thereafter, file with the inspector a statement and plan of the workings of such mine up to that date, which statement and plan shall be so prepared as to enable the inspector to mark the same on the original map or plan herein required to be made; and in case of refusal on the part of the owner or agent to make and file the map or plan, or the addition thereto, the inspector is authorized to cause an accurate map or plan of the whole of said mine to be made, at the expense of the owner thereof, the cost of which shall be recoverable against the owner, in the name of the person or persons making the map or plan, which shall be made in duplicate, one copy being delivered to the inspector and the other left in the office of the mine; and he shall, on being paid the proper cost thereof, on demand of any person interested in the working of such mine, or owner of adjoining lands, furnish an accurate copy of any map or plan of the working of such mine.

SEC. 297. It is unlawful for the owner or agent of any coal mine worked by a shaft, wherein over fifteen thousand square yards have been excavated, to employ or permit any person to work therein, unless there are, to every seam of coal worked in each mine, at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available to the persons employed in the mine; but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until fifteen thousand yards have been excavated in such mine; and to all other coal mines, whether slopes or drifts, two such openings or outlets must be provided within twelve months after fifteen thousand yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for agent or owner of such mine to permit more than ten persons to work therein at any one time. In case a coal mine has but one shaft, slope or drift, for the ingress or egress of the men working therein, and the owner thereof does not own suitable surface-ground for another opening, he may select and appropriate any adjoining land for that purpose and for approach thereto, and shall be governed in his proceeding in appropriating such land by the provisions of law in force providing for the appropriation of private property by corporations, and such appropriations may be made, whether he is a corporator or not; but no land shall be appropriated under the provisions of this chapter until the court is satisfied that suitable premises can not be obtained by contract upon reasonable terms.

SEC. 298. The owner or agent of every coal mine, whether shaft, slope, or drift, shall provide and maintain for every such mine, an amount of ventilation of not less than 100 cubic feet, per minute, per person employed in such mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless, and expel the poisonous and noxious gases from each and every working-place in the mine, and no working-place shall be driven more than 120 feet in advance of a breakthrough, or air-way; and all breakthroughs, or air-ways, except those last made near the working-faces of the mine, shall be closed up and made air-tight, by brattice, trap-doors, or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the mine, where the persons employed in such mine are at work, and all mines governed by the statute shall be provided with artificial means of producing ventilation, such as forcing, or suction fans, exhaust steam, furnaces, or other contrivances, of such capacity and power, as to produce and maintain an abundant supply of air, and all mines generating fire-damp shall be kept free from standing gas, and every working-place shall be carefully examined, every morning, with a safety-lamp, by a competent person, or persons, before any of the workmen are allowed to enter the mine.

SEC. 299. The owner or agent of every coal mine operated by shaft, in all cases where human voice can not be distintly heard, shall, forthwith, provide and maintain a metal tube from the top to the bottom of such shaft, suitably calculated for the free passage of sound therein, so that conversations may be held between persons at the bottom and top of the shaft; and there shall also be provided an approved safety-catch, and a sufficient cover overhead, on all carriages used for lowering and hoisting persons, and in the top of every shaft an improved safety-gate, and an adequate brake shall be attached to every drum or machine used for lowering or raising persons in all shafts or slopes.

SEC. 300. No owner or agent of any coal mine operated by a shaft or slope shall place in charge of any engine used for lowering into or hoisting out of such mine persons employed therein, any but experienced, competent, and sober engineers; and no engineer in charge of such engine shall allow any person, except such as may be deputed for that purpose, by the owner or agent, to interfere with it or any part of the machinery, and no person shall interfere or in any way intimidate the engineer in the discharge of his duties; and in no case shall more than ten men ride on any cage or car at one time, and no person shall ride upon a loaded cage or car in any shaft or slope.

SEC. 301. All safety-lamps used for examining coal mines, or which are used in any coal mine, shall be the property of the owner of the mine, and shall be under the charge of the agent thereof, and in all mines, whether they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine, shall be so hung and adjusted that they will shut of their own accord and can not stand open and the mining boss shall keep a careful watch over the ventilating apparatus and the airways, and he shall measure the ventilation at least once a week, at the inlet and outiet, and also at or near the face of all the entries, and the measurements of air so made shall be noted on blanks, furnished by the mine inspector; and on the first day of each month, the mining boss of each mine shall sign one of such blanks, properly filled, with the said actual measurements and forward the same to the mine inspector.

SEC. 302. No boy under twelve years of age shall be allowed to work in any mine, nor any minor between the ages of twelve and sixteen years, unless he can read and write, and in all cases of minors applying for work, the agent of such mine shall see that the provisions of this section are not violated.

SEC. 303. In case any coal mine does not, in appliances for the safety of the persons working therein, conform to the provisions of this chapter, or the owner or agent disregards the requirements of this chapter, any court of competent jurisdiction may, on application of the inspector, by civil action in the name of the state, enjoin or restrain the owner or agent from working or operating such mine, with more than ten miners at once, until it is made to conform to the provisions of this chapter; and such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 304. When written charges of gross neglect of duty or malfeasance in office against any inspector is made and filed with the governor, signed by not less than fifteen coal miners, or one or more operators of mines, together with a bond in the sum of five hundred dollars, payable to the state, and signed by two or more responsible free-holders, and conditioned for the payment of all costs and expenses arising from the investigation of such charges, the governor shall convene a board of examiners, to consist of two practical coal miners, one chemist, one mining engineer, and one operator, at such time and place as he deems best, giving ten days' notice to the inspector or against whom the charges are made, and also to the person whose name appears first in the charges, and the board, when so convened, and having been first duly sworn, truly to try and decide the charges made, shall summon any witnesses so desired by either party, and examine them on oath, which may be administered by any member of the board, and depositions may be read on such examination, as in other cases; and the board shall examine fully into the truth of such charges, and report the result of their investigation to the governor; and the board shall award the costs and expenses of such investigation against the inspector or the persons signing the bond according to their finding, against said inspector or in his favor, which costs and expenses shall include the compensation of such board, of five dollars per day for each member, for the time occupied in the trial, and in traveling from and to their homes; and the attorney-general shall forthwith proceed to collect such costs and expenses, and pay the same into the state treasury, being in the first instance paid out of the state treasury, on the certificate of the president of such board.

SEC. 305. In all coal mines in the state, the miners employed and working therein, the owners of the land or other persons interested in the rental or royalty of any such mine, shall at all proper times have full right of access and examination of all scales, machinery or apparatus used in or about such mine to determine the quantity of coal mined, for the purpose of testing the accuracy and correctness of all such scales, machinery or apparatus; and such miners, landowners, or other persons may designate or appoint a competent person to act for them, who shall at all proper times have full right of access and examination of such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person on behalf of the miners collectively, or one person on behalf of the landowners or other persons interested in the rental or roy-

alty jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such persons shall make no unnecessary interference with the use of such scales, machinery or apparatus; and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to inspect, not oftener than once in every month, the mine and the machinery connected therewith, and to measure the ventilating current, and if the owner, agent, or manager so desires, he may accompany said committee by himself or two or more persons which he may appoint for that purpose; the owner, agent or manager shall afford every necessary facility for making such inspection and measurement, but the committee shall not in any way interrupt or impede the work going on the mine at the time of such inspection and measurement, and said committee shall, within ten days after such inspection and measurement, make a correct report thereof to the inspector of mines, on blanks to be furnished by said inspector for that purpose; and if such committee make to the inspector a false or untrue report of the mines, such act shall constitute a violation of this section.

SEC. 306. The provisions of this chapter shall not apply to or affect any coal mine in which not more than ten men are employed at the same time; but on the application of the proprietor of or miners in any such mine, the inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this chapter that he deems necessary for the safety of the health and lives of miners.

SEC. 306 (*a*). The inspector of mines may, with the approval of the governor, appoint an assistant, who shall be a practical miner of not less than five years' experience, and who shall perform such duties as may be required by the inspector, and receive a salary at the rate of twelve hundred dollars ($1.200) per annum, and the inspector may, with the consent of the governor, remove such assistant at pleasure and appoint a successor, and may allow the assistant traveling expenses out of his contingent fund.

SEC. 6871. Whoever knowingly violates any of the provisions of sections two hundred and ninety-eight, two hundred and ninety-nine, three hundred, three hundred and one, three hundred and two, and three hundred and five, of the revised statutes, or does any act whereby the lives or health of the persons or the security of any mine and machinery are endangered, or any miner or other person employed in any mine governed by the statute, who intentionally and willfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of a mine in relation to the security of the mine in the part thereof where he is at work, and for fifteen feet back from the face of his working place, shall be fined not more than fifty dollars or imprisoned in the county jail not more than thirty days, or both.

MINES.

SEC. 4374. A person owning land adjoining a mine worked for the production of coal, ore, or other mineral substance, or a person having an interest in such mine, having reason to believe that the protection of his interest in the mine, or in like minerals on his adjoining land requires it, upon making affidavit to that effect before a justice of the peace or other proper officer, may enter such mine, and have an examination or survey made thereof; but such examination or survey shall not be

made until one day's notice thereof is given to the parties in interest, nor at unreasonable times, but in such time and in such manner as will least interfere with the workings of the mine, if the same is being operated at the time.

SEC. 4375. When the affidavit has been made and notice given, the person in charge of such mine shall, on the application of the party giving the notice, transport by the ordinary method in use at such mine for entrance and exit, a surveying party of not more than five persons, furnish to such party a competent guide and supply them with approved safety-lamps; and for every person so transported, he shall be entitled to receive, from the person requesting such survey, the sum of fifty cents, unless the shaft exceeds two hundred and fifty feet in depth, when he shall be entitled to the sum of one dollar for each person, and five dollars per day for the guide.

SEC. 4376. If the parties working or occupying such mine sustain any damage, for which compensation should be made by reason of such examination or survey having been made at unreasonable times, or in an improper or unwarrantable manner, the person making the same or causing the same to be made, shall be liable therefor.

SEC. 4377. The parties working or occupying such mine shall not hinder or obstruct the examination or survey, when made at a reasonable time and in a reasonable manner, under a penalty of not less than fifty nor not more than five hundred dollars for each offense, to be recovered before a court of competent jurisdiction.

SEC. 4378. The party who makes the application for the survey, may, upon refusal of the owner or person in charge of the mine to comply with the foregoing provisions, recover judgment, as upon default, in a court of competent jurisdiction, against the owner of such mine, in such sum as such party may declare, under oath, he believes to be justly due him for coal or other mineral belonging to him, taken by the owner of such mine without his permission; and the statute of limitations shall not be operative as against such claim; but the demand and refusal to enter such mine, shall be first proven to the satisfaction of the court or jury, and the refusal of the person in charge of the mine, shall be held to be the refusal of the owner.

SEC. 4379. The provisions of this chapter shall be available to any person who, on his oath, states that he is the owner or authorized agent of any owner of land which he believes contains coal, or other valuable mineral substance, within one mile of such shaft, although it do not adjoin any mine of the owner of such shaft; the affidavit required shall be sufficient if it state that the lands in which the affiant is interested are in the vicinity of such shaft, and not more than one mile distant therefrom; and service upon any owner or superintendent of such shaft shall be sufficient.

OFFENSES AGAINST PROPERTY.

SEC. 6881. Whoever, in mining for coal or other minerals, willfully and without lawful authority, trespasses upon the lands of another, shall be fined not more than one hundred nor less than five dollars, or imprisoned not more than ten days, or both; and any continuation of such trespass, for twenty-four hours after the commencement of any prosecution under this section, shall be deemed a separate offense, and all prosecutions hereunder shall be commenced within one year from the time the offense becomes known to any owner of the property injured.

OFFENSES AGAINST PUBLIC HEALTH.

SEC. 6925. Whoever intentionally throws or deposits, or permits to be thrown or deposited, any coal dirt, coal slack, coal screenings, or coal refuse from coal mines, or any refuse or filth from any coal-oil refinery or gas works, or any whey or filthy drainage from a cheese factory, upon or into any of the rivers, lakes, ponds, or streams of this state, or upon or into any place from which the same will wash into any such river, lake, pond or stream, shall be fined in any sum not more than two hundred or less than fifty dollars.

FRAUD.

SEC. 7070. Whoever sells and delivers any stone-coal, except at the weights and measures prescribed by law, shall be fined not more than fifty nor less than five dollars, or imprisoned not more than thirty nor less than five days.

WEIGHTS AND MEASURES.

SEC. 4443. A bushel of the respective articles hereafter mentioned shall mean the amount of weight, avoirdupois, in this section specified, viz:

Of coke, forty pounds.

Of bituminous coal, eighty pounds.

Of cannel coal, seventy pounds.

SEC. 4444. The standard bushel of stone-coal, coke and unslacked lime, shall contain twenty-six hundred and eighty-eight cubic inches; and the lawful measure for measuring such articles shall contain two bushels, and be of the following interior dimensions: Twenty-four inches diameter at the top, twenty inches at the bottom, and fourteen and one-tenth inches deep.

SEC. 4445. When facilities can be had, all sales of coal shall be by weight, and two thousand pounds, avoirdupois, shall constitute a ton thereof; but, where coal cannot be weighed, it may be sold by measurement.

SEC. 4446. Whoever sells stone-coal in violation of the provisions of this chapter shall be liable to the person to whom the coal is sold and delivered in treble damages, to be collected in a civil action before any court of competent jurisdiction; if the defendant in such action does not reside in the county where the mine is located, service may be had upon him by copy of the summons left at his place of business; and any judgment recovered in such case shall be a lien upon all property of the defendant, in the county, from the day of service; but this section shall not apply to any person or corporation mining or selling less than fifteen thousand bushels of coal annually.

SCHOOL OF MINES.

SEC. 8435. That the trustees of the Ohio agricultural and mechanical college be and they are hereby required to establish in said college, a school of mines and mine engineering, in which shall be provided the means for studying scientifically and experimentally the survey, opening, ventilation, care and working of mines, and said school shall be provided with complete mining laboratories for the analysis of ores, coals and other minerals with all the necessary apparatus for testing the various ores

and coals, and also with the models of the most improved machinery for ventilating and operating all the various kinds of mines with safety to the lives and health of those engaged.

(8436) SEC. 2. Said trustees may require one of the professors now authorized to be employed in said institution, to give instruction in the most improved and successful methods of opening, and operating, and surveying, and inspecting mines, and in the methods of testing and analyzing coals and other minerals, especially those found in the state of Ohio. It shall also be the duty of such professor to register all experiments made in testing the properties of coals and other minerals, and such results shall be published in the annual reports of said trustees. It shall also be the duty of said professor to preserve in a cabinet, suitably arranged for ready reference and examination, suitably connected with this school of mines, samples of the specimens from the various mines of the state, which may be sent for analysis, with the names of the mines and their localities in the counties from which they were sent, and the analysis and a statement of the properties attached. It shall also be his duty to furnish analysis of all minerals found in the state, and sent to him for that purpose by residents of this state.

(8437) SEC. 3. There is hereby appropriated out of the general revenue fund the sum of four thousand five hundred dollars, to be expended in providing apparatus, equipments, cabinets, etc., as mentioned in the first and second sections of this act.

SEC. 4. This act to take effect and be in force from and after its passage.

LIST OF MINES.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Athens County.			
Lick Run, No. 1	Drift	W. B. Shoemaker & Co	Columbus.
Lick Run, No. 2	"	" "	"
Laurel Hill	"	Laurel Hill Coal Co	"
Johnson's	"	Johnson Bros. & Patterson	Nelsonville.
Section 29	"	W. B. Brooks & Son	"
Mining Company	"	Nelsonville Coal Mining Co	"
Poston's	"	C. L. Poston & Co	"
Longstreth's	"	T. Longstreth	"
Poplar Run, No. 1	"	"	"
Poplar Run, No. 2	"	"	"
Briar Hill	"	Ricketts & Matthews	"
Happy Hollow	"	Nelsonville Coal & Coke Co	"
Half-Moon	"	Akron Iron Co	Buchtel.
Furnace Bank	"	"	"
East Hill	Shaft	"	"
L. D. Mines	Drift	Lewis Steenrod	Nelsonville.
New Floodwood	Shaft	Hocking Iron Co	Floodwood.
Sheffield's	Drift	B. B. Sheffield & Bro	"
Hamley Run	Shaft	H. C. Will & Co	Columbus.
Salina	"	E. Michael	
Chauncey	"	Ewing Heirs	Chauncey.
Carbondale	Drift	Carbondale Coal Co	Mineral City.
Belmont County.			
Rainey's	Drift	Rainey Bank Coal Co	Cleveland.
Etna	"	Etna Iron & Nail Co	Martin's Ferry.
Helling's	"	Henry Helling	" "
Laughlin's	"	Laughlin Nail Co	" "
La Belle	"	La Belle Glass Co	Bridgeport.
Wheeling Creek, No. 1	"	C., T. V. & W. R. R. Co	"
Wheeling Creek, No. 2	"	" "	"
Bernard's	"	G. W. Bernard & Co	Bellaire.
Belmont, No. 1	"	Jacob Heatherington	"
Belmont, No. 2	"	Belmont Coal Co	"
Franklin, No. 1	"	Steward and Meehan	Stewardsville.
Franklin, No. 2	"	" "	"
Kidd's	"	John Kidd	Shields.
Pittsburgh Coal Works	Slope	Rockenhausen & Sterritt	Bellaire.
Wegee	"	P. Shaefer & Co	Wegee.
Union	"	F. Davis & Son	Dilley's Bottom.
Sheck's	Drift	Heslop, Sheck & Co	Bellaire.
Kelley's	"	John Kelley	"
Carroll County.			
Sherodsville	Drift	New York and Ohio Coal Co	Dell Roy.
Empire, No. 1	"	" "	"
Empire, No. 2	"	" "	"
Empire, No. 3	"	" "	"
Empire, No. 4	"	" "	"
Allen's	"	Samuel Allen & Son	"
Osborne's	"	Osborne Coal Co	Salineville.
Robert's	"	Cleveland Iron Co	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Columbiana County.			
Cherry Valley, No. 1	Slope	Cherry Valley Iron Co	Leetonia.
Cherry Valley, No. 2	Drift	" "	"
Cherry Valley, No. 3	"	" "	
Shaft	Shaft	Ohio & Penn. Coal Co	Salineville.
Jone's	Drift	" "	"
Conrad's	"	" "	"
Empire	"	" "	"
Cleveland	"	" "	"
Hussay Hollow	"	" "	"
Farmer	"	Manufacturers' Coal Co	"
Granage & Anderson's	"	Granage & Anderson	"
Foster's	"	Columbiana Coal Co	"
Diamond Valley	"	Diamond Valley Coal Co	"
Wolf Run	"	A. Armstrong	Teegarden.
Shelton	"	Wm. Barrett	"
Maple Hill	"	Maple Hill Mining Co	"
State Line	"	State Line Coal Co	East Palestine.
Prospect Hill	"	James Southern	"
Salt Well	"	Robert Ellis	New Lisbon.
Grafton	Shaft	Grafton Iron & Coal Co	Leetonia.
New Shaft	"	Salineville Coal Co	Salineville.
Hays' Mine	Drift	W. J. Rainey Coal Co	"
Rock Hill	"	Niles Mining Co	Robbinsville.
Coshocton County.			
Beach Hill	Drift	Prosser & Cassingham	Coshocton.
Home Bank	"	W. G. Ricketts	"
Union	"	Union Coal and Mining Co	"
Hays	"	W. G. Hays	"
Franklin	"	Franklin & Coalport Coal Co	"
Gallia County.			
Cheshire Coal Works	Drift	C. A. Carl	Cheshire.
Guernsey County.			
Shaft	Shaft	Manufacturers' Coal Co	Byesville.
Cambridge	Drift	Cambridge Coal & Mining Co	Cambridge.
Scott's	"	Scott's Coal & Salt Works Co	"
Norris	Slope	Wm. Norris	"
Nicholson's	Drift	Ohio Coal Co	Marietta.
Guernsey	"	Guernsey Mining Co	Cambridge.
Akron Shaft	Shaft	Akron Coal Co	Byesville.
Harrison County.			
Philadelphia	Drift	Philadelphia Coal Mining Co	Station 15.
Hocking County.			
Sand Run	Drift	J. H. Somers	Carbon Hill.
Carbon Hill	"	"	"
Crafts	"	Craft Iron Co	Greendale.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Hocking County—Cont'd.			
Black Diamond, No. 1	Drift	Peter Hayden	Haydenville.
Black Diamond, No. 2	"	"	"
Gore	"	Thomas Iron Co	Gore.
No. 19	"	W. B. Brooks	Nelsonville.
Helen Mines	"	Ohio Central Iron Co	"
Longstreth's	"	T. Longstreth	"
Sacket's	"	Sacket & Smart	Carbon Hill.
Orbiston	"	Hocking Iron Co	Orbiston.
Lee Furnace	"	"	Monday.
Hocking	"	"	"
Popaler Run	"	T. Longstreth	Columbus.
Murray City Slope	Slope	Murray City Coal Co	"
Holmes County.			
Mayers'	Drift	Bowen Bros	Millersburg.
Jackson County.			
Corse	Slope	Ohio Southern Coal & Iron Co	Wellston.
Eliza	Shaft	H. S. Bundy	"
Fluhart's	"	T. Fluhart & Co	"
Milton	"	Milton Furnace & Coal Co	"
Wellston, No. 1	"	Wellston Coal & Iron Co	"
Wellston, No. 2	"	" "	"
Comet	"	Comet Coal Co	"
Thornhill's	"	Thornhill & Co	"
Murphin's	"		"
Standard	"	Standard Coal Co	Jackson.
Jones'	"	Jones Coal Co	"
Emma	"	Emma Coal Co	"
New Slope, No. 3	Slope	Jones & Morgan	"
Old Slope, No. 2	"	"	"
Drift	Drift	"	"
Kelley's	"	Kelley Coal Co	Coalton
Darling, No. 1	"	Pimlott & Hall	"
Darling, No. 2	"	"	"
Mohler's	"	Thornhill & Mohler	"
Thornhill's	"	Thornhill Coal Co	"
Garfield	"	Rittenhouse & Co	"
Patterson's, No. 1	"	Ohio Southern Coal & Iron Co	"
Patterson's, No. 2	"	" "	"
Eagle	"	Eagle Coal Co	Jackson
Ada	"	Ada Iron & Coal Co	"
Edwards'	Slope	D. F. Edwards	Jackson.
Wilson's	"	Wilson, Wheldon & Co	Coalton.
Hurd's	Shaft	J. H. Hurd & Co	Jackson.
McKitterick's	"	McKitterick Bros	"
Newport	Drift	Newport Coal Co	"
North Drift	"	Mohler & Kissenger	Coalton.
Alice	"	Alice Coal Co	Jackson.
Price's	"	Price Bros	"
Tropic	Shaft	Tropic Iron Co	"
Star	"	Star Furnace Co	"
Huron	"	Huron Furnace Co	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Jackson County—Cont'd.			
Eureka	Shaft	Eureka Coal Co	Jackson.
Globe	Slope	Globe Iron Co	"
Kyle's	"	Kyle, Shotts & Co	"
Miller's	Drift	Miller & Co	"
Callaghan's	"	Callaghan & Gilliland	"
Oak Hill	"	David T. Davis	Oak Hill.
Jefferson County.			
Rush Run	Shaft	Rush Run Coal Co	Rush Run.
Lagrange Shaft	"	Langrange Coal Works	Phillipsburg.
Walnut Hill	Drift	Tallman & Harwood	Yorkville.
Gravel Shaft	Shaft	Cleveland Furnace Co	Steubenville.
Stony Hollow	"	Steubenville Coal Mining Co	"
High Shaft	"	" " "	"
Rolling Mill	"	Spaulding, Woodward & Co	"
Everick's	"	Ohio & Pennsylvania Coal Co	"
Boreland's	"	Swift Iron Steel Works	"
Diamond	Drift	S. N. & W. G. McCullough	Linton.
H. Strip Vein	"	W. H. Wallace & Son	Hammondsville.
Groff	"	W. W. Nessly	Linton.
Fire Clay Bank	"	Calumet Terra Cotta Co	Elliottsville.
Bustard's	Shaft	Steubenville Coal & Coke Co	Steubenville.
Mingo	"	Junction Iron Co	Mingo.
Alecanna	"	Sharp & Daniels	Steubenville.
Lawrence County.			
Sheridan Coal Works	Drift	Sheridan Mining Co	Sheridan Coal W'ks
Newcastle	"	Means, Kyle & Co	Hanging Rock.
Belfont	"	Norton Bros. & Co	Ironton.
Lawrence	"	Lawrence Iron Works	"
Old Mill Mine	"	N. Y. & Ohio Iron & Steel Co	"
Union	"	Union Iron Co	Samsonville.
Medina County.			
Diamond	Slope	Humphrey & Coleman	Wadsworth.
Wadsworth	"	Wadsworth Coal Co	Doylestown.
Excelsior	"	Excelsior Coal Mining Co	"
Meigs County.			
Charter Oak	Drift	Pomeroy Heirs	Pomeroy.
Slope	Slope	Union Mines Co	Syracuse.
Riverside	"	Ohio Coal Co	Antiquity.
Williams'	Drift	Ebenezer Williams	Minersville.
Buckeye	"	Buckeye Salt Co	Pomeroy.
Coal Ridge	"	Coal Ridge Salt Co	"
Crescent City	"	Crescent City Iron Works	"
Big Bend	"	Big Bend Salt Co	"
Diamond	"	Pomeroy Coal Co	"
Dabney	"	"	"
Peacock	"	"	"
Minersville	"	"	"
Shaft	Shaft	Syracuse Coal & Salt Works	Syracuse.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Mahoning County.			
Osburn	Slope	Evan Morris	Girard.
John Henry	Shaft	W. T. Williams & Co	
Austin	"	Tod, Wells & Co	Mineral Ridge.
Cambria	"	W. T. Williams & Co	"
Leadville	Shaft	Leadville Coal Co	Youngstown.
Foster	"	Foster Coal Co	"
Osburn	"	Andrew Brothers	"
Darrow's	Drift	J. P. Darrow	Lowellsville.
Power's	Slope	A. W. Powers	Youngstown.
Enterprise Shaft	Shaft	Allen Coal Co	"
Kyle's	Slope	Kyle Coal Co	"
New Slope	"	Osborn Coal Co	Mineral Ridge.
Walter's Bank	Shaft	Walters & Co	Washingtonville.
Buckeye	"	Robert Hunter	Youngstown.
Pennel	Slope	New Lisbon Coal Co	"
Harroff	Shaft	Harroff Coal Co	"
Green's	Slope	Green Coal Co	Greenford.
Witch Hazel	Shaft	Witch Hazel Coal Co	Youngstown.
Muskingum County.			
Del Carbo	Drift	Consolidated Coal & Min'g Co.	Roseville.
Muskingum Valley	"	George Veredrone	"
Horton's	"	Henry Horton	Zanesville.
Wheeler's	"	G. Wheeler	"
Ballou's	"	Orrin Ballou	"
Blandy's	"	H. Blandy	"
Stelover's	"	W. A. Stelover	"
Greiner's	"	H. Greiner	"
Harper's	"	E. Harper	"
Peacock	"	D. Mathews & Co	Gilbert Station.
Owens'	"	James Owens	Putnam.
Harper's	"	L. Harper	Zanesville.
Noble County.			
Macksburg	Drift	Ohio Coal Co	Macksburg.
Perry County.			
Tucker's	Drift	Doe & Job	New Straitsville.
Plummer Hill	"	Straitsville Coal Co	"
Old Mine	"	Straitsville Coal Mining Co	"
Troy Mine	"	Thomas Coal and Iron Co	"
Chicago	"	W. P. Rend & Co	"
Consolidation	"	Consolidated Coal Mining Co.	"
Central	"	Straitsville Cental Mining Co.	"
Upson	"	Card & Upson	Shawnee.
XX Furnace	"	Sandusky & Shawnee C.& I. Co	"
Manly's	"	Furnace Coal Co.	"
Shawnee	"	Licking Iron Co	"
Shawnee Valley	"	Shawnee Valley Coal Co	"
New York	"	N. Y. & Straitsville C. & I. Co.	"
Tunnel Hill	"	Tunnel Hill Coal Co	New Lexington.
Jones'	"	S. & J. Jones & Co	McCluney.
Davis'	"	D. E. Davis	Bristol Station.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Perry County—Cont'd.			
Brilliant	Drift ...	J. E. Payne	McCuneville.
No. 1	" ...	Ohio Central Coal Co	Corning.
No. 2	" ...	" "	"
No. 3	Shaft ...	" "	"
No. 9	" ...	" "	"
No. 11	" ...	" "	"
No. 12	Drift ...	" "	"
No. 13	Shaft ...	" "	"
No. 15	" ...	" "	"
No. 19	" ...	" "	"
Sunday Creek, No. 7	" ...	Sunday Creek Coal Co	Rendville.
Rend's, No. 5	" ...	Rend Coal Co	"
Rend's, No. 2	" ...	"	"
Dickson's	Drift ...	J. C. Hamilton	Shawnee.
Black Hill	" ...	Levi Rerrick	Maholm.
Farques'	" ...	J. D. Farques	"
Consolidated	" ...	Consolidated Coal Mining Co.	Cincinnati.
Black Diamond	" ...	E. D. Simpson	Maholm.
O. K	" ...	W. D. Clark	"
Daugherty's	" ...	F. Daugherty	"
Lyonsdale	" ...	Lyonsdale Coal Co	Columbus.
Tague's, No. 1	" ...	M. & P. Tague & Co	McLuney.
Tague's, No. 2	" ...	M. & P. Tague & Co	"
Tague's, No. 3	" ...	M. & P. Tague & Co	"
Portage County.			
Wilson's	Shaft ...	Wilson, Osburn & Co	Palmyra.
Scott's	" ...	Scott Coal Co	Sharon, Pa.
Black Diamond	" ...	P. L. Kimberly	Diamond P. O.
Stark County.			
Osnaburgh Mine	Drift ...	Osnaburgh Coal Co	Osnaburgh.
Mountain	Shaft ...	Rhodes Coal Co	Cleveland.
Lawrence	" ...	Ridgeway Coal Co	Massillon.
Camp Creek	" ...	Camp Creek Coal Co	Elyria.
Pigeon Run	" ...	Massillon Pigeon Run Coal Co	Massillon.
Grove Shaft, No. 2	" ...	Rhodes Coal Co	Cleveland.
Willow, No. 5	Slope ...	Rhodes Coal Co	"
Sippo	" ...	Sippo Coal Co	Massillon.
Massillon City	" ...	Massillon City Coal Co	"
Oak Hill	" ...	Oak Hill Coal Co	"
Willow, No. 3	" ...	Rhodes Coal Co	Cleveland.
Valley Mine, No. 1	Drift ...	Va ley Coal Co	Canton.
Valley Mine, No. 2	" ...	Valley Coal Co	"
Greentown	" ...	Smith, Borst & Co	Greentown.
Fox Run	" ...	Fox Run Coal Co	Canton.
Zerby Drift	" ...	J. P. Burton & Co	Massillon.
Windsor	Slope ...	Windsor Coal Co	"
Garfield	Shaft ...	Navarre Coal Co	Elyria.
Hadley's	Drift ...	Brown & Hadley	North Industry.
Elm Run, No. 1	Shaft ...	Massillon Elm Run Coal Co ...	Massillon.
Elm Run, No. 2	" ...	Massillon Elm Run Coal Co ...	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Summit County.			
Thomas Drift, No. 1	Drift	Phillip Thomas	Cuyahoga Falls.
Thomas Drift, No. 2	"	"	"
Summit Mine	Slope	Summit Mine Coal Co	101 Sup. st., Clev.
New York	Drift	Thomas Bros	Thomastown.
Nemisslla	Slope	Nemisslla Coal Mining Co	Cleveland.
Summit	Shaft	Summit Mining Co	"
Dennison	Slope	Dennison Coal Co	Sherman.
Burnett	"	Brewster Coal Co	Akron.
Lake View	Shaft	Lake View Coal Co	Akron.
Tuscarawas County.			
Tunnel Mine	Drift	Rhodes Coal Co	Cleveland.
Block Vein	Slope	George J. Markley	Mineral Point.
Newberry	Drift	C. E. Holden	"
Walton Ridge	"	Buckeye Coal Co	New Philad'phia.
Hert's	"	Nicholas Hert	Tuscarawas.
Herning's	"	Andrew Herning	"
Minich's	"	Charles Minich	"
Jones'	"	Wm. R. Jones	New Philad'phia.
Goshen Ridge	"	Helmick & McFarland	" "
Coventry	"	Harry Miller & Son	" "
Rennie's	"	W. R. Rennie	" "
Goshen Drift	"	Goshen Ridge Coal Co	" "
Groff's	"	Frederick Groff	" "
Rock Hill	"	Rock Hill Coal Co	Elyria.
Pike Run, No. 1	"	Tuscarawas Coal Co	"
Trumbull County.			
Love	Slope	Andrews, Hitchcock & Co	Youngstown.
Burnett	"	" "	"
No. 3	"	Mahoning Coal Co	Coalburg.
No. 9	"	" "	"
No. 8	"	" "	"
Brookfield	Drift	Brookfield Coal Co	Sharon, Pa.
Cleveland Shaft	Shaft	Ohio Coal Co	Cleveland.
Shenango	Slope	Shenango Coal Co	Wheatland, Pa.
Halliday	"	Halliday Coal Co	Youngstown.
Kline	"	Briar Hill Iron Co	"
Church Hill	"	Church Hill Coal Co	"
New Blackberry	Shaft	Vienna Coal Co	"
Church Hill	"	Church Hill Coal Co	"
High Shaft	"	Morris & Sampson	Church Hill.
Garfield	"	McCurdy & Morgan	Youngstown.
Osborne's	Slope	Osborne Coal Co	Mineral Ridge.
Jacob's	Shaft	P. Jacobs & Son	Youngstown.
Williams'	"	D. Williams & Co	Hubbard.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Vinton County.			
Coalmont	Drift ...	Zaleski Coal Co	Zaleski.
Zaleski	" ...	"	"
Washington County.			
Coal Run	Drift ...		Coal Run.
Maxburg	" ...	Ohio Coal Co	Marietta.
Wayne County.			
New Chippewa	Drift ...	New Chippewa Coal Co	81 Bank st., Cleve.
Silver Creek	Shaft...	Silver Creek Coal Co	Wadsworth.
Fox Lake	" ...	Fox Lake Coal Co	Cleveland.

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NINTH ANNUAL REPORT

OF THE

STATE INSPECTOR OF MINES,

TO THE

Governor of the State of Ohio,

FOR THE YEAR 1883.

COLUMBUS, OHIO:
G. J. BRAND & CO., STATE PRINTERS.
1884.

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OFFICE OF INSPECTOR OF MINES,
COLUMBUS, O., *November*, 15, 1883.

HON. CHARLES FOSTER, *Governor of Ohio:*

SIR: I have the honor to present herewith the ninth annual report of the State Inspector of Mines.

Very respectfully,

ANDREW ROY,
State Inspector of Mines.

ANNUAL REPORT.

COLUMBUS, OHIO, *November* 15, 1883.

To His Excellency, CHARLES FOSTER, *Governor of Ohio:*

SIR: I have the honor to herewith submit the ninth annual report of the Inspector of Mines, in accordance with the requirements of the act of the General Assembly, entitled "an act to regulate mines and mining, and to repeal an act therein named," passed March 21, 1874, containing a record of the proceedings of the office, and a statement of the condition and operations of the coal mines of the State, enumerating all fatal accidents which occurred during the year in and around mines, together with such other information as has been deemed useful and proper, and making some recommendations as to further legislation on mines and mining.

The number of fatal accidents reported to this office, and collected during the visits of inspection to the mines, are 26. The names and cause of these accidents will be found in their proper place in the report.

The amount of coal mined during the year is estimated at 8,225,000 tons, the estimate for last year being 9,450,000 tons. These are, of course, only approximate estimates of the output, no provision being made by law for the collection of the coal statistics of the State by this office.

The falling off in the trade is due to the depressed condition of the iron industry, a large number of the iron furnaces being out of blast.

ANDREW ROY,

Inspector of Mines.

REVIEW OF THE OPERATION AND RESULTS OF THE MINING LAW.

The law regulating mines and mining was enacted on the 21st of March, 1874, in accordance with the almost unanimous petition of the coal miners of the State, its object being to secure increased safety to the lives, health and limb of underground coal miners. Under this act, which provided for the appointment of one Inspector of Mines by the Governor, to see that the provisions of the law were enforced and obeyed, I was appointed Inspector by Governor William Allen on the 6th of April, 1874. Upon the expiration of my term of office, April 6, 1878, Governor Bishop appointed James D. Poston, of Hocking county. Mr. Poston resigned on the 15th of November, 1879, and Governor Bishop commissioned David Owens, of Trumbull county, as his successor. The Senate failed to confirm Mr. Owens, thereupon Governor Foster appointed me to the office, my commission bearing date February 12, 1880.

On the 18th of April, 1881, the General Assembly provided by law for the appointment of an Assistant Inspector of Mines by the Inspector, with the approval of the Governor, and on the 4th of June of that year Jacob J. Klein, of Stark county, was commissioned to fill this position. Mr. Klein, who had been a practical miner from boyhood, and had worked in the mines of Stark county for many years, was a valuable auxiliary to the office. He was mainly employed in visiting and inspecting mines and reporting their condition to the office. While in the discharge of his duty he was thrown from a buggy and so badly kicked by the buggy horse that his leg was broken in two places, and he was incapacitated from further duty in consequence for seven months. He has not yet, and will never fully recover from the accident.

Mr. Klein finding himself unable for duty, and desirous of keeping up the part of the work assigned him, employed John P. Williams, of Trumbull county, to act as assistant from the 27th of March, 1882, until the 15th of May of the same year. Mr. Klein reassumed duty May 15, 1882, but his injured limb continued to pain him and he resigned on the ——— to accept a position of mine boss. Mr. Williams, who had acted as assistant for Mr. Klein, was thereupon named for assistant, and he was commissioned by the Governor on the ———, 1883.

The law for the regulation and ventilation of mines, enacted by the General Assembly of Ohio on the 21st of March, 1874, was largely an

experiment. No legislation on the subject of mines and mining for the proper security of the lives and safety of miners had at that time been enacted in the United States, with the exception of the act providing for the health and safety of the miners employed in the anthracite mines of Pennsylvania. When the legislature of Pennsylvania passed that act it made no provision for the regulation and working of the bituminous mines of that State, regarding all these mines as too safe by nature to need State supervision. When, therefore, the legislature of Ohio proposed to regulate the working of mines with the view of adding increased safety to the underground workmen, the mine owners fiercely opposed the scheme, and pointed to the State of Pennsylvania exempting all bituminous mines from the mining law, as proof that laws for the regulation of mines, and especially for the inspection of mines, were alike unnecessary and uncalled for in Ohio. The legislature, however, paid no attention to the example of Pennsylvania, but in enacting the mines inspection law burdened it with duties which would have required at least six mine inspectors to perform, at the same time making provision for the appointment of but one inspector, without any clerical assistance for the office.

In assuming charge of the office, however, I resolved to give my whole time and attention to the practical duties of the new department, namely, to visit and inspect the mines for the purpose of bringing about improved systems of mining and ventilation, in order to secure increased safety to the life, limbs and health of the people for the proper protection of whom the law had been enacted. For some years the true intent and purpose of the law was not understood either by the mine owners or by the working miners. The former looked upon the enactment of the law as an invasion of their proprietary rights, and as one of their number expressed it to me, "regarded an Inspector as having no more right to enter and inspect his mine than he had to enter his parlor and see what he had in it; that the law was enacted simply and only by the political party in power for the purpose of currying favor with the workingmen and securing their votes." The miners, on the other hand, looked upon the passage of the law as a triumph over the operators, and regarded the Inspector in the light of an officer of their Union bound in duty to obey their wishes, to side with them in all their quarrels with their employers, and to enforce the law against the mine owners in a vindictive spirit. There were, of course, noteworthy exceptions to these views by men in both interests. It is with a feeling of pride that I am now able to state that such views have entirely disappeared. The mine owners now regard a visit of the Inspector with pleasure, listen with interest to his

suggestions, and act upon them, while the miners when the Inspector finds the law is being disregarded, counsel forbearance and moderation in the enforcement of the law. There is no longer any occasion to institute legal proceedings to compel obedience to the law, nor do the miners ever insist upon it. All the important coal mining States in the Union have of late years enacted laws for the ventilation and inspection of mines, following the example of Ohio.

Since the passage of the mining law in 1874, it has, besides the provision for the appointment of an Assistant Inspector of Mines, been several times amended. But many of the duties of the Inspector, which the law requires, are still beyond the ability of the Inspector to perform.

The one paramount necessity of the law was the provision for the better ventilation of the mines; compared with this, all other requirements were the mere limbs and outward flourishes. A very great improvement has been made in this regard; still there are mines which are yet behind, and far behind the requirements of the law.

This condition of affairs is largely due to the incompetency of the bosses in charge of such mines. Ventilation is an art now generally well understood, but it is not universally understood, and it would be well if incompetent men could be removed by the Inspector, or at least if the law were so amended that such men could be summoned before a magistrate, and fined every time an Inspector visited a mine and found the air loaded with health-destroying gases. Some bosses are so constituted by nature that they will never understand their duties thoroughly and well. They resemble many housekeepers who are always in confusion and filth.

The mining law has not added a single dollar to the cost of mining. It has, in a large degree, conduced to improved systems of mining and ventilation, and perhaps, most important of all, it has been the means in no small degree of bringing about a better feeling between the miners and their employers. We have fewer strikes than formerly. Miners are now disposed to reason—"that column of true majesty in man"—rather than strike. Men whose energies had become prostrated from breathing the foul and poisonous atmosphere of a badly ventilated mine were not in a fit state of mind to season. Pure air underground means fewer strikes and mining troubles. The mine owner who attempts to economize by withholding from his workmen underground the pure, sweet atmosphere of heaven, soon finds himself confronted with fretful and quarrelsome employes, whose fanciful wrongs assume the gigantic proportions, and there will be no peace until the fundamental cause of trouble is removed—the bad air of the mines.

ANNUAL OUTPUT OF COAL.

The Inspector has endeavored each year to present an approximate estimate of the annual output of the mines. The following figures embrace the estimate for the past 12 years:

1872	5,315,294 tons.
1873	5,450,028 "
1874	3,267,585 "
1875	4,864,259 "
1876	3,500,000 "
1877	5,250,000 "
1878	5,500,000 "
1879	6,000,000 "
1880	7,000,000 "
1881	8,225,000 "
1882	9,450,000 "
1883	8,225,000 "

Last year blanks were sent out to the mining companies, with the request that a statement of the production of each mine be forwarded to this office. Companies responded, representing —— mine, the aggregate of which amounted to —— tons. Were provisions made by law for the collection of statistics of coal by this office, the mining companies would generally furnish the same. But it would require clerical assistance to make the classification of such statistics a success. The Inspector, burdened by the mining law with duties which he had not time to fulfill, has always felt unwilling to assume duties not provided for by law.

I have in previous reports taken occasion to point out the faulty system by which the mineral statistics of the State are furnished the Secretary of State, and as a result the grossly inaccurate statements published in the annual reports of the Secretary of State from the reports made by township assessors to county auditors. The following table shows the difference in the reports of the Mine Inspector and Secretary of State for a series of years:

Mine Inspector.		Secretary of State.	
Years.	Tons.	Years.	Tons.
1872	5,315,294	1872	4,417,550
1873	5,450,028	1873	3,511,769
1874	3,267,585	1874	No report.
1875	4,864,259	1875	3,915,072
1876	3,500,000	1876	3,636,318
1877	5,250,000	1877	3,501,955
1878	5,550,000	1878	3,526,804
1879	6,000,000	1879	5,874,486
1880	7,000,000	1880	No report.
1881	8,225,000	1881	3,933,225

Considered by districts, the State may be divided as follows:

Mahoning Valley—This includes the counties of Trumbull, Mahoning and Portage. The coal mined is block exclusively, except that mined on Mineral Ridge, about 700,000 tons.

Tuscarawas Valley—Stark, Summit, Wayne and Medina counties are included in this district, which is apparently being worked out very rapidly, several mines having been abandoned during the year, about 800,000 tons.

Hocking Valley—Included in this are the counties of Athens, Perry and Hocking. This district has witnessed a marvelous development during the past six years. Ten years ago the product did not reach 350,000 tons per year; last year it aggregated over 3,500,000. These figures we verified by calling for information, upon Mr. M. M. Green, President of the Columbus, Hocking Valley & Toledo Railroad Co., who courteously furnished all desired data.

Jackson County—This district was opened five or six years ago and produced last year about 450,000 tons.

Ohio River District—This includes the Pomeroy and Syracuse districts. Last year's production was about 300,000 tons.

Bellaire District—The district thus designated lies above and below Bellaire, on the Ohio River, and for some distance back on the Balti-

more & Ohio Railroad, mainly in Belmont county. In 1883 it produced from 450,000 to 500,000 tons.

Steubenville District—Owing to the depression of trade, this district did not produce in 1883 more than one-third its usual amount. An approximation puts the total at 190,000 tons.

Leetonia District—The veins in this district do not run over 28 inches in thickness, yet the mines are counted among the most prosperous in the State. About 350,000 tons were mined in 1883.

Cambridge District—The lines of Guernsey county include this district. Up to a short time the coal developments here were upon a small scale, but during the past two years development has gone rapidly forward, and last year the amount of coal mined reached about 200,000 tons.

Coshocton District—This region has been in a languishing condition for some time past, but recent developments on Morgan Run promise to revive production considerably. About 100,000 tons constituted the output last year.

Del Roy District—This new district, situated in Carroll county, produced last year 150,000 to 180,000 tons. In its first developments horsebacks seriously retarded operations, but some very promising fields have lately been opened at Sherradsville, four miles east of Del Roy.

Ironton District—The mines of this district lie mainly in Lawrence county. Their total output for 1883 was from 180,000 to 200,000 tons.

Salineville District—Situated mainly in Columbia county. There were no new features of special interest in this district during the year.

Sunday Creek Valley—Though situated in Perry county, in the Hocking Valley, this is essentially a district to itself. To the enterprise of the Ohio Central Railroad is due its rapid development during the past four years, its production in 1883 being well up toward 1,000,000 tons.

Beside the above there are isolated mines located at Zaleski, in Vinton county; Hammondsville, on the Cleveland & Pittsburgh Railroad; near Bridgeport, on the Cleveland, Lorain & Wheeling Railroad, and at Mineral Point, on the Valley Railroad, the two latter regions having been recently opened up.

Summarizing for the State, we find that coal is produced in 30 out of 88 counties, but in four of them on a small scale. The subjoined table, just made up by the State Inspector, is now published for the first time. It shows the coal production by counties in 1883, based upon reports and estimates on file in the State Mine Inspector's office:

Counties.	Lump Coal.	Nut Coal.
Athens	723,500	109,015
Belmont	469,339	106,987
Carroll	156,096	17,519
Columbiana	504,670	67,412
Coshocton	63,000	17,000
Gallia	8,058	2,098
Guernsey	171,555	2,100
Hocking	502,160	86,999
Holmes	20,000	4,000
Jackson	407,854	42,645
Jefferson	192,444	9,578
Lawrence	122,326	36,467
Medina	263,780	27,000
Meigs	359,445	3,112
Mahoning	223,740	20,631
Muskingum	32,600	1,800
Perry	1,557,799	177,400
Portage	69,000	3,500
Stark	328,594	35,181
Summit	155,000	15,500
Tuscarawas	320,216	33,850
Trumbull	437,612	20,000
Vinton	38,500	6,500
Wayne	140,304	8,543
Total 1883	2,773,592	854,747
Grand total for 1883		8,229,429
Grand toial for 1882		9,450,000

There are at present 277 companies or individuals engaged in mining coal in the State, as follows:

Athens	17
Belmont	16
Carroll	4
Columbiana	16
Coshocton	5
Gallia	1
Guernsey	7
Hocking	11
Holmes	1
Jackson	36
Jefferson	15
Lawrence	6
Medina	3
Meigs	10
Mahoning	18
Muskingum	12
Perry	31
Portage	3

Stark	21
Summit	8
Tuscarawas	15
Trumbull	15
Vinton	1
Washington	2
Wayne	3
Total	277

Some of the above companies operate two or more mines, thus increasing the total in that respect.

The event of the year has been the formation of the great coal and iron syndicate known as the Columbus & Hocking Coal & Iron Co., which has virtually absorbed the product of the Hocking Valley. Its properties now include 18 mines, 5 furnaces, 12,579 acres of coal land, 570 houses, 12 stores, and 444 cars, the total appraised value of which, real and personal, is $4,494,637.01.

ESTIMATE OF THE AMOUNT OF COAL MINED IN 1883 BY COUNTIES.

Counties.	Lump coal.	Nut coal.
Athens	723,500	109,015
Belmont	469,339	106,987
Carroll	156,096	17,519
Columbiana	504,670	67,412
Coshocton	63,000	17,000
Gallia	8,058	2,098
Guernsey	171,555	21,000
Hocking	502,160	86,999
Holmes	20,000	4,000
Jackson	407,854	42,645
Jefferson	192,444	9,578
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Meigs	359,445	3,112
Mahoning	223,740	20,631
Muskingum	32,600	1,800
Perry	1,557,799	177,400
Portage	69,000	3,500
Stark	323,594	35,181
Summit	155,000	15,500
Tuscarawas	330,216	33,850
Trumbull	437,612	20,000
Vinton	38,500	6,500
Wayne	140,304	8,543

Business the past year has been rather depressed, in sympathy with the general iron market. Selling prices have been low, in consequence of competition. For the Northern mines prices at mines averaged in

1883 $2.00, against $2.50 in 1882. At the Southern mines the price has been $1.25 @ $1.50. The proximity of the Northern coal fields to the lake and the high royalties paid are the controlling causes of the higher prices received here.

In addition to the amount contained in the above estimate there were fully 725,000 tons mined in small mines which do not come under the requirements of the mining law, about one hundred thousand tons of which are mined in the counties of Harrison, Monroe, Morgan, Noble and Scioto, in which no large mines are operated.

The above table being only estimates may require considerable revision in some counties. Provision should be made by law for the collection of statistics by this office, as it is of very great importance to have accurate reports in order to make a comparison of the amount of mineral raised for each life lost in the mines. The publication of accurate statistics of the annual coal production of the State would be of advantage in other ways besides. If provision were made by law for the collection of the statistics of coal, and clerical assistance were furnished this office for the purpose of collecting, assorting and systemizing such statistics, much would be added to the affectiveness of the office.

LIST OF FATAL ACCIDENTS.

The following are the names of miners killed in the pursuit of their calling, together with the cause of the accident:

1882—November 29—Daniel Gardiner, at Mine No. 2, Osborne Coal Co., by a fall of slate.

December 14—Philip Kisor was caught by a fall of slate in his room in the mine of the Milton Furnace and Coal Co. The slate broke his back. He lingered until April 25, 1883.

December 18—George Rees and John Jones were killed in the Middlebury Shaft, Summit county, by a fall of slate. The unfortunate men were working on pillars (always dangerous employment) when a massive piece of slate suddenly fell, killing both men instantly.

1883—January 24—David Fogle was hurt by a fall of soap-stone in the mines of the Wheeling Creek Coal Co., which proved fatal.

January 24—A. M. Beese was fatally injured by being crushed with a descending cage in the Weathersfield Shaft.

February 10—Jacob Phillips was so severely injured by a fall of roof in the Buckeye Mine, Pomeroy, that he died. His back and both legs were broken.

February 12—Lawrence Bridge was killed in Hamley's Run mine by a fall of coal from the roof. He was in the act of examining the dangerous piece when it suddenly fell upon him.

March 1—Michael Hollern was so badly hurt by a fall of slate in the No. 5 Mine, New Straitsville, that he died as the miners were carrying him home.

May 16—William Price was fatally injured in the Mine of the Sunday Creek Co. He died the following day. The cause of the accident deserves special mention. Price was working in his room, when a miner in an adjoining room fired a shot. The rib dividing the room was thin, and the shot blew through, a piece of the flying coal striking Price, who was retreating from the blast at the time.

May 18—John Gurthie and Charles Eddie were killed in the shaft of the Union Mine, Washington Furnace, Lawrence county, being suffocated by the gases produced by a discharge of powder. A shot with an unusually large quantity of powder had been fired in the air shaft. Gurthie went down after the discharge. He asked to be hauled up as the gas was suffocating him. While being raised he fell back in the shaft overcome with the gas. Eddie then went down to rescue him, but asked to be hauled up before he reached the bottom. He also fell back into the shaft.

May 23—Mike Lutz was killed by a fall of draw slate. He had began to undermine for a shot, and had not worked more than five minutes when the slate overhead fell and injured him so severely that he died in half an hour.

June 2—William Williams put in his blast about noon and went out to eat his dinner. The blast had knocked the props out, and when he returned the slate fell and killed him instantly.

June 6—Phillip Young was immediately killed by falling down Murfin's Shaft, Jackson county. He was the engineer, and had taken off a car at the lower landing and hoisted the cage to the upper landing. He then dumped the car and pushed it back, thinking the cage was still at the lower landing. The car and man both went down the shaft, a distance of 108 feet.

July 5—Claus Johnson was killed at Longstreth mine by a fall of slate in his room.

August 3—Grant Ross was killed by a fall of slate in Sackett, Smart & Co.'s mine at Carbon Hill. He was a driver, and died about twelve hours after he was injured.

August 16—Rufus Watson was killed by a fall of slate at Fluhart's mine.

August 24—George Head, mine boss, at the Wadsworth mine, Medina county, was killed by the cage falling upon him at the bottom of the shaft.

August 28—Evan Thomas, the mining boss, at Mine No. 3, Ohio Southern Coal & Iron Co., Jackson county, was killed by a fall of slate. A massive piece of slate had fallen in the mine, one part still reclining on the roof. Thomas and a miner were at work cutting it in two. Thomas passed underneath it to attack it from the other side. It broke in two and fell upon him.

August 31—David Griffith was killed by a fall of slate at Sherrodsville mine, Carroll county. He was picking slate in front of him when a piece fell, striking him on the spine. He lived three hours.

September 2—James Roy was killed at Zoar, Tuscarawas county, by a fall of slate.

September 10—Sylvester Webster was killed at Diamond mine, Jackson county, by a fall of slate. He was drawing pillars when the slate fell upon him.

September 13—Preston White was caught by a fall of slate in Mine No. 12, Ohio Central Coal Co., Corning. His back was broken; he afterwards died in Indiana.

October 28—Wm. W. Evans was crushed by riding on the full cars and died on the 29th. The accident happened in the Minersville Bank, Pomeroy.

November 14—William Reese was hurt by a fall of slate in Ebenezer Williams' bank, Pomeroy, and died on or about the 22nd.

NUMBER OF LIVES LOST TO AMOUNT OF COAL MINED, ETC.

The following table, prepared from the best estimates at command, gives the number of tons of coal mined for every life lost in and about the mines from the year 1874 to the year 1883, inclusive:

Years.	No. of fatal accidents.	No. of tons mined.	No. of tons mined for each fatal accident.
1874	30	3,267,585	108,919
1875	24	4,864,259	202,667
1876	13	3,500,000	269,999
1877	30	5,250,000	175,000
1878	No report.	5,500,000	.....
1879	No report.	6,000,000	.....
1880	22	6,437,725	292,624
1881	29	8,225,000	283,621
1882	25	9,450,000	378,000
1883	26	8,225,000	316,346

When we consider the dangerous pursuit of the miner, it is doubtful if the number of fatal accidents to the amount of coal mined will be seriously reduced below the above figures. None of the countries of the old world and no other State in the Union show equally satisfactorily results. Since the mining law was enacted in 1874, the coal production of the State has nearly doubled itself, while the number of fatal accidents has not increased.

The great majority of mine accidents, as I have taken occasion to point out in former reports, occur in the working places of the mines, and neither the mine owners nor their bosses are in any wise responsible for them. To attribute them to the carelessness of the deceased would not be just. Mining is dangerous work; miners must take risks, and accidents will occur. At the same time it must be admitted that greater

care on the part of the miner will somewhat reduce the number. The law provides that in his working place, and for fifteen feet back from the face of the same, the miner himself shall be held responsible for his own safety, and this is right; for he has absolute control there if props are provided against the dangerous elements which surround him.

In 1882, it will be seen, that the lives lost averaged one for every 378,000 tons of coal raised. In Pennsylvania there was one life lost for every 214,928 tons mined. In Illinois there was one life lost for every 78,424 tones raised, while in Great Britian one life was sacrificed for every 198,119 tons mined. The death rate in Illinois is frightful, amounting to 134. Two great catastrophies—that of Braidwood and that of Coulterville, caused the death of 79 miners. Even omitting these catastrophies, there were still 50 lives sacrificed, which, when the condition of the mines as compared with those of Ohio are considered, is still a frightful list of mining casualties.

A recent law of Illinois divides the State into five inspection districts, in each of which an inspector of mines is appointed by the Governor, and the mining law of the State has been made much more strict in addition. The present system of inspection cannot fail to have a beneficial effect upon the health and safety of the miners of Illinois, though the plan of appointing the Inspector for one year only cannot be commended. The term of office should be at least three years.

SERIOUS ACCIDENTS.

The proportion of serious accidents to those of a fatal character are as four to one. Limbs are broken, the body is bruised, and such accidents are frequently of so severe a character as to unfit the miner in all future time from following his calling. For some years after the enactment of the mining law the Inspector collected and published a reasonably complete list of serious accidents, being greatly aided by the general officers of the Miners' Union, and by the reports which the miners themselves forwarded to this office. Since the law was amended requiring the mining bosses to forward a monthly statement of the amount of air in circulation, reliance has been had on the bosses for noticing the accidents in these monthly returns, but only a small per cent. of accidents are reported. The parties injured seldom report the facts, even after they get well. Just what a serious accident is, is an open question. There are all grades of non-fatal accidents, from the mashing of a finger to the breaking of a back.

SHAFTS WITH SINGLE OPENINGS.

As will be observed from the detailed account of the condition of the mines, there are several shafts in operation having but one means of ingress and egress. The owners of such mines were notified to provide a second opening as soon as the Inspector was satisfied that the necessary amount of excavations had been made, namely, 15,000 square yards in the case of shafts, and to all other mines, whether slope or drift, within twelve months after, 15,000 square yards have been cut. A few of the mines in the Mahoning Valley, opened in horsebacks, have been tardy in making the second outlet, but all have promised to do so, or abandon their mines if the expense of providing the second shaft would prove greater than the mine was worth. Several of such mines voluntarily reduced the underground force to ten men until the second opening should be provided, and in the case of the Rush Run shaft, in Jefferson county, there has been an injunction in force for several years forbidding the working of the mine with more than ten men until the other outlet was made.

EXPLOSIONS OF FIRE-DAMP.

Our mines are comparatively free from this dread scourge of underground life, yet explosions occasionally take place. During the year a mining boss was burned at the Rainey mine in Belmont county, and two miners were burned in the Minglewood mine, in Stark county. When this gas is once seen too great care cannot be exercised in future. If the mining law is complied with in its letter and spirit, there cannot be an explosion. Whenever men are burned by fire-damp in a coal mine in this State there can be but one reason for it, namely, insufficient ventilation. It is true that after gas has been allowed to accumulate miners may thoughtlessly or ignorantly enter the dangerous place and fire the inflammable air, but in attaching blame for such a result the primary cause of the disaster must never be lost sight of, the want of the necessary current of fresh air to dilute the gas and render it harmless. It ought to be accepted as a self-evident proposition that explosion is never caused by the miners.

SAFETY-CATCHES.

These catches, which are attached to the cages used for lowering and raising miners through a shaft, are required by law to be applied to all cages. But they have never been able to meet with general approval from parties in interest. They are always tested when first applied and

work very satisfactorily, but they get out of order by usage, and are found wanting in many cases when they are most needed—during the breaking of a rope while the loaded cage is being raised through the shaft. Many superintendents prefer to risk a safe rope rather than a highly recommended safety-catch. Still, if these catches were examined and tested once every four or six months, they would hold the cage if the rope should break. Their application, however, ought not under any circumstances induce superintendents to neglect the rope. A man's life is worth a coal bank, and if a single life is saved at any mine by the adoption of these catches, they shall have paid for their labor and expense at all other mines.

CONDITION OF THE MINES.

It has been the ambition of the Inspector to make, together with himself and assistant, a complete circuit of the mines of the State each year, visiting the working-places underground of each and every mine, pointing out danger and suggesting means of safety. But the work has never been as thoroughly and well done as could have been wished. The mines are scattered over 30 counties; their ramifications extend fully 1,200 miles underground, which have to be traversed on foot, often in situations where the workings are less than four feet in height. A number of the mines found in bad condition have to be visited two, three, or four times each year, and the office-work has to be done.

During the earlier years of the department, before the office of Assistant Inspector of Mines was created, the Inspector visited every mine in the State and inspected the same thoroughly, until every room and entry had become familiar. He endeavored to make a complete round each year, but found the task greater than his ability to perform it. After an assistant was provided for, the mine-bosses were required by law to furnish the Inspector a monthly report of the condition of the mine under the charge of such boss on blanks furnished by the Inspector. This work alone keeps the Inspector in the office fully two weeks of each month. Only a small minority of the bosses understood the manner of measuring the air of mines and had to be instructed. Many of them do not understand it yet, and send in random reports or do not report at all.

The miners themselves were authorized by law to appoint a committee in each mine to inspect the mine and machinery connected therewith and report the facts to the Inspector, at least once a month. but few of them have availed themselves of this opportunity, fearing that it might lead to discharge. The miners prefer and insist that all

inspections be done by the Inspector or his Assistant. The following report of the mines of the State gives their condition from the notes taken at the date of inspection; the time and all material circumstances were noted. These reports run in a groove, but there is a general desire on the part of all concerned to see what the Inspector has to say after his visit to a mine:

The Manner of Mining.

The beds of coal which traverse the Ohio coal field are not disturbed by dykes or dislocations of the strata, so frequently found in other coal fields of the world. There are many local faults found in our coal mines, which are known by the general name of "horsebacks." These faults, which sometimes come from the roof and sometimes from the floor of the mine, are occasionally troublesome and expensive; but taking the whole coal field throughout, the conditions for cheap and systematic mining are unusually favorable. The floor of mines is comparatively level, the usual dip, except in local cases, being 25 or 30 feet to the mile.

Over large areas of the coal field, where the country is hilly, the beds of coal in course of development come to day or crop out in the hillsides, and admit of what is termed drift or level-free mining. Under such conditions the seam is followed into the hill, and the waters of the mine generally discharge themselves by gravitation. Care is taken in opening a drift mine to select the lowest place on the property, if the circumstances will admit of it, for the purpose of drainage.

In regions where level-free mining is impracticable, two methods of sinking for coal are followed: one is by opening perpendicular shafts, the other by sinking slopes at a pitch of from 25 to 35 degrees. Slopes are, however, rarely opened where the coal is found more than 150 feet below the surface, for below this depth it is more costly to sink and deliver coal by a slope than by a perpendicular shaft. Even under favorable conditions slopes are largely a matter of taste on the part of managers; they are never cheaper than shafts.

The coal business has localized itself, and the various districts in which the mines are opened are known by appropriate names, as for example the Tuscarawas Valley, the Mahoning Valley, the Hocking Valley, etc. There are now a dozen districts in the State in which the coals possess peculiarities by which they are known, as the Mahoning Valley coal, the Jackson county coal, the Ironton coal, the Pomeroy coal, the Bellaire coal, the Steubenville coal, the Salineville coal, the Cambridge coal, the Del Roy coal, and the Coshocton coal. Sometimes

two or more qualities of coal are drawn from the same bed, as, for example, the Brier Hill coal and the Mineral Ridge coal, both of which are mined in the Mahoning Valley; or the Nelsonville, Straitsville, Shawnee, Sunday Creek and Monday Creek coals, all of which are drawn from the great seam of the Hocking Valley region.

All other conditions being equal, the best seams are first selected and opened. There are thousands of tons of as good coal still untouched in the coal field as in any present course of development, but for want of railroad facilities, or because of its lying in the interior of the coal field, it remains for the time being unwrought. The severe competition of the trade obliges the mining operators to take advantage of all the conditions in developing the mines. The districts which are furthest from market must have superior coals, which command extra prices, or else the trade languishes. The business largely turns on the character of the individual seams. The quality of the coal rather than its thickness, and the cost of placing the same upon the market, very largely deter mines the value of mining properties and mines.

All seams of coal, two feet thick and upward, are regarded as of mineable thickness, but four feet is regarded as the standard height. The expense attending the working of a three-feet vein is often considerably greater than working one four feet, exclusive of the dead work. This is a general but not universal rule, and obtains in mines like those of the Mahoning and Tuscarawas Valleys, where the coal varies suddenly in thickness. In such mines, for digging coal below four feet, 5 cents per ton extra is paid for every 3 inches of decreasing height, until the seam falls to two feet, when it is regarded as unmineable. At Leetonia, Hammondsville, and in the Coalton district of Jackson county, coals no thicker than 28 to 32 inches are wrought, but these coals possess peculiar qualities. The best coke in the State is made at Leetonia and Hammondsville, and everything that comes from the miner's pick is credited to him. At Coalton the coal is tender, and mines easily. The difference in expense of mining a 4-feet coal over a seam 10 feet in thickness is inconsiderable in amount; the advantages to mining operators who possess thick coals consisting more in the greater yield per acre than the lessened cost of production. Thus, at Wellston, in Jackson county, the coal is 4 feet thick; while at Straitsville the bed is 9 to 10 feet thick, but the same price obtains in both places for digging; at Wellston the coal is a homogeneous mass, while the thick coal of the Hocking Valley contains two bands of shale, and frequently a band of bone coal, which have to be sorted out by the miner, which militates considerably against his producing power.

In point of economy, drift mines do not ordinarily possess any material advantage over shaft mines opened in the same district.

It costs less, it is true, to open and equip a drift than a shaft; but after a shaft is opened and equipped the workings may be extended east, west, north and south, without any interruption to their symmetry or continuity. In drift mines on the other hand, even under the most favorable circumstances, not nore than one-half of the same extent of work can be opened up; and, frequently, by means of the numerous ravines, which cut down through the coal, a symmetrical and extended mine cannot be laid out at all. Moreover, a considerable part of hill coal along its line of outcrop is so largely impregnated with iron rust and earthy matter, as to render it unfit for market. In deep shaft mines, which discharge a great flow of water, the advantages are in favor of drift mining, but we have neither deep nor wet mines in Ohio.

In districts in which the coal seams about to be developed are level-free, the manner of opening mines is simple and inexpensive. The coal is usually exposed at some point on the hill-side, and is readily distinguished by a dark-colored streak on the clay, called the coal "blossom" or "outcrop." As the blossom is followed into the hill it gradually hardens into coal. For some yards, sometimes for many yards, the coal is soft, dead and rusty. This is called crop coal, and cannot be shipped. If the front of the hill in which the mine is opened is bold and steep, the coal soon becomes compact and bright, and fit for commercial use; but if the hill is retreating, and the mine is opened near the top, the entries may be pushed from 50 to 100 yards before merchantable coal is met. On lands where the cover is light, say 30 or 40 feet, and is mainly composed of alluvial matter, only a few feet of shale forming the immediate cover of the seam, the coal is often so tender and earthy as to be worthless. Under such conditions the roof is never good.

All drift mines require to be timbered for some distance from the mouth of the mine. The timbers, which are made out of hewn or sawed wood, are usually 8 by 10 inches in size, their length being governed by the height of the seam. The bents are sometimes placed close together, but are generally set about 2½ to 3 feet apart, the intermediate space being filled with 2-inch plank. The leg of each bent of timbers slants inward about 1 foot in 6. If the bottom of the mine is wet, cross-sills are laid under each set of timbers to keep them from sinking in the floor.

The mine is usually made from 8 to 10 feet wide, and the timbering is carried forward until the roof becomes so firm that it will safely stand of its own accord.

The point usually selected for opening is as near the southeast line of the mining property as may be practicable, so as to extend the workings to the north and west, along the rise of the strata, to facilitate hauling and draining. For 100 to 200 feet the coal usually dips from the mouth of the opening; and experienced miners take up several feet of the bottom, which they tail out to a point.

It is not always practicable to open and work to the rise of the strata. The main entries of many mines run east and south, and dip more or less. This always adds to the cost of getting the coal, but it cannot be avoided.

When the coal lies in the hill, 25 to 30 feet above the level of the railroad switch, the most favorable conditions for opening a mine are found, as this gives the proper height for dumping the mine cars through the chutes into the railroad cars below. We have, however, to accept the conditions as we find them; and frequently a mine is opened high upon the hill. Under such circumstances an inclined plane is constructed from the chutes to the drift mouth; the track of the plane is made double, the empty train ascending as the loaded train descends.

If, in opening a mine, the coal should be found too near the base of the hill to admit of dumping height, it adds considerably to the cost of hauling, as well as militates against the producing power of the mine to pull the loaded cars up-hill, from the mine mouth to the tipple, by horse-power; under such circumstances it is cheaper in the end to provide steam-power at once.

When a coal bed lies below water level, and has to be sunk for, it may be reached by a slope or shaft. A slope dips at from 25 to 30 degrees, and is preferred by many managers to a shaft, owing to the facility it affords for the ingress and egress of the miners. The expense of sinking and equipping a mine with adequate machinery is about the same in a shaft or slope until, as already stated, the latter exceeds 150 yards in length, when, in point of economy, the advantage is on the side of the shaft. In the Mahoning and Tuscarawas Valleys the mines opened on the lower bed of the series are generally slope openings. In all the other districts of the State the shaft seems to find favor, whether the depth to the coal be great or little.

The width of a slope is usually about 10 feet, and the height 5½ to 6 feet. The hauling road or railway track is made single; a loaded train of cars, two to four in number, being first hoisted and then an empty trip lowered. Shafts are made with double hoists, a loaded car ascending in one cage while an empty car descends in the opposite cage.

Shafts are rectangular in shape, and are usually 8 feet wide and 16 feet long. This is the standard size.

In commencing to sink, whether by shaft or slope, the horse and gin is employed until solid ground is reached. If the opening be no greater than 100 feet in depth, the horse and gin is often used until coal is struck, particularly in mines in which the flow of water is not great. It is, however, true economy to erect the permanent hoisting machinery of the mine before ground is broken. This has to be done sooner or later in any event, and it costs no more to construct it one time than another, while the money saved in hoisting rocks and water goes into the pocket of the mining adventurer.

All mines have to be timbered until solid ground is reached. The manner of timbering slopes is similar to that of timbering drifts, except that the bents require to be set a little closer together. In shafts the timbers are laid as tight as possible, and in well regulated mines are made of 10 inch square timbers. In some shallow mines in the State 3-inch plank is used, but this is mistaken economy. Timbers of eight inches are light enough under any conditions.

The cost of sinking a slope, 10 feet wide, and 6 feet high, does not ordinarily exceed $35 per yard. A shaft 8 feet wide and 16 feet long will average in good ground $45 to $50 per yard. This includes the expense of timbering, the powder used in blasting, and the raising of both rock and water. No uniform rule can, however, be laid down in such matters, the nature of the ground, the flow of water, and the provisions made in commencing operations for the success of the enterprise determine the expense. Some shafts cost more than double that of others under the same conditions, and on the same field the cost of sinking varies greatly, the result of the skill and judgment exercised in guiding and directing the subterranean excavations. The machinery of shaft and slope mines consists of an engine for raising coal, a pump for lifting water, and the necessary boiler power. The size of the hoisting engine is in proportion to the depth of the shaft and the weight of the coal raised. Double engines are coming into use around coal mines. Two to four boilers, 36 to 40 feet in length, and of 36 inches diameter, are generally needed to procure the necessary steam power for lifting coal and water. The drums upon which the shaft ropes revolve are 5 to 7 feet in diameter; the pulley wheels upon the pit head-frame of shafts are made 6 or 8 feet in diameter. The hoisting ropes are 1¼ inches in diameter, and are made of iron or steel wire.

At many mines where the coal is met within 100 feet of the surface, less elaborate arrangements suffice, but it is always wisdom to have

good, strong machinery, and especially to have abundant steam power. The money invested for such purposes will surely find its way back into the pocket of the owner of the mines. The hoisting arrangements of slope mines differ somewhat from those of shaft mines; in the former the track is nearly always single, and only one rope is needed, while in shafts the hoist is double. At many slopes a chain is often preferred to a wire rope, but the rope of wire or steel is better.

The pit head-frame of shaft mines is made 35 to 40 feet in height; the upper landing, where the coal is delivered, is 22 to 25 feet above the mouth of the pit, and two screens are used in sorting the coal into lump, nut and pea, as it goes from the tipple into the hoppers below.

All mines have water in them. In many drift mines, particularly in those in which the workings extend to the rise of the strata, the water is discharged by gravitation. In slopes and shafts, natural drainage is impossible, and the waters of the mine must be pumped or lifted out by steam power. A number of first-class coal pumps are in use in coal mines, Cooper's and Blake's being generally preferred to others. The size of the pump is governed by the amount of water. Some mines discharge much more water than others, and the mines of some districts are wetter than those of others. In the Mahoning Valley more water is met with than elsewhere in the State; this is due to the open character of the coal—the joints of which serve as reservoirs. A favorite pump in this valley, and one still largely in use, is the Buffalo, which has wooden pitments, which run down the side of the slope.

One of the first things necessary after coal has been struck in a slope or shaft mine, is to sink a water lodgment or sump. This is cut in the floor of the coal, and is sunk to a depth of 8 or 10 feet, and made of sufficient diameter to hold several hours' supply of water. A number six steam pump of the Cameron, Cooper, or Blake manufacture will discharge 500 gallons of water per minute, while 200 gallons per minute is a good flow in a mine. The quantity of water in mines varies greatly; frequently two pumps are necessary, sometimes three, and in the Leadville shaft in the Mahoning Valley, six No. 6 steam Cameron pumps were unable to keep down the water, even while the shaft was going down. So great was the flow of water in this shaft that special pumps had to be manufactured expressly for the occasion, and a special shaft sunk alongside of the main shaft in order to control the water. More than 3,000 gallons per minute were pumped out of the mine.

There are a number of methods or systems of laying out the workings of mines in use, according to the varying conditions which are met in the several mining districts, as, for example, the thickness of the

overlying strata, the character of the roof as to hardness and softness, the nature and thickness of the underlying fire-clay, the ability of the coal seam to resist pressure, etc. Suitable modifications of all the English systems are practiced, except that of long-wall. A number of mines, situated along the line of the Niles and New Lisbon Railroad, in Columbiana county, were opened out on the long-wall system some years ago, with satisfactory results, but during the late panic operations were suspended. On resuming work two or three years ago, the mining properties changed hands, and the new manager changed the plan to pillar and room practice.

A large amount of coal has been lost, and some valuable coal is still being lost by faulty systems of mining, as I have taken occasion to point out in former annual reports. The first mines opened in the State were drift workings, opened in the hills along the lines of outcrop of the coal. These hills, penetrated in all directions with ravines, generally contained only a few acres of coal, and the overlying strata were not heavy. Very light pillars sufficed to support the roof under such circumstances.

As the coal trade began to develop, and the mines became more extensive, the frail supports, which sufficed for small mines, were found inadequate for those of larger extent. The result was the falling in of the workings before they were fairly opened out. In reopening them larger pillars were left; this, however, was done grudgingly, for the larger the pillars left, the greater is the expense of getting the coal. Coal lands were, however, abundant and cheap, and the cost of opening new mines inconsiderable; hence, there was a temptation to adopt any system which would reduce the immediate cost of working to a minimum.

When shaft mining became a necessity, and the first ton of coal cost the mining adventurers ten or twelve thousand dollars, better systems were adopted from a sense of true economy, until by degrees, in all the mining districts of the State, improved systems were adopted; though there are still mines in every district very unskillfully managed, but they are now few and far between.

In all our well regulated mines the plans which generally obtain, correspond to the second system of British practice—that of working with pillars and rooms, the pillars left being of sufficient strength to maintain the incumbent strata in place as the workings advanced, and after the rooms are all finished, the pillars being in turn attacked. There are many modifications of this general system practiced in the various regions of the State.

In laying out the underground workings of mines, a plan of the proposed system of working is usually made in advance by a competent

practical mining engineer. The conditions must be carefully investigated as to drainage, the nature of the roof and floor, the texture of the coal, and the weight of the overlying strata. It is not always practical to follow the letter of the plan laid down, owing to the irregularities of the floor, and to the presence of horsebacks, but the spirit of the plan may be followed to the end.

The double entry system obtains in all well regulated mines; it consists in carrying forward two galleries in parallel lines on the face of the coal; a pillar of coal, 3 to 6 yards in thickness, being left between the entries, which is cut through every 30 to 40 yards for air. As a new air-hole is made at the face of the heading, the outer one is closed up, and made air-tight by wooden brattice, or otherwise, so as to force the air forward to the working face. Butt entries are opened to right and left of the main galleries; they are also made double, and are in all respects like the main galleries. Entries are made much narrower than rooms; they are generally driven 8 or 9 feet wide, for the purpose of having the roof firm and safe. The rooms from which the great bulk of the coal is got, are opened in the butt entries. Rooms are started at the same width at which the entries are worked, but they are rapidly opened out to full width, 7 to 9 yards; they are worked both north and south, in lines parallel with the main galleries of the mine. Butt entries are 160 to 200 yards apart.

The pillars or ribs left between rooms are of varying thickness, according to the nature and weight of the overlying strata; under a firm roof and a light cover, ribs 2 to 3 yards in thickness suffice; they are made thicker in proportion to the weight of the overlying rocks. Thin ribs are cut through every few yards, but when they are 4 to 6 yards in thickness, break-throughs are less frequently made. These break-throughs, like those made between the entries, are cut for the purpose of keeping a fresh stream of air as near the face of the workings as may be practicable.

The pillars of the mine are generally allowed to remain until all the rooms are worked out; they are then attacked in the interior of the mine, and cut away as clean as practicable, but a great part is necessarily lost by the falls which follow their extraction. Pillar-work is the most dangerous part of mining. In some mines the pillars are attacked as soon as the rooms are finished; under such circumstances it is necessary to leave strong supports along the galleries, to prevent the crushes and falls of the overlying rocks from overruning the mine.

The manner of digging the coal is artful and curious. The tools of the miner consist of a sledge, 8 to 10 pounds in weight; several steel

wedges, 6 to 8 inches long; 3 to 6 picks, each from 2½ to 3 pounds in weight, with handles 28 to 32 inches in length; a set of drilling tools, to wit: a drill, a scraper, a needle, and a tamping bar; frequently the drill and tamping bar are made of one piece, one end being used for a drill and the other for a tamper.

Two miners work together in rooms and entries; they keep each other company, assist in setting props; one watches while the other works in dangerous situations, and if one is caught in a fall of the roof or coal, the other can raise the alarm and call in adjoining comrades to the rescue.

The first and the most laborious part of the work of coal digging consists in undermining, bearing in, or holding the rooms. This is generally performed in the bottom of the coal seam with the pick. An undermining is made of varying depth, sometimes 3 to 4 feet frequently 5 or 6 feet; the miner stands upon his feet, and strikes with all his strength, until a few inches in depth are undercut, he then sits down on the floor of the mine, his legs stretched wide apart in front of his body, and cuts in 6 inches to a foot deeper; finally he stretches his body along the floor, his shoulder and arm to the elbow resting upon his thigh, and in this constrained position finishes up the undermining. It will take two active miners 4 or 5 hours to undermine a room 8 yards wide and 4 to 5 feet in depth. Forty or fifty blows of the pick are delivered per minute, and considerable skill is exercised in holing. Miners raised to the work from boyhood are both speedier and cleaner workmen than those who assume the calling after manhood. There is a good deal of difference also in the nature of the undermining, some beds cutting easy, others hard. A room is not usually undercut across its whole breadth in preparing a blast, though it is better to so undercut it.

Having finished the undermining, the next thing in order is boring a hole for the blast. Some skill is also required in performing this work, so as to give the powder the best possible advantage. In some mines more reliance is placed upon the drill than upon the pick, the coal being largely blasted out of the solid. In doing so the miner shatters the coal, but this gives him little concern so long as it adds ease to his body. Coal is not mined now with the care and skill of ten and twelve years ago. The amount of powder required for a shot varies from 1 to 8 pounds, the former amount sufficing when the coal is properly undermined—the latter amount being required in blasting out of the solid. As a general rule, a pound of powder is burned for every three tons of coal mined. In the Massillon region, where the main weapon of the miner is the drill, a pound of powder is burned for every single ton

mined. In some mines powder is not required, the coal being knocked down after it is undermined, with wedge and sledge.

The entries of mines are driven so narrow that prop-wood is not required to maintain the roof in place, but all rooms need propping. Sometimes 4 or 5 rows of props, planted 3 to 4 feet apart, are required to make the roof safe. The props are sunk in the floor a few inches, and are surmounted with a flat-cap, about 2 inches thick, 10 inches wide, and 18 inches to 2 feet in length. Some rooms require only one or two rows of props. The roof is not uniform throughout the mine; in one part it may be hard and strong, in other parts, tender and treacherous.

The railroad track of mines is about 3 feet in width; along the main entries the rails are made of T-iron, 12 to 16 pounds to the yard; in the rooms scantling is generally used, the size of the rail being governed by the weight of the loaded mine cars. Providing a good T-iron track all over a mine, entry and room alike, is true economy on the part of mine owners, although the first cost may be greater.

A good track and abundant ventilation are found wherever good mining engineering practice prevails. Mules cannot haul coal over bad roads; miners cannot work in bad air. Nature will rebel; the mule may be lashed by the driver, but he will retaliate with his heels; the miner may be cursed by the boss, but he will retaliate with a strike.

Mines in which the coal is 6 feet high use horses for hauling; below this height, mules are used.

Beds lower than 4 feet require to have the roof ripped, to admit the hauling mules. In low veins, a frequent practice is to employ pushers to push the mine cars from the working faces to the hauling roads or entries. This is the practice in the Steubenville district of Jefferson county, and the Coalton district of Jackson county. It costs less to employ men as pushers than to rip the roof to admit mules.

Along the main galleries of low mines the roof is ripped from end to end, and mules do the hauling to the main shaft or mouth of the drift, as the case may be.

In the thicker beds of coal the mine cars hold 1 to 1½ tons; in the thinner veins, 1½ to 1 ton. Thick beds cost less than thin ones for hauling coal, and other dead work. The cost of the dead work of mines ranges from 15 to 40 cents per ton; this includes entry-driving, cutting air-ways, cutting ditches, blasting roof and bottom, laying track, providing props and rail timber, and hauling, dumping, and loading coal.

Three grades of marketable coal are made at mines, "lump," "nut," and "pea," the latter, which is the finest or smallest variety, is not made at all mines. The space between the bars of the screen is 1 to 1¼

inches; occasionally wider or narrower bars are used, but they are exceptional cases. All coal which does not fall through the bars of the screen is called "lump." A second screen, with bars ½ an inch apart, separates the "slack" from the "nut." Pea coal is made by screening the nut coal. The slack is raised from the ground by a self-loading elevator, and thrown into a revolving circular screen, which thoroughly sifts out the fine coal which falls back to the ground, and is hauled away as refuse matter. At some mines the nut coal is washed and purified before being loaded for shipment.

The proportion of lump to nut and slack varies considerably in mines, partly owing to the nature of the coal, and partly to the skill with which the coal is mined. Tender seams naturally make more nut and slack than hard coal. In the Coalton or Wellston district, where the seam is unusually tender, two-fifths of the whole pass through a 1¼-inch screen, while in the Mahoning Valley, in the Brier Hill district, where the coal is hard and firm, only one-sixth of it falls through the screen. In mines in which powder is injudiciously used the coal is wantonly broken up into nut and slack. Unskilled miners make more fine coal than experienced workmen.

Work commences in the great majority of mines at 7 o'clock A.M.; an hour is given to dinner at noon, and work ceases at 5 P.M.; nine working hours being a day's work. The diggers work by the ton, and are in a measure their own bosses. All the workmen are expected to be down the shaft or slope before the mules commence hauling. In mines in which heavy charges of powder are used in blasting out the coal, the workmen are forbidden from firing until 4 P.M. In 5 minutes after the blasting signal is given 40 or 50 discharges are heard, and such is the force of these blasts that the earth shakes above. Vast volumes of smoke load the air of the mines after these subterranean discharges.

In some mines firing is allowed twice a day, at noon and quitting times, and in the Steubenville district, where small discharges of powder suffice, and the ventilating currents are usually strong, the workmen blast at all hours of the day, and suffer no inconvenience in consequence.

All shaft mines are provided with cages or elevators, upon which the loaded and empty cars are raised and lowered through the shaft. Cages are provided with safety-catches or locks designed to hold the cage in the guides, and prevent it from falling in case the rope should break. On the top of the cage there is a cover of oak boards or sheet-iron to protect the workmen from falling stones, and in front of the shaft, at the landing on top, self-acting gates are placed, which are lifted out of the way by the ascending cage, and drop back as the cage is

lowered, and guard the entrance of the shaft. Not more than ten persons at once are allowed by law to ascend or descend a shaft mine. Signaling arrangements are provided at all shafts, consisting of a bell or hammer, for the information of the hoisting engineer. When a loaded car is pushed on the cage at the bottom, the cager below raps once, signifying that coal is coming up; two raps are for the return of the cage, and three raps that men are about to be hoisted, when the engineer exercises more than ordinary care. The system of signaling is not uniform at mines, though it should be. The best signal arrangements in the State are in use at the Garfield shaft in Trumbull county. There is a bell on top and one at the bottom. When men are about to be hoisted the cager below raps three times, the engineer answers by one rap, and until this is done no person is allowed to step on the cage. After the miners (not more than ten in number) are safely on the cage, the cager knocks again, giving one rap; the engineer answers that he is about to start by one rap, and the men are carefully raised to day.

In laying out the workings of mines two general systems are adopted with the view as well to provide the means for circulating currents of air through the workings, as for mining away the coal bed, namely: the long-wall system and the pillar and room system. By the former method all the coal is excavated as the workings advance progressively forward, the overlying strata being allowed to fall down and close in behind the miners, who maintain traveling-ways by cutting up the floor or blasting down the roof. In the latter method columns of coal are left in the mine as the workings advance for the support of the superincumbent strata, these columns being attacked afterwards; sometimes in a series of rooms as the workings advance, but more generally after all the rooms have been finished up to the boundary line of the mining plant. Long-wall mining, although it can be applied to more advantage in many seams of coal than pillar and room practice, has not yet obtained a foothold in Ohio mines, all our coal being won by the pillar and room system, as I have already stated.

Pillar and room working, as its name indicates, consists in forming pillars and rooms, alternately, the proportion of coal mined away to that left standing being governed by surrounding circumstances and conditions. Rooms are made wide and pillars narrow when the roof is hard and firm, and the thickness of the overlying strata is not great; when the roof is tender, and the superincumbent strata heavy, narrow rooms and strong pillars are required.

In opening a mine on the pillar and room system, gangways, entries, headings or galleries, as they are variously called, are first run forward

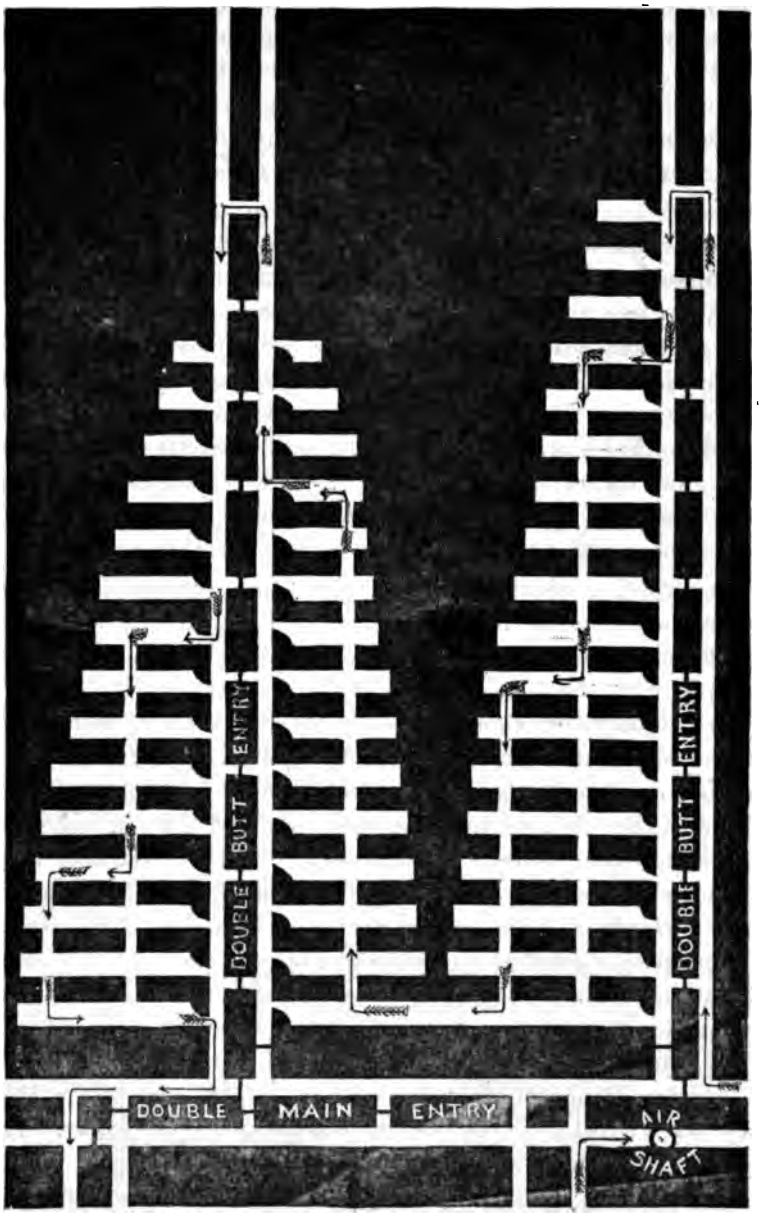
on the face and end slips of the coal bed. These entries, which in all well regulated mines are made double, constitute the main avenues of the mine; they are usually driven much narrower than the rooms or chambers so as to make them extra safe, as well as to add strength to the pillars. The rooms are invariably started from off the butt entries of the mine. In both entries and rooms breakthroughs require to be made from one working place to another at stated intervals for the passage of the ventilating currents of air.

In all mines in this State in which improved mining systems are understood, no working place is driven forward more than forty yards ahead of the circulating current until a breakthrough is cut in the pillar, from one working place to another. All breakthroughs, except those last made near the working faces of the mine, are built up and rendered air-tight by brettice trap-doors, or otherwise, in order to force the air currents forward where the people are employed, for the tendency of the current is to follow the easiest route to the upcast and return to day.

In mines in which no fire-damp is given off, fully 100 cubic feet of air per miner per minute should be circulated in the mine; in mines which make fire-damp a much greater quantity is required, particularly if the fire-damp is emitted copiously. But this current must be made to sweep through the interior of the mine, where the men are employed, or it will do little or no good. There may be ten times the amount of air required for the sanitary condition of a mine entering by the intake and being discharged by the upcast, and yet the working places in the interior be in a very defective condition. Under every system of ventilation there is a loss of air by leakage through the trap-doors.

When two separate openings of different depths are made into a mine a current of air is set in motion by the natural pressure of the atmosphere. In winter the lower opening will be the downcast, and in summer it will be the upcast, because during winter the atmosphere outside is denser and consequently heavier than the air of the mine, while in summer the reverse is the case. During those seasons of the year in which the mine atmosphere and the air outside approximate each other in density there will be no motion, or it will be so slight as to be of little service for ventilation.

As underground excavations become more extensive the natural forces, even during seasons most favorable to their operation, become wholly inadequate as a ventilating power, owing to the resistance which the top, bottom and sides of the airways offer to the moving current of air, and artificial ventilation has to be applied to produce a circulation



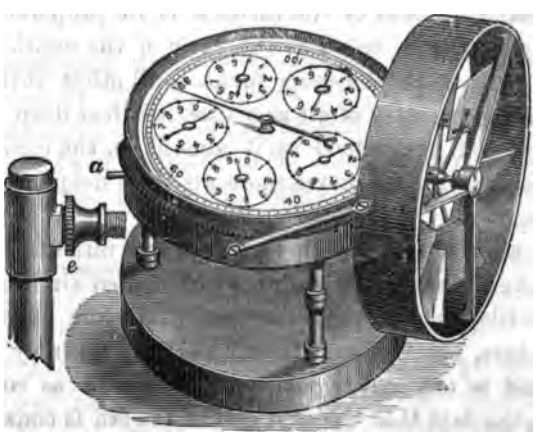
PLAN OF WORKING BY DOUBLE ENTRY.

of sufficient power, to sweep away the gases and render them harmless. Furnaces and fans are the favorite powers applied to produce artificial ventilation. Frequently exhaust steam from the steam pump at the bottom of the upcast or pumping shaft is applied; but while this is a valuable auxiliary, it is too weak a ventilating force in a large and extensive mine to be used alone, if systematic perfection in ventilation be desired.

The furnace has long been the favorite method of producing ventilation among practical men, but of late years exhaust fans of the Guibal, Waddle, Schiele and other patterns have been introduced, and have worked so successfully as to supplant the furnace nearly altogether over large and important mining districts in England and the continental States of Europe. The furnace in its first cost is cheaper than the fan, and in deep mines is capable of doing equally effective work, while for shallow shaft mines the fan is both cheaper and more effective as a ventilating power. The furnace is likely, however, to continue as a ventilator as long as coal mining is followed, either in this or other countries.

The proper construction of a ventilating furnace is a debatable question among mining engineers. A thin, wide fire and low arch more effectually heat the passing current of air and so add to the ventilating power of the furnace than a furnace having a high arch. The arch, in my judgment, should never be higher than 3½ feet above the bars, and the wider the furnace is the better, and the whole width should be kept constantly and uniformly heated As furnaces are ordinarily built they do not admit the whole amount of air which they are capable of moving, hence it is found to add to their ventilating power to provide side chambers. The object of these chambers is to admit the passage of columns of cool air between the furnace and pillars of coal for the purpose of preventing the pillars taking fire, but the chambers are found in practice to add to the amount of current. This fact produced quite a discussion among some of the members of the Ohio Institute of Mining Engineers at the Nelsonville meeting in May, 1882. The Orbiston Mine, which is opened on the thick coal of the Hocking Valley, was visited by several of the members of this society. The air courses are 8 feet wide and 8 feet high, making a sectional arch of 64 feet. The furnace is 6 feet wide, 3½ feet high above the bars, and has two side chambers for the passage of cool air. Mr. Palmer, the mining boss, stated that when these chambers were opened the amount of current was increased fully 2,000 feet per minute, the column of air moved being about 30,000 cubic feet per minute. Mr. Hazeltine contended

that there must have been a mistake committed in taking the measurements, as the cool air which passed through the side chambers would, by mixing with the hot air which passed through the furnace, decrease the temperature in the upcast shaft and so reduce rather than increase the amount of air in circulation. I have taken measurements frequently in mines where the current was increased in quantity where side chambers were opened, and while Mr. Hazeltine was undoubtedly correct in theory, his idea did not embrace the whole theory. The greater the heat communicated to the air of the upcast, the greater must of course be the ventilating pressure. The power was lost in the passage of air through the furnace, for the sectional area of the furnace was only 11 or 12 feet, being fully five times smaller than the airway of the mine, while the column of air itself became expanded to more than double its volume in passing over the fire. The resistance which the air encountered at the furnace checked the column, which found vent when the side chambers were opened; hence, the increase in the quantity of air. The cool air which escaped through the side chambers would, on uniting with the hot column which passed over the fire, decrease the temperature to some extent and so lessen the ventilating pressure, as Mr. Hazeltine suggested; but this counterpoising influence was overcome to the extent of an increase of 2,000 cubic feet by the side chambers of the furnace. Some years ago the furnace attendant in a mine in the Mahoning Valley in digging coal for the furnace near the bottom of the upcast shaft accidentally cut into the shaft. As soon as the coal was removed the flow of air increased 60 per cent. The mine boss was astonished and delighted, and when I visited the mine afterwards he told me that he had made an important discovery in mining



ANEMOMETER FOR MEASURING THE AIR OF MINES.

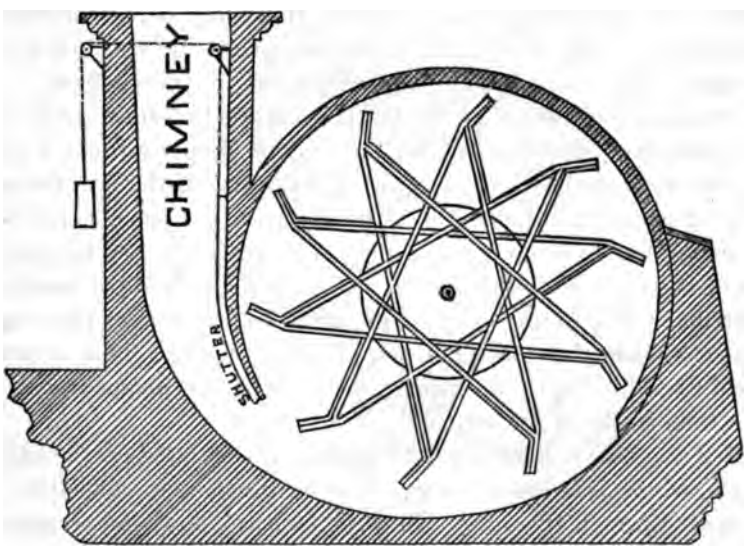
ventilation, and proposed applying for a patent on it. I told him his furnace was too small for the requirements of the mine, that the air had not room to pass through the furnace, and his plan was, not to apply for a patent, but to pull down his furnace and treble its sectional area and he would behold still more surprising results in the increase of current.

Where the airways of a mine are of. say 30 feet of a sectional area, a furnace 7 feet wide and 3½ feet high above the bars, will, I think, approach systematic perfection. The furnace has a limit to its power, and when it is reached we pile on coals in vain. In building a furnace it adds to its efficiency to slant it upward inside of the bars, say one foot in six until the upcast shaft is reached.

In the mines of this State, the quantity of air moved by a properly constructed furnace ranges from 2,000 to 6,000 cubic feet per minute for every foot of breadth of fire. The depth of the ventilating shaft, its freedom from water, the size of the air-courses of the mine, the temperature of the outside atmosphere, all combine in determining the quantity of air which can be moved through a mine by furnace ventilation. In winter, as already stated, the natural forces aid the ventilation, while in summer the natural forces oppose the furnace, like a steamboat going up stream. In deep mines, like those in England, the natural current is in the direction of the upcast all the year round, because the mine air of deep mines is always rarer than the atmosphere on the surface; but while in summer there is no opposing force to overcome, there is little assistance given, the temperature of mine and surface air being so nearly equal in weight. In winter the natural forces and the furnace in proportion to the difference of temperature of the mine and surface air. The practical power of the furnace is in proportion to the depth of the shaft, the powder being as the ratio of the depth ; hence, a shaft 400 feet deep will, with the same furnace, all other things being equal, move double the quantity of air as a shaft 100 feet deep. This practical fact is not as well understood as it should be, the common impression being that shallow mines move more air than deep ones with the same ventilative power. Until within a few years ago, it was a rare thing to see a roomy, well-constructed furnace in a coal mine in this State, owing to this mistaken view of the influence of heated air in shafts.

Fan ventilation, on the other hand, is more effective in shallow than deep mines, but fan ventilation has only recently been applied in this State, and is not making as rapid headway as could be wished, mainly from the fact that the first cost of the fan is considerably greater than that of the furnace, and in drift mines it is as costly at all times,

because at drift mines the fan and engine require the attendance of an engineer, while in a shaft mine the hoisting engineer can attend both engines, which is a saving of one man at the mine, besides the saving in the coal required to maintain a ventilating furnace. Whenever furnace ventilation is applied the supply of air is liable to great irregularity by neglect of the furnace man; and the danger of fire, of which we have so many fatal examples, is ever present. Moreover, in mines where the furnace is placed at the bottom of the hoisting shaft the guides, the ropes and the timber of the shaft are subject to injury from the gases given off by the furnace. All these evils are obviated by the fan, in addition to the daily saving in fuel and attendance.



GUIBAL'S FAN

The best ventilating fans are constructed on the centrifugallar principle, and those of the Waddle, Schiele and Guibal patterns, as already stated, have attained high fame in England and the Continental States of Europe. Guibal's is preferred to the others, and is probably the best ventilating fan for the use of coal mines ever applied in any country. This fan has a large diameter, some of those used at the deep and extensive mines in England ranging from 40 to 50 feet. The blades of the fan, eight in number and 10 feet wide, are inclined backward and the air is discharged through an adjustable shutter into an expanding chimney about 20 feet in height. This fan, although more extensively applied in the coal mining districts of England and Continental Europe than all other fans combined, is yet mainly confined in this country to

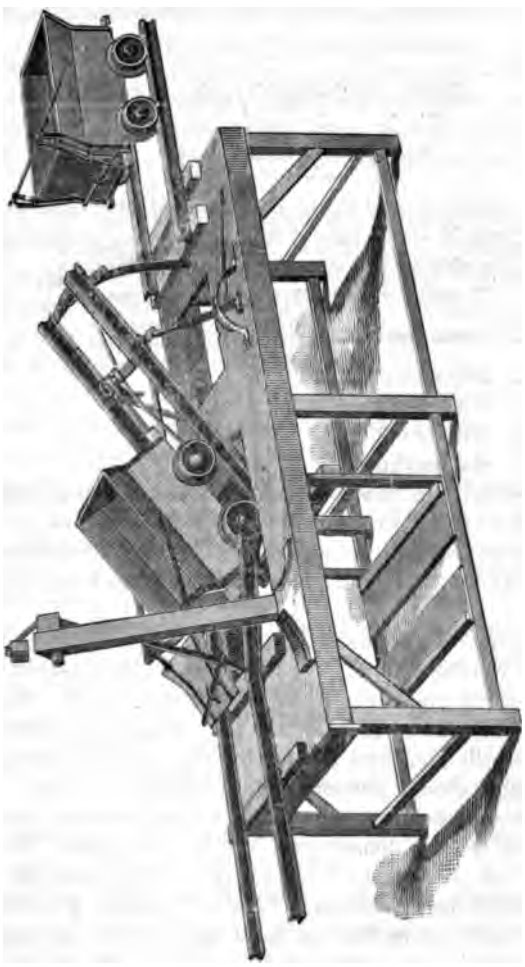
the anthracite region of Pennsylvania, because such costly and elaborate arrangements as attend its construction are not required to produce the limited currents of air which suffice for our shallower and smaller mines. From 250,000 to 300,000 cubic feet of air per minute are frequently produced by means of the largest Guibal fans in the mines of England.

The Champion fan, which was introduced in the mining regions of Ohio and other western States a few years ago, gives very satisfactory results. Wherever this fan has been introduced mining engineers and mining bosses declare that they could not be hired to go back to the furnace as a ventilating power.

This fan consists of two revolving wheels set in one shaft, a few feet apart; the blades are so constructed that they do. not oppose any flat resistance to the air, being curved backward and run into the circumference. There are several sizes made, which range from 4 to 10 feet in diameter; the speed of the fan is from 200 to 600 revolutions per minute, and from 10,000 to 60,000 cubic feet of air per minute is put in motion throughout the mine, according to the size of the fan, the speed at which it is run and the frictional resistance which the air encounters in traversing the galleries of the mine. The air is received between the wheels of the fan and is expelled direct to open day, and the machine is so constructed that it can be used either as an exhaust or blowing fan without changing the gearing or stopping the engine. This advantage will be duly appreciated by mining bosses who are plagued with wet shafts which freeze in winter.

All of the fans mentioned in this paper are operated on the exhaust principle, which is found in practice to be much more effective than blowing air through the mine. Blowing fans are, however, occasionally used, and there are two of this kind in the Mahoning Valley, one at the Church Hill Shaft in Trumbull county, and the other at the Leadvill Shaft in Mahoning county. The diameter of these fans is about 7 feet, the width of the blade being 3 feet. They move each from 14,000 to 16,000 cubic feet of air per minute and serve every purpose for which they were intended.

The Mitchell dump, to which I called attention in my report for 1877, has become a favorite in the Hocking Valley and other regions where speed is required in dumping coal. This dump is so arranged that a loaded car in passing into the tipple tips up automatically, its speed being regulated by a brake, the handle of which is alongside of the dumpman. When the car in the tipple is emptied it falls back in place, and the top irons are thrown out of place by a spring acted upon by the advancing loaded car. When the second car (loaded) strikes the



one that has just been emptied on the tipple, the empty car is pushed forward out of the way. The tipple irons then spring back and receive and hold the loaded car which is dumped as the former one was, to be in turn pushed out of the way by the next advancing full car. Everything works without friction and in the most satisfactory manner.

THE USES OF OHIO COALS.

By Prof. Edward Orton.

A few general statements as to the chief uses of Ohio coals will be given here, in order that the detailed statements that follow may be seen in their proper light. The following list shows their more important applications:

1. Household use—Grates, stoves, furnaces.
2. Steam production { In locomotives. / In stationary engines.
3. Iron-smelting coal.
4. Coke manufacture.
5. Rolling mill fuel.
6. Gas-making.

1. For household use, there is no fixed and common standard. Widely separated varieties are used with apparently equal acceptance in different sections of the State. The rich cementing coals of the Pittsburg district have long been the chief supply of the Ohio Valley, and here they hold their ground against all competitors.

The open-burning coals of the Mahoning and Upper Tuscarawas valleys are the standard fuels of Northern Ohio. Through Central Ohio, several distinct varieties have each the decided preference in as many distinct fields. The most accessible coal will generally be used by each section, and acquaintance with the character of this particular fuel will often lead to its being retained, even when competing coals of intrinsically higher though different quality reach the market.

There are, however, some general considerations by which the degree of adaptability of our several coals to domestic use can be determined. For this, as indeed for all other uses, low percentages of ash and sulphur (pyrites) are desirable, as it is to these elements that the production of "clinker" is due. It must also be free from slate and bone. Furthermore, the coal must ignite easily, and still must hold the fire at least moderately well. A fairly high percentage of carbon is of course necessary. The less smoke and soot it makes in burning, the better. In addition to these points, its physical properties must also recommend it. It should be clean and bright, and it should also have strength enough to bear all necessary handling without excessive breakage.

According to such a standard, the coal of the Sharon seam, and especially in the Massillon district, would be entitled to the first place, but it would be followed closely by several other coals. There are many large coal-fields, and some entire seams, that make no attempt to enter this market.

2. High quality in a coal will tell upon its efficiency in the production of steam as promptly and certainly as in any other use, but poorer quality is less objectionable and offensive here than elsewhere. Chemical and physical properties that would wholly exclude a coal from certain of the higher uses may not interfere with the wide and acceptable use of the same coal in the production of steam. A coal that mines small, or that is too tender to bear handling, is ruled out of the market for

domestic use; but such points count little or nothing against it as a stream coal at the present time. Both locomotive and stationary engines have been lately adjusted so as to successfuly use the smaller grades of coal, nut, pea, and even slack. The yard engines of many railroads, and the freight engines of some, do all their work on pea coal and slack. This great saving of fuel, often derived from the best part of the seam and entirely lost hitherto, is a matter of great importance to the coal-fields and to the State.

The "strength" of the coal, or its absolute heating power, seems a matter of more consequence in a steam coal than the nicer points of composition.

All the coals of the State, from the purest and best to the seams of lowest quality, do duty as steam coals, but there are some seams that are practically limited to this service. The Upper Freeport coal is an example of this class. It is one of the most important seams of the Coal Measures, but every year fixes its character more definitely and exclusively as a steam coal. Its high percentage of fixed carbon insures its efficiency, and its tenderness under handling works less against it here than in most other applications.

Open-burning and cementing coals are used promiscuously by the same railroad often, but probably not without some disadvantage. Each coal has its own behavior on the grate-bars, and each gives better results when treated in one way than in other ways. The neglect to study and recognize these "personal equations" of the different seams vitiates or even nullifies many of the practical tests to which the coals are subjected. Unless each coal has been so treated as to insure its best results, the so-called test is unfair and deceptive. One locomotive engineer will complain of a coal that it "smuts the flues." Another will use coal from the same mine without experiencing the slightest tendency to this trouble.

Ash, sulphur, and slate that tend to run on the grate and form "clinker," or that accumulate so as to deaden the fire, are the elements that are most obnoxious in our steam coals.

3. For blast-furnace use, only the best and purest of our open-burning coals are available in the raw state. There are four fields from which such coals are taken, namely, the Mahoning Valley, the Massillon district, the Hocking Valley, and the Jackson county district. The first of these regions has furnished the type and standard of this class of fuels hitherto, but its day of service in this field has gone by, and it is now almost entirely displaced on its own ground by the great iron-making fuel of the Ohio Valley, Connellsville coke. The Massillon coal has not as happy an adaptation to this use as the coal already named, and has never been applied to iron-making in the large way. But very little of it is used in furnaces at the present time.

The Hocking Valley coal in its best phases is well adapted to iron manufacture, and a great and growing industry is already established upon it in this connection.

The two seams of Jackson Court-house and vicinity, namely, the Shaft coal and the Hill coal, are both largely and successfully used in the furnaces of the district to which they belong.

4. There is but one field of the State in which coal is mined expressly for coking. The small coal and slack of several districts go to the coke-ovens, but in Leetonia alone is the whole product of the mines brought to the ovens. This is the only coke now made in Ohio that is used in iron-smelting. The Shaft coal at Steubenville

has been largely used in this way in the past, but it has also succumbed to the superior quality and lower price of Connellsville coke.

The coke now made in the State is chiefly manufactured from the small coal and slack that accumulate in mining. The impurities of the seam are often gathered here in large amount, and the coke that results shows their presence by excessive ash and sulphur. These cokes are used to but small extent in foundries, and find their main applications in heating purposes where quality is not essential. The use of these waste products in this way is an important step in the line of fuel economy, a topic which our coal producers are just beginning to consider.

The seams used for coking are especially the Freeport coals and the Pittsburg. No successful manufacture now exists in any other seam, in fact, except in the two cases already noted of the Lower and Middle Kittanning coals, at Leetonia and Hammondsville, respectively.

5. The requisites for a good milling coal are quick combustion, with plenty of flame, together with as much purity as can be secured. The Brush Creek coal, the Freeport coals, and the Kittanning coals furnish the chief supply. Each of these several seams does good service at some point or other in its development.

The Salineville Strip seam (Brush Creek coal), the Steubenville Shaft seam (Lower Freeport), and the Leetonia coal (Lower Kittanning), all enjoy excellent reputation as milling coals. The Pittsburg and the Upper Freeport seams are also considerably used. The Block coal of the Mahoning Valley is highly esteemed for this use, wherever the price at which it can be afforded allows it to be used.

6. For gas-making, our native supply is not drawn upon to any great extent outside of the State boundaries. Within these limits, several seams are used with a fair degree of acceptance. The Hocking Valley coal furnishes by far the largest supply for this purpose. The inferior quality of the coke produced puts them all at a disadvantage when compared with the Pittsburg coal.

Almost all Ohio coal is sorted and cleaned by a process called screening before it is brought into market. All that is used for domestic purposes is treated in this way, also all that is used in iron-making. Until quite recently, all railroad fuel was also screened. A large proportion of it is still prepared in this way, but there is a growing tendency on the part of railroad companies either to use the coal as it comes from the miner's pick, which is technically known as the "run of mine," or else to throw together two or more of the several grades of coal that have been sold separately hitherto.

There are two grades of coal supplied by almost all mines, and three grades from many. These are respectively designated lump or round coal, nut coal, and slack. The first commands the highest price, the last is often valueless; but within the last few years, the slack of certain seams has come into demand for various purposes, and a large quantity is now finding its way to market. From the slack is also derived the grade of coal called pea coal, which a few mine are furnishing.

The process of screening consists in passing the coal as it comes from the bank-cars over one or more inclined screens on its way to the cars, boats, or wagons by which it is to be transported to market. There is no general system in force in the process of screening. The length and width of the screens, the angle or pitch at which they are placed, the space between the bars, the width and shape of the bars, all vary between wide limits in the different portions of the field, and even in dif-

ferent mines in the same district. The miner is paid in most of the districts on that portion of the coal only that passes over the screen, or in other words, on lump or round coal, which is also called clean coal. The varying character of the seams, the differences between different mines in the same seam and different portions of the same mine, all these elements combine with the facts already noted as to the varying dimensions of the screens to make the question of wages for mining a complicated and troublesome one. The screens are a fruitful source of discord between the mine operator and the miner.

There is a rapidly growing appreciation of the second grade of the coal product, that is, the nut coal. This grade results quite largely from the operation of "bearing in" upon the coal seam, or undermining it. In a large number of instances, the best portion of the seam occurs in the "bearing in" bench, and thus the nut coal often contains the choicest fuel that is produced from the seam. The lump coal must generally be reduced to smaller size before it can be used, but still the popular demand has hitherto been for large coal, and great quantities of the smaller sizes have been utterly wasted. The arrest of this waste and the bringing into use of all the products of the mine are steps of great interest to the State at large.

The nut coal is run with the slack in some fields, enriching this latter element so as to make it a fully marketable product, which still goes under the name of slack.

Within a few years, two new departures have been made in the disposition of the slack in several districts. In some, the slack is sifted or washed in revolving screens, by which the dust is removed, and the resulting fuel is known as pea coal. This finds market for use in stationary engines, and for other like purposes. The second of these new methods consists in coking the slack.

The proportion of the coal gained in mining is increasing in most districts of the State, owing to better methods of mining, and better demand for the smaller coal. The empirical rule that gives 1000 tons of coal to every acre for each foot in thickness of the seam, doubtless expresses the actual result in a large number of instances, but better figures are now obtained in many sections, as will be hereafter shown, and far better results are certainly attainable in almost all our districts.

The specific gravity of our coals ranges for the most part between 1·24 and 1·34. Assuming the mean, or 1·29, as the average—and this figure is very near the truth—every acre of such coal will contain for each foot in thickness 1,752 tons of 2,000 pounds. The miner's estimate, as embodied in the rule above referred to, shows that he is content with securing four-sevenths, or a little more than half, of the coal that the seam contains. The best foreign practice is far in advance of such results. In the Bristol coal-field of England, it is calculated that 1,500 tons to the foot are won for each acre, the entire loss in mining being reduced to one-tenth of the seam. The best practice that is fairly well verified in Ohio gains two-thirds of the coal, and the cases in which this is done are very rare. More than this is claimed in many mines, but it is probable that, if examined, such claims would be found to be untenable.

INDUSTRIAL CO-OPERATION.

The miners of the State do not improve the opportunities placed within their reach. There are many men among them of good executive ability and fair education, capable of doing their fellows enduring service if their talents were directed into proper channels. The temporal salvation of the workingmen of this country, in my judgment, lies through industrial co-operation, and the time is fast approaching when this subject will force itself upon the toiling masses of our people as the only remedy for the redemption of labor. A brief sketch of the operations and results of co-operation may not be out of place in this report.

Co-operation, which is meant the banding together of a number of workingmen for the purpose of applying their earnings in starting a store, opening a coal mine, building a blast furnace, or engaging in other industrial pursuits, and thus becoming at once the possessor of their own capital and labor, had its origin in England in the year 1843. The subject had been for a number of years previously discussed during strikes and labor troubles.

In 1843 the flannel weavers of Rochdale having failed in their effort to secure an advance of wages which they regarded as due them, turned their attention to the question of opening a store on a co-operative plan, and by the lessened cost of purchasing provisions make up in a measure for that which had been denied them by their employers. A society was organized consisting of forty members, and a little shop in Toad Lane was rented for $50 a year. All the cash the company could raise to commence business with did not exceed $10; the whole stock of the store consisted of a barrel of salt, a few pounds of butter and a little oatmeal. For some time the little store was made the butt of much clumsy ridicule, but the members were men of sense and intelligence, who attended to their own business, and the ridicule about the "owd weaver's shop in Toad Lane" soon gave way to wonder and admiration. The affairs of the society continued to flourish from the day the little shop was opened, and its fame was sung before long from "Land's End to John O'Groat's." At the end of fourteen years it had grown into one of the largest establishments in the United Kingdom—the business of the association having reached the enormous amount of $380,000 per annum, and all this business was done on a cash basis. This co-operative society still exists; its business has branched out into every other department of trade, and a score of first-class stores are owned by the company. There is now a library and reading-room in connection with the society, which contains 20,000 volumes and all the leading periodicals published in Great Britain and the United States. A newspaper, called the *Roch-*

dale Co-operative News, is published in connection with the society, and is the official organ of the co-operative movement in England.

The success attending the venture of the Rochdale weavers soon spread over all England; other co-operative societies were formed, and there are now in Great Britain between 1,400 and 1,500 such associations in existence, having an aggregate membership of upward of 500,000, the annual sales of all these co-operative stores reaching the enormous amount of $75,000,000 per annum. Every one of these societies was little better off at the date of organization as to means than the Rochdale association. They were originally established for the purpose of purchasing food, clothing and other necessaries of life at wholesale prices for the benefit of members. Their rules are such that a share in no case exceeds $5, and the greatest number of shares each member may purchase is usually limited to 200. Members are not required to pay the whole amount subscribed in advance, and in default of payment, resulting from sickness or want of employment, the time is extended.

A committee of management, consisting of a few of the wiser heads of the society, are elected by members to serve for a stated time, who receive a small compensation for their services. Business meetings are usually held every quarter. Many of the societies have grown into enormous proportions, almost surpassing credence. The co-operative society of Halifax has twenty-five branches, and does a business aggregating at least one and a half million dollars per annum, and realizing a net annual profit of fully $150,000. Like the Rochdale society, a magnificent library and reading-room has been provided, which issues to its members 500 volumes per week. The leading daily, weekly, monthly and quarterly periodicals are always on hand. In fact, a leading feature of co-operative societies in England consists in supplying their members with wholesome literature, for such societies are only a possibility among intelligent workingmen. Wherever there are reading-rooms and libraries among workingmen there is the beginning of industrial independence; there you will find temperance, morality and thrift, without which there can be no intelligence.

The manner of carrying on business on the part of these co-operative stores is as follows: All goods are purchased and sold for cash. Goods are sold to all purchasers alike, whether they belong to the society or not, for one price. Only the best goods the markets can afford are purchased and offered for sale. So careful are the managing committees at many of the stores that any goods suspected of being adulterated are sent to chemists for analysis, the workmen who control these societies justly concluding that as all the food of the world is raised by the

brawny arm of labor, so the workingman has the best right to pure, healthful, unadulterated food. This plan also gives such stores a deserved reputation for keeping only the purest articles for sale. All true men will pay a good price for a pure article of food rather than purchase an article at a less price which has been adulterated. As a general rule only stores that sell for cash have succeeded, nearly all those adopting the credit system having failed. The average interest to investors derived from these co-operative stores often reaches as high as 28 per cent. Some pay better than others, according as they are managed with skill and judgment. So successful have they been, however, that they may be said to have become permanent institutions in England, and it is believed that they will, before the lapse of many years, control the whole productive and distributive business of the United Kingdom. They possess another great advantage to the workingman—they encourage thrift. Thousands of workingmen who are now in a measure well-to-do never had a dollar ahead until they became members of a co-operative society. Having accumulated a little for a rainy day, the desire to add to it grows upon most men, and the possession of means invariably commands respect on the part of society, for, as Dr. Franklin says in Poor Richard's: "Now that I have a cow and a horse everybody says 'good morning, sir.'"

In Great Britain, with its dense population, its aristocracy, its laws of entail, the avenues to wealth or political distinction have ever been hermetically sealed against the workingman, except only through co-operative associations such as have been described, where a very little capital, but an abundance of good business sense, was all that was needed to command success. Co-operation grew out of the necessities of the English laborer, and all honor to him who, surrounded with such formidable barriers, has found a safe and sure way to improve his condition in his life.

Although co-operation has been attended with such grand results in the mother country, it has attracted very little attention in this country up to date. Twenty-five years ago numerous associations similar in character to the co-operative societies of Great Britain were organized in the New England States and other portions of the Union; but instead of flourishing and becoming a vast power in bettering the condition of the industrial masses, the great majority of them soon declined and passed away. The reason for this is, however, obvious; they were organized too soon. In this country, with its free institutions, its sparse population, its vast agricultural and mineral resources, its boundless great west, the avenues to wealth and honor have been so numerous and

so easily accessible that workingmen capable of leading in great industrial reforms have been drawn into business or public life, and have done for themselves as individuals what the English workingman could never hope to accomplish—become capitalists on their own account, owning stores, opening mines, building railroads and achieving honor in the public service. The man who a few years ago was a day laborer on the farm, in the coal mine, at the rolling mill, is now the controlling spirit in every department of human industry, while the rail splitter, the tanner, the tailor and the canal boat driver have become world-renowned Presidents.

But as our country becomes filled up with a denser population; as wealth finds its way into fewer hands; as corporations increase in magnitude and power; as the public service becomes more and more corrupt by the use and influence of money, the opportunities for workingmen rising in life will become correspondingly difficult. The labor leaders will then in self-defense, as in England, organize co-operative societies to protect themselves against the growing power of aggregated capital. And this will be the beginning of the end of industrial independence.

The miners of Kansas are reaching out and solving the labor question, not by fruitless and endless strikes and combinations against capital, but by the practical application of industrial co-operation. I found during a recent visit to Osage county, in that State, two mines worked by the co-operation of miners, who, combining labor and capital, were doing for themselves what no strike had ever accomplished or ever will accomplish for them.

The Superior Coal and Mining Company, situated at Osage City, a joint stock enterprise, composed of 41 members, all miners, was organized four years ago. They purchased 56 acres of land owning coal and surface, but since the mines were opened most of the land has been sold out in lots to individual members. The mines have been worked successfully on the long-wall system, the prevailing plan of mining coal in the district.

The Industrial Coal and Mining Company was organized in March, 1880, and consists of 12 members, all miners, each of whom holds an equal share in the mining adventure. The company have leased the coal they work, paying half a cent per bushel royalty. The plant consists of 40 acres; the mines are located at Scranton. Upon the organization of the company work was immediately commenced in the shaft and was pushed so vigorously and successfully that less than fourteen

hundred dollars were expended in sinking the shaft and completing all arrangements for shipping purposes.

Another enterprise, called the Co-operative Store Company, was commenced June, 1881; this enterprise is located at Scranton, and consists of 19 members, all of whom are working miners. The store room is 20x22 feet.

These industrial movements owe their being to the Knights of Labor, an organization of working men of great numbers and power in the coal mining regions of the West. Such movements deserve encouragement as the true solution of the "Labor Question," and are of more real value to the practical interests of workingmen than an army of strikers and labor agitators. Success to the Knights of Labor of Kansas. Long may their banner of industrial progress wave in the van. The true labor reformer desires to build up, not to pull down; to save, not to destroy.

Industrial co-operation is now being revived in other parts of this country among our workmen, and ought to be encouraged by every true friend of labor; but above all the workingmen must work out their own temporal salvation. "God helps those that helps themselves," is a maxim that is true alike of individuals and of communities, and it is especially true of American workingmen. By the constitution of this country every man is equal before the law, and under our school system every boy, no matter how poor, can receive an education which fits him for every pursuit of life. This is a duty the Republic owes to all its citizens, for without education free institutions could not long exist.

In this country everything is possible to workingmen; the history of the Republic, as already stated, shows that many of the most active workers and thinkers and the best men in every department of human industry have been drawn from the industrial classes. Men who are born and reared in easy circumstances seldom put forth great efforts or achieve enduring places in history. The spirit of manly self-reliance which faces and surmounts great obstacles is fostered on the farm, in the workshop and in the mine. "The best part of every man's education is that which he gives himself," said Sir Walter Scott. Life is a great school and the world a great school-master. The original differences between men are not naturally great; they consist more in self-help than in native talent. What men achieve in life is the result of industry and perseverance, rather than native superiority.

Historians tell us that Robert Bruce, the hero king of Scotland, having made six unsuccessful attempts to regain the throne of his ancestors and restore the liberties of his country, was almost in despair.

He was one day lodging in a barn in Ireland, when he saw a spider on the ceiling trying to pass from one rafter to another. Six times it made the attempt and failed, but the seventh it succeeded. The king took courage; he thought he read his fate in the success of the spider. Rallying a few trusty followers, he again landed in Scotland, and again raised the flag of his country. From this time he was successful; he overthrew the English in every battle, and on the field of Bannockburn established the liberties of Scotland and humbled the proudest monarch in Christendom.

SICK AND ACCIDENT ASSOCIATIONS.

Associations of this character are not as numerous among miners as the necessity for their existence would justify. This is largely owing to the fact that in cases of accident resulting in death or serious injury to a man in the pursuit of his calling his associates in the mine are ever ready to lend a helping hand. The establishment of accident funds is, however, a better way of aiding the crippled or the friends of the deceased; for the necessary funds being raised in advance, are ever ready to be applied. The miners of the Pittsburgh & Wheeling Coal Co. have therefore acted wisely in forming an association of this character, a copy of the rules and regulations of which is herewith submitted for the guidance of miners in other parts of the coal field:

WHEELING CREEK WORKMEN'S SICK AND ACCIDENT ASSOCIATION.

RULES AND REGULATIONS.

Name.—This Society shall be known as the Wheeling Creek Workmen's Sick and Accident Association, and shall consist of men and boys who are employed in and around the Wheeling Creek Coal Works, and shall be governed by a President, Vice-President, Recording Secretary, Trustees, and an Investigating Committee of six.

Object.—The object of this Society shall be, first, to create and disburse money for the benefit of its members, by paying stipulated sums in case of sickness, accident or death; second, to discontinue the pernicious practice of making collections.

Duties of Officers.—1. The President shall preside at all meetings; shall sign al orders drawn on the treasury; shall have power to call special meetings when requested to do so by not less than ten members; shall have no vote except on a tie, and perform such other duties as his office may require.

2. The Vice-President shall preside in the absence of the President.

3. The Recording Secretary shall keep a faithful record of all proceedings, and keep account of all moneys paid in and out of the Society; sign all warrants drawn on the treasury, and make a report every three months.

4. The Trustees shall receive all moneys, and give their receipt for the same, and after paying all demands, must bank the surplus as soon as possible; pay all warrants signed by the President and attested by the Secretary.

5. The Investigating Committee shall visit disabled members at least once a week after receiving notice of accident or sickness.

6. Every three months the President shall appoint six members, who shall serve as an Investigating Committee for the next three months; they shall be appointed in the regular order as they stand on the books.

Dues.—1. Every member shall have fifty cents per month stopped of his wages, until a fund of five hundred dollars has been accumulated.

2. All boys working shall pay according to their work, up to eighteen years of age, half dues, and receive half benefits; provided, a young man under eighteen years of age, working a man's work, and paying full dues, shall be entitled to full benefits.

Benefits.—1. If any member dies, the Society shall pay fifty dollars to those who are entitled to receive it. Any member disabled whilst following his employment, shall receive five dollars per week for the first six months, and three dollars per week for the next six months, and after that time all benefits shall cease.

2. Any member sick shall receive five dollars per week, except the first week, for the first six months, and three dollars per week for the next six months; provided, that such sickness is not caused by intemperance or other immoral conduct, and after that time all benefits shall cease.

3. A general meeting shall be held every three months for the election of officers. All officers to be elected by ballot.

4. Any officer neglecting to attend to his duty, without a reasonable excuse, shall be fined ten cents for each offense. The excuse must be work, sickness, or away from home.

5. In cases of emergency, should the funds become exhausted, the trustees shall have power to put on an extra levy to defray necessary expenses.

6. Should any member change his place of residence, he may still continue his connection or membership by sending to the Financial Secretary the dues and assessments; provided, the said member works within a radius of twelve miles.

7. A doctor's certificate must always be produced before any member can claim benefits, showing cause and nature of sickness, members' dues to be deducted from their sick benefits.

8. Any member, while receiving sick benefits, is not allowed to visit taverns or be under the influence of liquor, and any member disobeying any of these rules, will have all benefits suspended the remainder of his sickness. No sick member allowed to be away from home more than four miles, and out of his home later than seven o'clock at nights.

9. Whenever any question shall arise as to the construction of these rules of this Society, the aggrieved party shall notify the Secretary in writing, and he shall call a special meeting, and if not then settled, five members shall be appointed to investigate the case, and their decision shall be final.

10. Any member allowing his dues to be three months in arrears, shall not be entitled to any benefits and expelled from the Society.

President, Peter Moakin; Vice-President, Wm. Neal; Secretary, Joseph Slack.
Trustees—H. Wilson, W. Roberts, Robert Costene, W. Welsley, Peter Moakin.

RULES OF THE BENEFICIAL FUND OF THE LEHIGH COAL AND NAVIGATION COMPANY.

The following are the rules for establishing and administering the Beneficial Fund recently created by the Lehigh Coal and Navigation Company for the benefit of its employes:

This fund shall be created and maintained by the following contributions, to be made monthly:

The Lehigh Coal and Navigation Company will pay into it one cent for every ton of coal produced at its mines. The inside workingmen employed on its property will pay into it one per cent of their earnings and the outside workingmen will pay into it one-half of one per cent. of their earnings, but no one shall pay more than one dollar in any one month.

All contributing workingmen who may be accidentally injured when actually engaged in the service of the company, shall be entitled to the following benefits, to be paid out of the fund:

In case of accident so received, which shall cause disability lasting more than one week, the person injured shall receive a sum equal to one-half the weekly wages of the class of workmen to which he belonged, for each week of such disability, but no one so injured shall receive from this fund such benefits for a longer period than six months for any one accident.

In case of accident so received, which shall result in death, thirty dollars will be paid for funeral expenses, and a sum equal to one-half the weekly wages, as in the case of injury, will be paid to the legal heirs of the deceased, for one year from the date of accident.

These benefits will be paid only on the statement of the proper foreman that the injury was received in the service of the company, and on a certificate from the physician to the fund, in case of accident, that the accident was a disabling one, and in the case of death, that the death resulted from accident, and not from disease. In the case of accident, the certificate of disability must be renewed every two weeks.

All moneys which shall be paid into this fund shall be placed in charge of a Board of Trustees to be appointed, from time to time, by the President of the Lehigh Coal and Navigation Company, and to be chosen by him partly from the officers of the company and partly from the business men of experience and of good reputation in or near the mining region. A report of the receipts and expenditures of this fund shall be published by the Board of Trustees at least once a year. The first Board of Trustees to be so appointed will be Mr. George Ruddle, of Mauch Chunk, Hon. Michael Cassidy, of Nesquehoning, and Mr. Daniel Shepp, of Tamaqua. They shall receive no remuneration for their services.

The physician to the fund shall be appointed, from time to time, by the President of the Lehigh Coal and Navigation Company from the practicing physicians in the region. The physician to the fund for the present will be Dr. Edward H. Kistler, of Summit Hill. He will make no charge to the contributors for the necessary certificates, but if the contributors desire medical attendance they must themselves pay such physicians as they may select to attend them.

Any workingman not desiring to contribute to this fund nor to share in its benefits, can, after any monthly pay-day, receive from the Lansford Office the sum deducted for the fund from his last month's pay, but his name will not again be enrolled among the contributors nor will he be entitled to any benefit from the fund until after he shall have made another payment.

The fund thus established is believed to be ample to meet all claims arising from accidents to the contributors, and if, as is hoped, there shall be more than is required under this plan, the benefits will be increased as, from time to time, the trustees may think prudent.

The Lehigh Coal and Navigation Company, in making this contribution and establishing this fund, desires to relieve the suffering which accidents cause among its workingmen, and to render unnecessary the collections which make a heavy tax on the benevolent, and, also, to promote the growth of the kindly feeling which now exists between the company and the men engaged in its service.

CERTIFICATED MINING MANAGERS AND INSPECTORS OF MINES.

The mining law provides (Sec. 290, Revised Statutes), that the person appointed to the office of Inspector of Mines shall possess a competent knowledge of chemistry, geology, and mineralogy, and have a practical knowledge of mining engineering, and of the different systems of working and ventilating mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp. The above qualifications are not always met in a single individual, and yet no person is capable of discharging the duties of Mine Inspector who has not a practical knowledge of these subjects so far at least as they relate to the working and ventilation of mines.

The only proper way to test the qualifications of applicants for the office of Mine Inspector is to have all candidates examined before a competent Board of Examiners, pass a satisfactory examination, and receive a certificate of competency. The States of Pennsylvania, Illinois and Colorado provide by law for such examinations, and it is simply a question of time when every State which have mine inspection laws upon their statute books will make similar provision for the appointment of inspectors.

In Great Britain, which has a vast array of trained mining engineers, the Secretary of State selects the inspectors from the higher class of such experts, and provision is made by law forbidding the appointment of any but competent. practical mining engineers.

Since the year 1872 all underground managers of mines are required,

by the English mining law, to appear before a Board of Examiners and receive a certificate of competency, previous to assuming charge of mines.

The following qualifications are required on the part of applicants presenting themselves for examination, viz.:

Applicants must be above 21 years of age, and must have had either—

1. Two years' experience, underground, in any capacity; or,

2. Have served three years in a mining engineer's office, and have been engaged in the active survey of pits and making plans; or,

3. Have been employed as a mechanic at a mining establishment for two years, and have been, during the eight months immediately preceding their application, employed underground acquiring a knowledge of mineral workings.

The subjects of examination are the following, viz.:

Written examination, applicants required to count on:

1.	Mines Regulation Act, 1872, general knowledge of	20
2.	Ventilation, theory and practice	80
3.	Sinking, fitting and pumping	40
4.	Windage and haulage	40
5.	Modes of working coal, iron, stone, or other mineral, having reference to the nature of roofs and pavements, and setting of the workings of a new pit	80
6.	Surveying and drawing	60
7.	Arithmetic up to vulgar fractions, including calculation of areas and velocities	40
	Maximum number of marks	360

There need not be *viva voce* examinations; 120 marks to pass, but every candidate must obtain at least 30 marks in each of No. 2 and No. 5, and must obtain at least 60 marks out of at least two of the other subjects.

Candidates for examination for a certificate of competency are required to sign an undertaking to keep the information contained in the examination papers strictly private and confidential; and, also, to engage not to take copy of such paper, or to publish the same in any way.

The questions are usually of a practical scientific nature, and are confined to matters relating to the successful working and ventilation of mines. The result of these examinations has brought to the front a superior class of mine superintendents.

LIST OF QUESTIONS

Put to applicants for certificates of competency as underground manager, by the examing board in Edinburg, Scotland, in November, 1873, as follows:

When underground workings are approaching old wastes of which no plans have been kept, what special dangers are the workmen exposed to, and how would you provide against them?

State shortly the general rules as to the use of gunpowder and other explosive material in mines where inflammable gas has been noticed.

What is the requirement of the act as to the number of shafts in use at each mine, and state shortly the exceptions to it that may be allowed.

In mines where there is inflammable gas, what special precautions are to be observed by the workmen, and by those in charge of the mine?

Give a short statement of the requirements of the act regarding man-holes, or places of refuge on underground roads.

What limitations does the act impose in the employment in mines of young persons between 12 and 16 years of age?

Explain why artificial ventilation is more reliable than natural. Describe the different modes of producing artificial ventilation.

For an extensive but shallow working, would you adopt a fan or a furnace? And give your reasons.

How do you measure the velocity of an air current, and at what velocity would you have air traveling through the workings?

Give your reasons for making air courses as large as possible. Explain the advantages of splitting the air.

Describe the barometer, and explain how it indicates the atmospheric pressure. What is a water gauge, and of what use is it?

Sketch what you consider a good furnace for a pit 60 fathoms deep, with 100 men, giving its dimensions and relative position to the shaft.

Under ordinary conditions as regards gas, what quantity of air would you have circulating in a pit with one hundred men, and what is the least dimensions you would have the air courses? Give observations regarding the necessity of having the air course uniformly large.

Explain the ordinary conditions for adopting the long-wall, and the stoop and room working.

In a seam having a dip and rise of 1 in 6, and the direction of the plane of the coal being to full rise, sketch what you consider a good form of long-wall working for it, having regard to the ventilation, direction of the drawing roads, etc.

Under the same conditions, give us a sketch of a stoop and room working by which the greatest percentage of the seam can be got out.

In a four-foot seam of coal 80 fathoms deep, what size would you make the pillars, having regard to the ultimate extraction of the greatest quantity of coal, combined with safety to the workmen.

Give a rough section showing the different seams of coal in your district.

Under ordinary conditions as regards roof and pavement, give your observations

on the cost of working a four-foot seam of coal by stoop and room, and a two-foot seam by long-wall, embracing the oncost necessary in each.

Sketch what you consider the best form of a shaft one hundred fathoms deep, for an output of three hundred tons a day, including ordinary provisions for pumps, and showing arrangement of sides and cages with dimensions.

Explain how you would prevent water met with near the surface from getting into the shaft.

How many gallons are there in 1,200 tons of water, and describe the general arrangement and size of pipes for lifting that quantity daily from a pit 80 fathoms deep.

Describe the class of engine best adapted for the above work, size of cylinder, stroke and strokes per minute.

Explain fully the advantages in a deep shaft of having a series of lifts instead of one long lift to the surface.

Explain the action of a syphon and its use and application in draining mines.

State the various methods you know of pumping water out of a dip working.

Describe the best kind of a boiler for the safe and economical production of steam.

Explain the forces acting on a self-acting inclined plane.

Compare the friction of ordinary tubs on tram-rails with the friction on a well made railway.

Under the usual conditions of tram-rails and tubs, what is the flattest gradient for a self-acting inclined plane 300 fathoms long, to pass 100 tons in 8 hours. Sketch the best arrangement of it at the top.

Explain the best modes of drawing coal along a level road, or one not dipping sufficiently to take away the rope.

Explain why conical drums are necessary in deep shafts.

Whether are chains, wire ropes, or hemp ropes preferable, and give your reasons. Given the breaking strains of a rope, what is a safe working load for it?

State from your experience what is the cost of haulage underground per ton per mile. How does it compare with the cost of a mineral railway above ground? Give your observations on the different modes of hauling known to you, and how you think they might be improved.

Accidents frequently happen at headings where the loaded tubs are taken down with snibbles, by the full tub running into the one before it, or an empty one coming up; how would you remedy this and still retain the use of snibbles?

In speaking of machinery, what is meant by horse-power?

Sketch on paper as near as you can the following bearings of a survey: 82° N. E. 68 links, 51° S. E. 95 links, 63° N. E. 79 links, 20° N. E. links, 85° N. W. 87 links, 87° N. W. 140 links, 52° S. W. 140 links, and 48° S. E. 85 links.

Describe the compass and explain the circumstances under which it is unreliable.

Explain what is meant by the scale of half an inch to a chain.

Describe the process of surveying underground.

Describe how you would plot the same survey on paper, and name the instruments you would require to use.

Why is it necessary to make deductions from the measurements to the rise and dip in steep working, and how would you find the correct measurements?

Suppose you were driving toward an old waste which is shown only in a plan twenty years old, explain the precautions to be taken as regards the meridian.

Add together 507 tons, 13 cwts., 2 qrs., 12 lbs.; 1,670 tons, 15 cwts., 1 qr., 8 lbs.; 47 tons, 14 cwts., 3 qrs., 14 lbs.; and 408 tons, 9 cwts., 2 qrs., 7 lbs.

How much would be required to pay 75 men a fortnight's wages at the rate of 27s. 4½d. each week?

How many cubic feet of air will pass per minute through an airway 5 by 7 feet when the air current is traveling at the rate of 20 yards in 15 seconds.

What weight of material will have to be raised in sinking a shaft, 15 by 5½ feet and 40 fathoms deep, supposing it averages 150 lbs. per cubic foot?

How many gallons of water will be pumped in an hour by an engine making 8 strokes of 7 feet each minute, the diameter of the pump being 15 inches?

How much power would it require to send 10,000 cubic feet of air per minute through an air course having an area of 40 square feet, and how much would the power require to be increased to do it if the area was only 20 square feet?

QUESTIONS

Prepared by the examining board of the bituminous coal fields of Pennsylvania, for the purpose of testing the qualifications of applicants for the office of Mine Inspector at the examination held in Pittsburg April 18, 1877:

What is your age?

Are you a citizen of the United States?

What is your present occupation; how long have you been thus engaged?

Have you had five years' experience in the workings of the bituminous coal mines of Pennsylvania?

State particularly what opportunities you have had for obtaining a practical knowledge of the workings of mines.

Have you had any experience in mines where fire-damp or any noxious gases have been evolved to any great extent?

How would you lay out a mine to conform with the provisions of the "ventilation act?"

What are the most frequent causes of accidents in coal mines?

Where should the largest pillars be left, in swamps or on summits?

In the use of powder, where there is fire-damp, what plan do you consider the safest?

What effect, if any, does gob heaped against the side of a pillar have on its strength?

Which requires the largest pillars, thick or thin seams of coal—all other conditions being equal?

How would you test the safety of the roof in entries and rooms?

What kind of wood, in practical mining, do you consider the best for pit posts?

Name the different gases found in coal mines.

What is the composition and relative weight of carbonic acid gas (black damp), as found in coal mines; how can its presence be detected?

What percentage of carbonic acid gas, in the air of a mine, will extinguish the flame of a lamp; and what percentage is dangerous to life?

Mention some of the causes which produce carbonic acid gas in mines.

What is the composition and relative weight of carburetted hydrogen gas (fire-damp), as found in coal mines; and how can its presence be detected?

How is this gas produced, and where is it found in mines?

What is the appearance of the flame of the lamp or candle, when the mixture of this gas and air is near the explosive point?

Will this gas explode unmixed with air?

After explosion is this gas dangerous to life; and is it heavier or lighter than air?

What is it called after explosion?

What are the component parts of atmospheric air, and the proportions?

What is the weight or pressure of the atmosphere at the earth's surface, nearly?

What safety lamps do you consider the best?

Give a general description of each of these lamps, and how used.

How many holes to the square inch in the gauze surrounding a lamp is considered safe?

What is the reason that the gas, when ignited in the lamp, does not pass through the gauze and ignite the gas outside the lamp?

What velocity of air current will drive the flame through the gauze?

If you were examining a mine, and the gas in your safety lamp should ignite, what would be your method of procedure?

Mention the different modes in use for the ventilation of mines.

Can natural ventilation be relied on at all times?

If so, by what plan? If not, why?

Name some of the best modes of artificial ventilation.

Explain the principles of furnace ventilation.

Does the capacity of a furnace depend upon the depth of the shaft to secure the same ventilation?

Where would you locate a furnace to be the most effective?

Where would you locate the upcast, in low or elevated positions?

What advantage, if any, is there in building a chimney on the surface, at the upcast shaft?

What is the best form of shaft, or chimney for ventilating purposes?

Can you, with safety, use a furnace to ventilate mines where explosive gases are generated? If so, describe the kind you would use?

How would you kindle a furnace, situated at the highest opening, when the exterior air is at the temperature of 90° and that of the mine at 50°, and the current moving in the direction of lowest opening, to prevent filling the mine with smoke?

How does the steam jet compare with the furnace as a means of ventilation, and how should it be applied?

Describe the different modes of using the fan in ventilating mines, which mode would you prefer; and why?

If you wish to double the velocity of the air-current in the mine, in what pro-

portion would you increase the capacity of the furnace, fan, or other motive power?

If you consider it any advantage to split the air-current in mines, state your reasons, and the method of doing the same.

What will the volume of air, per minute, passing through an opening 6 feet 9 inches by 5 feet, when the anemometer shows a velocity of 105 feet per minute?

What instruments should an inspector have to enable him to discharge his duties under the ventilation act; and what is the particular use of each instrument?

How does a barometer indicate danger in a mine?

What means may be employed to ascertain the velocity of air-currents in mines other than by the anemometer?

What is the cubical contents of a circular shaft whose diameter is 5 feet and height 60 feet?

Give a description of an approved safety catch and its action.

What test would you give to wire ropes and chain cables used in shafts and slopes?

In a mine having two divisions, from the downcast to the upcast, one division being 3,000 yards long, on which is placed a regulator, 3 feet high and 4 feet wide, what should be the width of a regulator, of the same height, placed in the other division, which is 4,000 yards long, so that the same quantity of air may pass through both openings, other conditions being the same in both divisions? What is the dimensions of a square regulator, on the latter division, to allow the same quantity of air to pass.

QUESTIONS

Prepared by the board of examiners and put to applicants for the position of Inspector of Mines after the passage of the new mining law of Illinois, June 21, 1883:

Are you thirty years of age, and a citizen of this State?

Have you had a practical mining experience of ten years?

Are you interested as owner, operator, stockholder, superintendent or mining engineer, of any coal mine?

What is the character and extent of the Coal Measures of Illinois?

What are the difficulties usually encountered in sinking and timbering shafts in this State, and how would you overcome them?

State particularly how you would lay off a coal mine so as to secure the best method of ventilation, and make a small diagram of the same, showing the location of ventilating apparatus, doors, air-splits, overcasts and direction of air-currents from inlet to outlet.

Explain the difference between long-wall and pillar and room workings, and the advantages of each as to ventilation and the relative amount of coal produced per acre by the two systems.

What are the relative merits of the fan, furnace, or other appliances for producing ventilation?

Give the dimensions and a description of a furnace required to circulate a lawful amount of air in a mine having 2,000 yards of airway—36 square feet of area—

working 100 men and the usual number of animals; and state what would be the kind and size of a fan to produce the same amount of air-current in such a mine.

How can you produce the same amount of circulation in such a mine by natural ventilation?

Describe the different gases encountered in mines, their composition and characteristics, and their effects on animal life.

Describe the kind of furnace you would use to ventilate mines where *explosive gases* are generated in large quantities.

How would you ascertain the ventilating power of a shaft by the difference of temperature?

Having two shafts 5x5 feet and 120 feet deep, connected by an entry 50 feet in length, the temperature at the downcast being 82°, and at the upcast 122°, what would be the difference of the columns of air, and what would be the capacity of the ventilating shaft in cubic feet of air per minute?

What would be the horse-power necessary to produce a similar current?

Describe particularly the methods and instruments by which the velocity of air-currents in mines can be measured.

Name the different kinds of safety-lamps now in use, and the kind you regard the best, and why.

How would you apply the water gauge in testing the power of ventilating apparatus? Give a rule for calculating the same.

If the water gauge shows a depression of $\frac{4}{10}$ of an inch, and the quantity of air passing the same point is 37,000 cubic feet per minute, what is the horse-power expended in producing the same?

What kind of a hoisting engine do you consider the most suitable for a coal shaft?

How would you ascertain the horse-power of an engine with 12x24-inch cylinder?

(*a.*) What load would it lift from the bottom if the drum were 10 feet in diameter?

(*b.*) What would be the cage speed?

How would you calculate the breaking strain of a steel or iron wire rope, and what would be the *working strain* of each?

How would you calculate the safe working load of a $\frac{5}{8}$-inch chain?

Describe some of the best forms of safety-catches and their mode of action.

What kind of steam boiler is best adapted to coal mining, and why?

How would you test a steam boiler to ascertain its safety?

What are the usual causes of fires in mines, and how would you prevent them, or suppress them?

State what experience you have had in mine surveying, and name the different instruments in use for that purpose.

If the workings of a mine were approaching the abandoned workings of another mine filled with water, what precautions would you require to be taken to prevent accidents?

Thirty-four applicants were examined by the board on the above questions, only four of whom passed a satisfactory examination and re-

ceived certificates of competency. As the mines inspection act provided for the appointment of five inspectors, a second meeting of the board was subsequently held, and the following prepared questions were placed before the applicants, three of whom passed a satisfactory examination and received certificates of competency:

SECOND EXAMINATION.

Give a general description of the Coal Measures in Illinois; stating the number, character, and depth of the various seams found.

State particularly how you would proceed to prospect for coal, and how you would overcome the difficulties that usually present themselves in sinking and timbering shafts in this State.

Describe the different systems of working coal in this State, and the most approved methods of ventilating mines.

State what is meant by air-crossings, stoppings, and regulators, and what is the best method of constructing the same.

What would you call a safe velocity for an air current in mines where explosive gases are given off in large quantities?

How many cubic feet of air per minute should be indroduced to the working face of a mine in which are employed 150 men and 15 animals?

What should be the dimensions of the air-ways in such a case?

What are the different methods of splitting air in mines, and what is the effect of the same upon the ventilation?

If you have two air-ways, one with an area of 40 feet, the other with an area of 30 feet, each being 3,000 feet long, with 20,000 feet of air passing, what would be the difference of friction in the two air-ways?

What is the practical use of the Barometer and of the Thermometer in mine inspection?

If you have a difference of pressure of 3 pounds per square foot between the upcast and the downcast, with a volume of 24,000 cubic feet of air per minute, what would be the difference of pressure with a volume of 48,000 cubic feet of air passing, other things being equal?

If you have an air-way with an area of 36 square feet, and a volume of 60,000 cubic feet of air passing, what would be the velocity in feet per minute?

What will be the motive column when the air in the downcast shaft has a temperature of 60°, and that of the upcast shaft a temperature of 160°?

If, by the expenditure of 3-horse power, you create a current of 30,000 cubic feet of air per minute, how many horse-power will it take to produce 90,000 cubic feet per minute?

With a difference of one-tenth of an inch of mercury (in barometer) between the downcast and upcast shafts, what would be the pressure per square foot, and what would be the motive column?

Describe particularly the methods and instruments by which the velocity of air currents in mines can be measured.

Describe the different kinds of Fans and Furnaces in use, and the method of calculating their capacity.

Describe the different gases encountered in mines, their composition and characteristics, and their effects on animal life?

Name the different kinds of safety lamps now in use, and give their peculiarities, and state which you consider the best, and why.

In case of an explosion of gas underground, whereby the furnace doors, overcasts, and air stoppings are displaced or destroyed, what method would you adopt to restore such a circulation of air as would admit of the prompt rescue of men within?

What kind of a hoisting engine do you consider the best for a coal shaft, and what is the rule for finding the horse-power of an engine?

If you have an engine of 60-horse power, with a cage speed of 600 feet per minute, what load will it lift from the bottom of a shaft, and what will it haul up an inclined plane with a gradient of 1 inch in 3?

How would you calculate the breaking strain of a steel or iron wire rope; and what would be the working strain of each?

Give a rule for calculating the breaking strain of chains.

Describe some of the best forms of safety catches, and their mode of action.

How would you test a steam boiler to ascertain its safety?

What are the usual causes of fires in mines, and how would you prevent them or suppress them?

If the workings of a mine are approaching the abandoned workings of another mine, in which there is a head of water of 100 feet, how much coal would you leave as a safe barrier between the two? and if you should tap it with a two-inch hole, what would be the number of cubic feet of water discharged per minute?

In case a mine were making 50 cubic feet of water per minute, and had a sump that would hold 20 hours water, and a pump that would raise it in 15 hours (the supply being cut off), how long would it take the same pump to exhaust the sump, if the water was allowed to continue running into it at the above rate?

What would be the dimensions of a pump necessary to perform the work?

QUESTIONS PREPARED BY THE BOARD OF EXAMINERS, FOR THE EXAMINATION OF APPLICANTS FOR THE OFFICE OF INSPECTOR OF COAL MINES, IN THE STATE OF COLORADO,

Under authority of an Act approved February 24, 1883, to regulate the working and inspection of coal mines.

1. What is your age?
2. How long have you been a citizen of the United States?
3. Are you at present interested in the operation of coal mines, either as owner, partner, agent, manager or mining engineer?
4. What has been your occupation up to the present time?
5. How many years practical experiance have you had in the workings of the coal mines of Colorado?

6. State particularly how you would lay off a coal mine, so as to conform most effectually with the provisions of this act, and make a small diagram of the same showing location of ventilating apparatus, doors, air-splits, over-casts and direction of air-currents from inlet to outlet?

7. What constitutes ventilation in a coal mine, and what are the methods by which a lawful ventilation can be produced?

8. Name and describe the methods by which artificial ventilation can be successfully produced in mines?

9. What are the causes affecting the natural ventilation in mines?

10. Give dimensions and description of a furnace, shaft and stack, required to circulate a lawful amount of air in a mine having 2,000 yards of airways, of 36 square feet area, working 100 miners, together with the usual number of mules and drivers; and what would be the kind and size of a fan to produce the same amount of air-current in such a mine?

11. How can you produce the same amount of circulation in such a mine by natural ventilation?

12. Describe particularly the methods and instruments by which the velocity of air-currents in mines can be measured?

13. What is the most reliable instrument or method by which air-currents can be accurately measured?

14. How much should the ventilating power be increased in order to double the qauntity of air passing through the mines; and how much should it be increased in order to treble it?

15. What are the methods for splitting the air-currents in mines, and what are the advantages to be derived from the same?

16. What size and width would you drive entries, gangways, and rooms, and what size would you leave ribs and pillars for safety and economy?

17. Describe the kind of furnace you would use to ventilate mines where explosive gases are generated in large quantities; and in what part of the mine would you locate the same?

18. How can you increase the circulation of air in the mines without changing the ventilating apparatus?

19. Would you ventilate a shaft mine by using the hoisting shaft for either the up or downcast; and if so, which would you prefer?

20. How would you apply the water gauge in testing the power of a ventilating apparatus? and give a rule for calculating the same.

21. If the water gauge shows one and one-half inches, and the quantity of air passing the same point is fifty thousand cubic feet per minute, what is the number of horse-power producing the ventilation?

22. What is the size of a square air-way through which a current of 30,000 cubic feet of air is passing per minute, at a velocity of 500 lineal feet per minute; and what would be the size of two square air-ways to divide the same current into two equal splits, the velocity of each being the same?

23. Which of the last two arrangements would offer the least resistance? and why?

24. What instrument should an inspector have to enable him to discharge his duties under the "Mining Act" and describe the particular use of each?

25. Should a syphon be placed in a mine with sufficient fall at the outlet and on trial fail to work properly, what would be the probable cause?

26. To what height can water be lifted by a syphon?

27. What form and size would you make the hoisting shaft of a mine, in order to have the necessary room for two cage ways, ladder-way and pumping and steam pipes; and what form and size should the other openings be made in order to conform to the law?

28. Describe some of the best forms of safety-catches, and their mode of action?

29. What arrangements should be made in shaft and drift mines for the protection and rescue of the miners in case of an explosion?

30. In approaching old workings that you have no map of, what method would you adopt to insure safety to life and property?

31. Name the different kinds of ropes used in slopes and shafts, and state what is the best kind.

32. What is the breaking strain of hemp, iron and steel rope? and give a rule for finding the same.

33. What methods would you use in firing powder blasts, where there is much explosive gas present?

34. If from any cause a mine should take fire, and the workings become thereby endangered, how would you deal with it?

35. Name the most frequent causes of serious accidents in coal mines, and your methods for preventing the same?

36. What advantage is there in piling gob against the sides of ribs and pillars?

37. Name and describe the various gases found in coal mines, by giving their composition, specific gravity, and their effects on the miners while working in the same?

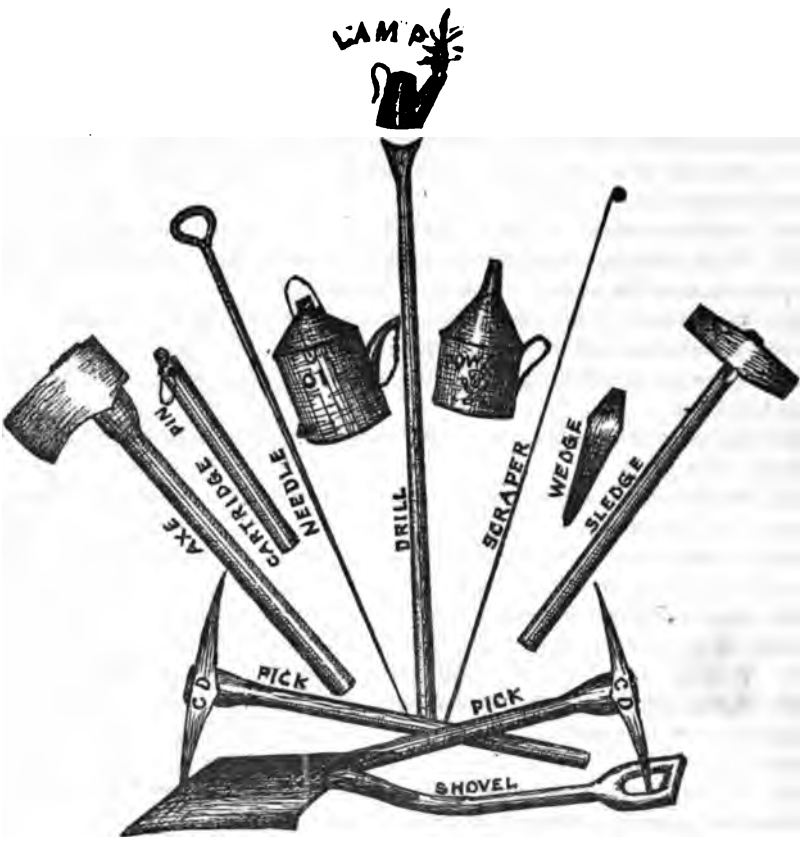
38. Where are these gases generally found in the mines, and how can their presence be detected, previous to any serious results?

39. What has been your experience and observation in mines where dangerous gases are evolved?

40. What kind of a safety-lamp would you recommend, and why?

41. At what depth does a fan and a furnace become equal as regards the amount of air propelled around the workings?

42. Make sketches showing the best methods of making and fitting timbers for shaft, slope and drift.



SET OF MINERS TOOLS.

TRUMBULL COUNTY MINES.

SECEDER MINE.

This mine is situate about four miles north of Youngstown, on a branch of the N. Y., P. & O. R. R. It is the oldest mine in the township. It was abandoned about thirteen years ago, and was reopened the present summer by Morris, Sampson & Co., the present owners. It was visited twice this season, and found in good condition, their mode of ventilating being exhaust pump. The mining boss is John Lewis; Superintendent, John B. Sampson. The roof is in some places conglomerate rock, hard, firm and safe.

SHADY SIDE.

This mine is a shaft opening ninety feet deep, situate at Vienna, ten miles north of Youngstown, and was sunk in the fall of 1882 into a fine-looking basin of block coal 4½ feet thick. It was visited twice this year, and found in good order. All

mining bosses would find it a great improvement if they would adopt the plan of this mining boss, of putting up brettice, which is all put up double and clayed between, so that it is impossible for any leakages of air to occur, and you can find nearly the same amount of air at the nearest break-through to face of entry as you will at bottom of downcast. They have the required amount of coal mined out, and was ordered to put down their second opening. The mining boss is Thomas E. Thomas; Superintendent, John Morris.

Blaine Shaft.

This mine is owned by Morris, Sampson & Co., and located four and a half miles north of Youngstown. It has been visited twice this year; ventilation found good, with very few exceptions. It is one of the worst mines to manage in the State, being so full of horsebacks. They have plenty of swamps, but if they attempt to follow any of them, as they do in all block coal mines in the Mahoning Valley, they will surely strike a horseback, cutting the coal all out. They were ordered to put down their second opening. The name of the mining boss is John Kennedy; Superintendent, David Morris.

Kline Slope.

This mine is located four miles north-west of Youngstown, and was sunk in 1868. The owners have succeeded in getting out about 600,000 tons of good block coal. This mine was found in good order. They are drawing pillars at present, and about eighteen months' steady work would take them all out. The mining boss is William Parker; Superintendent, H. Marshall.

Witch Hazel Shaft.

This mine is situate one mile north of Youngstown, on the Holmes road, and is owned by the Witch Hazel Mining Co. It has been visited three times during the year, and found in very good order. They were directed at the proper time to put down their second opening, and they complied with said request immediately, their shaft being 160 feet deep, but have no ladders in it yet.

No. 9 Slope.

This mine is located about seven miles north-east of Youngstown, and was visited twice during the year, the first time February 9th, and the second time May 8th, 1883. When visited first the ventilation was defective in three entries, but on the second visit there was great improvement in the ventilation, the stoppings having been overhauled, but there was room left yet for more improvement. The roads of this mine are kept in good condition. The name of mining boss is Charles Herbert; Superintendent, R. J. Wick.

Jacob's Shaft.

This mine is situate two miles south-east of Hubbard, and was visited February 10th and March 10th, 1883. It was in very bad condition on the first visit, the main

entry being 400 yards ahead of air, and it was ordered stopped until the current was got forward. On the second visit it was found to be 180 yards nearer the face, and I was informed by the mining boss that he would not start the entry until it was put to the face.

New California Slope.

This is a new opening sunk in the latter part of 1882, by the Brier Hill Iron & Coal Co. It is about 100 yards in length, at a pitch of eight inches to the yard. They had coal eight feet from the surface, and followed it down about 300 feet before they struck the bottom of the dip. There the coal was about five feet thick, and a swamp was found running north-west and south-east. On the south-east side they struck a horseback, which cut the coal clean out; they drove about eleven yards into it, and also drilled several holes ahead of it, but did not succeed in getting any coal. On the north-west side they struck a clay vein that cut the coal down to 8 feet 11 inches, and it kept getting less every cut of coal, until the bottom and roof nearly came together, and they are at present drawing the pillars. It was visited twice this year, and found in good condition both times. The name of mining boss is William Parker; Superintendent, Henry Marshall.

Garfield Shaft.

This mine is situate three miles north of Church Hill, and was sunk in the fall of 1880 to a depth of 181 feet. They had considerable difficulty in putting it down, owing to quicksand, the hoisting machine and everything else, nearly, going to the botton by the quicksand running in. After getting it down it was believed by nearly every mining expert in the Mahoning Valley that it was going to be one of the largest basins of block coal found in the valley, but they had not worked over a year before they struck a large horseback thirty-four yards thick; they drove through it and got a little coal, but the horseback kept branching out like a tree in every direction, some of said branches being thirteen yards thick, and several others from five to eight yards, and at present there is not much in view to encourage them in driving forward. The mine was visited three times this summer, and was always found in good condition. The name of the mining boss is Thomas Phillips; Superintendent, Johnson Head.

Brookfield Tunnel.

This mine is situate at Brookfield, near Sharon, Pa., and was described at length in previous reports. A few weeks previous to being visited this year they had struck through to the Cleveland Shaft. The mine has about twelve different inlets, and the workings were in very good order, with the exception of one entry. Mr. John McIntosh, the mining boss, promised to have it fixed immediately. The name of Superintendent is Jonathan Head.

Love Slope.

This mine is situate about one mile east of Coalburgh, and when visited the miners were busy drawing pillars. They were troubled a great deal with black-

damp from the old Cramer Slope, having struck through to said slope. Since it was visited the company have abandoned it, and have taken out all the machinery and fixtures.

Church Hill Slope.

This mine has been visited twice this summer. A good current of air was found in circulation both times. The workings have been struck through to the Niles Coal Co.'s old shaft, which was abandoned about three years ago, and also to the south side of Kline Slope. They are troubled with black-damp that comes back with the water from said old workings. They are drawing pillars at present, and about two years' steady work would take the whole of the coal out. The name of the mining boss is Thomas J. Williams; Superintendent, A. J. McCartney.

Church Hill Shaft.

This mine is a continuation of the Church Hill Slope basin, but the field is not so extensive. The mine has been visited twice this year, and is about the best ventilated mine in the valley. They experienced great difficulty in ventilating this mine before they got a fan. Their leading swamp was narrow; the coal would raise from said swamp at about nine inches to the yard for a distance of thirty-five yards, then it would plunge down at the same rate into another swamp, then take the hill and run out. Their mode of ventilating at that time was an exhaust pump, which was inadequate for the requirements of the mine, but the miners all agree that it is now the best ventilated mine they have worked in in this valley. The name of mining boss is Thomas J. Williams; Superintendent, A. J. McCartney.

Morris & Price Shaft.

This mine is located at Mineral Ridge, and has been visited twice during the year, the first time on May 25th, and second time November 9th, 1883. They work on entry and windway system, and ventilate with an exhaust steam pump. It was in very bad condition when first visited, but a little better on the second visit, but was still far behind the requirements of the law. Mr. Williams, the mining boss, informed me that he would see t at things would be remedied as quickly as possible. The mining boss is John T. Williams; Superintendent, William T. Williams.

Pumpkin Shaft.

This mine is located at Church Hill, and was sunk in 1868, but was abandoned until the present year. The first lessees were the Niles Coal Co., but the present ones are the Taylor Coal Co. They employ about fourteen men at present; are not rightly fixed up yet, but the mine was in very good order on the whole. They ventilate with exhaust steam pump. The name of the mining boss is Joseph Collins; Superintendent, William Taylor.

The mines of this county are becoming rapidly exhausted, and a few years more will witness the total exhaustion of the last of the swamps or basins of block coal, famous as a typical iron-making fuel.

The majority of the mines of Mahoning county are opened on the same seam of coal.

Blaine Shaft.

This mine is a shaft opening, situate about 1½ miles east of Church Hill. It has been visited three times during the year, and described in my previous reports. They have been in horsebacks or troubles since they struck coal first, but it appears that they have gone through the worst at present. They work on entry and windway, and ventilate with exhaust steam, and the work was in better order than when inspected last. They have no second opening, and their quickest way of getting said opening would be to drive through to the Church Hill Coal Co.'s shaft, being but about 100 yards apart at present. They employ about sixty miners and eight daymen. The mining boss is John Kennedy; Superintendent, David Morris, Girard, Ohio.

MAHONING COUNTY.

Poland Shaft.

This mine is situate four miles south-east of Youngstown; it was sunk in 1882. The company had a great deal of difficulty in putting it down, owing to water, but finally succeeded in reaching three and one-half feet of excellent block coal. The mine was visited three times during the year, as follows: February 15th, July 6th, and September 3rd, 1883.

The coal generates a good deal of fire-damp, and they have to keep a fire-viewer to go around the different places before the men go to work in the morning. There were three men burned there this summer, but all through their own neglect, having been notified of the presence of fire-damp in their places before they went down the shaft, and also warned not to go to said places until the gas was cleared out. The mine is laid out in good order. The company are putting down their air-shaft at present. Their mode of ventilating is by exhaust steam pump, but they contemplate putting in a fan as soon as the air shaft is down. The mining boss is Wm. Young; Superintendent, A. J. McCartney.

Valley Mill Shaft.

This mine is situate one and one-half miles north east of Youngstown, on the Coitsville road. It is a small shaft, with only one cage in it, and everything very poorly constructed around it. The coal has been very thin and full of troubles, but about the beginning of the present year they struck an excellent basin four and one-half feet thick. They were requested to put down their second opening immediately, and promised to do so, but when visited the second time they had not commenced, and were ordered to put their force down to ten men. They stopped the mine for a few months, and when they started up again they commenced their second opening also. Their ventilation was very feeble when visited. The mining boss is John Mathews.

Craver Shaft.

This mine was sunk in 1882, to a depth of eighty-one feet. They work on entry and windway system. The mine was visited twice during the year, and found in good order. They ventilate with an exhaust steam pump, and if the current gets feeble they have it fixed so that they can turn the exhaust of the hoisting engine into the upcast. The mine is situate at West Austintown, on the line of the Niles and New Lisbon Railroad. The mining boss is John J. Rees; Superintendent, George Frack.

Fulk Slope.

This mine is located about one mile south of Weathersfield, and worked on entry and windway system. When visited they had abandoned driving entries, the coal getting too thin and of inferior quality; they have now drawn all the pillars and abandoned it altogether. The mining boss was Richard Perkins, and Superintendent, Evan Morris.

Leadville Shaft.

This mine is situate about three and one-half miles south-west of Youngstown, and is notorious for the amount of water it makes. They have two pumps kept running night and day; the working barrels of each is twenty-seven and one-fourth inches in diameter, with a 6-foot stroke, and three and one half strokes each per minute. The mine was visited twice the present year, and found in good order. They ventilate with a fan, and work on entry and windway plan. The name of mining boss is James Thompson; Superintendent, R. J. Wick.

National Mine, No. 1.

This mine is a drift opening, situate on the Niles and New Lisbon Railroad, at Washingtonville, and owned by Walters & Co., of Youngstown, Ohio. When visited the mine was in fair condition, with the exception of one entry, that being ahead of the current considerably, but the air-course would be through in a day or so and put the current thirty-five yards nearer the face. The current was not sufficient to answer the amount of men employed. Their furnace was at the mouth of mine, and the air had too long a distance to travel. I suggested that they put an air-shaft down near the face of workings; it would be on higher ground on the outside, and the air would not have more than half the distance to travel. The mining boss is Ralph Wainwright; Superintendent, J. E. Walters.

National Mine, No. 2.

This mine is a drift opening, and owned by the same company, situate at Washingtonville; they work on entry and windway principle and natural ventilation. They have an air-shaft, but no furnace, there being sufficient draft without it. The mining boss is Ralph Wainwright; Superintendent, J. Walters.

Manning Shaft.

This mine is owned by the Manning Coal Co., of Youngstown, and situate four miles south-west of Youngstown. It was sunk to a depth of 150 feet in 1882, having ninety feet of cribbing. It was visited twice this year; first time on July 3rd, and second time November 13, 1883. It was found in good order as far as ventilation was concerned, but ought to have had a second opening down; was requested to do so. About the latter end of October they struck a sand bar, or rather the bed of the old mill creek, in a south-east butt entry, and according to the testimony of the Superintendent it closed in about 250 yards of their entry in about three minutes. The men that struck it had to run for their lives. The Superintendent was notified to have their second opening down as quick as possible. The mining boss is C. A. Simon; Superintendent, Harry Manning.

Brownlee Shaft.

This mine is owned by the Powers Coal Co., and situate about two and a half miles south-east of Youngstown; it was sunk in 1881. The coal will not average over two feet in thickness, and it is very hard to dig. They work on entry and windway system, and ventilate with exhaust steam pump. There was a very good current of air traveling, but it was mixed with steam. They have not the required amount of coal worked out to commaud a second opening, having been idle a long time since it was first sunk. The mining boss is Thomas E. Blunt.

Fairview Mine.

This mine is owned by the Warner Coal Co., of Mineral Ridge. It is a slope, situate at Washingtonville. They work on single entry and drive no air-ways at all. Their main entry was on the butts of the coal, and as soon as they have their rooms far enough off the entry they break through the pillars and put a door at the mouth of room. When visited there were a great many doors needed, consequently the air was bad in the entry. The mining boss promised to have doors put up in a few days. They have a good furnace, but not sufficient stack on top. The mining boss is D. E. Houffer; Superintendent, J. B. Warner.

Pennell Slope.

This mine is a slope opening, 420 feet deep, at a dip of thirteen inches to the yard, situate at West Austintown, and owned by the Andrews Coal Co., of Youngstown. They work on entry and windway principle, and ventilate with a furnace. The mine was in good order when visited. The mining boss is Frank McIntosh; Superintendent, Jonathan Head.

Haroff Shaft.

This mine is situate on the Niles & New Lisbon R. R., at West Austintown, and owned by the Haroff Coal Co., of Youngstown; is 180 feet deep. They work on the same system as all other block coal mines, and ventilate with exhaust pump. The mine had been idle nearly a year previous to being visited, and only started up

the day previous. It was in very good condition, taking all into consideration. The mining boss is B. T. Jones; Superintendent, John Owens.

Austin Shaft.

This mine is owned by the Tod and Wells Coal Co, and situate at Mineral Ridge. They work on entry and windway plan, and ventilate with exhaust steam pump. It was in good order when visited; good air all through; was informed by the miners that it is always kept the same. The mining boss is William Dunn; Superintendent, E. G. Marshall.

Brier Hill Shaft.

This mine is situate on the Holmes road, one and a half miles north-west of Youngstown, and owned by Davies & Turrell, of Youngstown. It is a continuation of the old Brier Hill basin. It was not fixed up altogether when visited. The mining boss and Superintendent, Richard Davis.

PORTAGE COUNTY.

Black Diamond.

This mine is a shaft opening, located at Palmyra, Portage county, and owned by P. L. Kimberly, of Sharon, Pa. They work on entry and windway plan, and kept in good order. They have nothing but natural ventilation. They have an air-shaft but no furnace, and also had no bonnet or covers on their cages, and was requested to put them on. The mining boss is Abel Dore; Superintendent, W. J. Murdock.

Filer's Shaft.

This mine is situate at Palmyra, and owned by the Scott Coal Co., Sharon, Pa. It was visited twice during the year, as follows: February 23rd and December 12th, 1883. It was found in very bad order the first time, but was a little better the second. They work on entry and windway system and natural ventilation. They have no covers on their cages, and was requested to put them on immediately. The mining boss is J. N. Crawford; Superintendent, J. F. Filer.

Wilson Mine.

This mine is located at Palmyra; is a shaft opening, and owned by the Palmyra Coal Co. They work on entry and windway plan, and the mine is kept in good order. It was visited twice this year, on February 24th and December 4th, and both times found good. The mining boss is Richard Jones; Superintendent, W. B. Wilson.

COLUMBIANA COUNTY.

NEW SLOPE.

This mine is situate at Salineville, on the C. & P. R R., and owned by the O. & P. Company, of Cleveland. It was visited twice during the year, as follows: February 20th and October 30th, 1883. The first time it was not in very good order, the third right entry being far in advance of the current air. All that was needed to put that in order was a door on the second breakthrough from the face, and a stopping-in under the door of second right, and it was ordered to be done. On the second visit it was found in better trim; the air well up to the faces. They work on double entry, and ventilate with a furnace They use an end and tail rope for hauling the coal out, a distance of 550 yards from the pulley-wheel inside to the top of landing outside, capable of making a trip every 7 minutes, if necessary. The mining boss is Peter Brown; Superintendent, James Black.

EMPIRE MINE.

This is a drift opening, situate at Salineville, on the C. & P. R. R., and owned by the same company. They work on single entry system, and ventilate with a furnace in summer and natural ventilation in winter. The mine was in good order when visited. The mining boss is Samuel Carnahan; Superintendent, James Black.

FARMERS' MINE.

This mine is located at Salineville, and owned by the Manufacturers' Coal Co. It is the best ventilated mine in the district, and the roads are always kept in good condition. The top of their upcast is 222 feet higher than their inlet, which gives them advantages to ventilate. The mine was visited twice this year, and both times found in good condition. It is managed by J. M. Smith.

HAYES MINE.

This mine is a drift opening, situate at Salineville, and owned by the O. & P. Co. The mine was not in very good condition when visited, their main inlet having closed in, consequently they experienced great difficulty in ventilating the mine at all; but it could be made better by putting proper stoppings along their main entry; the present ones were leaking considerably. They work on single entry plan. The mining boss is James A. Watkins; Superintendent, James Black.

NO. 2 MINE.

This mine is a drift opening, on the strip vein situate at Salineville, owned by Granage & Anderson, of Cleveland, and managed by Gomer Lewis. They were not hauling coal the day it was visited, but the majority of the miners were at work. They work on single entry, and ventilate with a furnace; the mine was in good order. They have abandoned hauling coal out through No. 1 mine since they struck through from No. 2.

Hussey Mine.

This mine is a drift opening, on the strip vein of Salineville, and owned by the O. & P. Co. It is an old opening, abandoned many years ago, but was reopened a few months since. They work on single entry, have no artificial means of ventilation, and it was in bad condition, the air baffling, just as the wind would be outside. They were ordered to put in a furnace immediately. The mining boss is Hamilton McPherson; Superintendent, James Black. Mr. Black is generally found behind hand, in all the mines under his charge, with his ventilation.

Foster Mine.

This mine is located at Salineville, and owned by the Columbiana Coal Co.; is a drift opening, worked on single entry, and ventilated with a furnace. It was in a bad condition. They had not sufficient air in motion, and it was not carried up near the faces of workings. They needed five doors on the fifth entry. The roof was also very dangerous and needed timbering. Their air-ways were nearly choked up with dirt. They were ordered to make an improvement immediately, or else draw their force down to ten men. The mining boss is Wm. E. Jenkins; Superintendent, Jesse Thornton.

Old Shaft.

This mine is located at Salineville, and owned by the O. & P. Co., of Cleveland. It is fifty feet deep, and worked on double entry plan They ventilate with both furnace and exhaust steam pump, but there was no fire in the furnace when visited, consequently there was not a very strong current of air moving, but the mining boss, Mr. Roberts, informed me that he would have it in working order in a few days. The Superintendent is James Black.

New Shaft.

This mine is situate at Salineville, and owned by the Salineville Coal Co. They work on double entry system, and ventilate with an exhaust fan. The mine was not in very good order when visited, several of the entries being far in advance of the air. They have had considerable difficulty of late, the creek having broke in on them, which took up all their time, consequently other things were neglected. Mr. Sharp, the superintendent, informed me that he would see that things were remedied as soon as possible. The mining boss is H. B. Gengle.

Robbins Mine.

This mine is situate on the Niles & New Lisbon R. R., and operated by the Niles Mining Co. It is a drift opening; is worked on entry and windway plan, and ventilated with a furnace. The mine generates fire-damp to some extent, and about two years ago several persons lost their lives by an explosion. The mine was in very good condition when visited. They keep a fire-viewer to go around all places in the morning before the miners go to work. They have notices stuck up at the mouth of the drift, forbidding persons to go to their places until the viewer reports

the condition of the mine. The mining boss is Jenkin Harris; Superintendent, P. C. Maurer. Since this mine was visited it has suspended operations.

Franklin Shaft.

This mine is situate on the Niles & New Lisbon R. R., about two and one-half miles south of Leetonia, and owned by the Alberta Coal Co., of New Lisbon; is worked part on single and part on double entry system, and ventilated with a Boston shaving exhauster fan. The mine was ventilated very well, but had no safety-catches on when visited. The rope had broken a few days previous, and the catches, which were then on failed to do duty, but slipped, and the cage went to the bottom. Orders were given to put the catches back on the cages, and also to put ladders in the air-shaft in case of accident. This mine also generates fire-damp. The mining boss is Thomas Prosser; Superintendent, O. R. Dibble.

Cherry Valley Mine.

This mine is a slope opening, situate at Leetonia, on line of the Niles & New Lisbon R. R. It is about eighty yards deep, and worked on entry and windway system, and ventilated with furnace. It was in first-class order when visited; a good current of air all through. They have about 600 yards of double track on the main entry—the full cars traveling on one track and the empty ones on the other, so that the haulers would not interfere with one another. The mining boss is John Briggs; Superintendent, Zachariah Tittlow. This mine is always found in good condition. It was visited twice during the year.

Washingtonville Mine.

This mine is a drift opening, situate at Washingtonville. They work on entry and windway plan, and ventilate with furnace. There were over 10,000 cubic feet of air in circulation when visited, and the furnace had been damped down for the night. The miners complained of it being too cold when working near a break-through. The roads were also kept in good condition. The name of mining boss is Elijah Bouker; Superintendent, Zachariah Tittlow.

State Line Mine.

This mine is a drift opening, situate on the Pittsburgh & Fort Wayne R. R., thirteen miles east of Leetonia. It has been described in my previous report as being in both States, namely, Pennsylvania and Ohio. The Ohio side will soon be abandoned; they are busy drawing pillars at present. It was in good order. This mine is one of the best managed in the State. The coal is hauled out by machinery instead of horse-power; the slack is washed and cleaned, and the Superintendent, Hugh Laughlin, has lately invented an improved dump for saving the coal from breaking as it passes from the chutes to the gondola. Name of mine boss, James Southern.

PROSPECT HILL.

This mine is operated by James Southern, and is equipped with improved underground hauling machinery, constructed last year, and described in detail in the last annual report of this office. Mr. Southern has two mines opened in different veins, both of which deliver coal to the same dump. The lower mine is a slope, opened in coal number 6, and the upper one, run most extensively, is level-free. The works are well opened out, and are under the charge of James Southern, Jr.

CARROLL COUNTY.

OSBORNE NO. 1.

This mine is a drift opening, situate on a branch of the Cleveland & Pittsburgh R. R., at Salineville, and owned by the Osborne Coal Co. It was visited twice during the year. There was a good current of air in the mine, but they had neglected putting doors up on some of the rooms, and the air was bad in one of the entries; on the second visit it was found in good order. They work on entry and windway principle, and ventilate with a furnace. The mining boss is Samuel Madison; Superintendent, ——— Walker.

OSBORNE NO. 2.

This mine is a drift opening, owned by the same firm. It also has been visited twice this year, and found in good condition—the roads in far better condition the last time than on the first visit. The mining boss is Samuel Madison; Superintendent, ——— Walker.

NO. 3 MINE—N. Y. & O. COAL CO.

This is a drift opening, situate at Dell Roy, and owned by the New York & Ohio Co. They work on single and part on double entry, and it was very badly ventilated. There was a very good current of air at the outlet, but none at or near the faces of workings—it returned back to the furnace before it reached the miners. It was impossible to get at the outlet for water. Orders were given to improve the condition of the mine, and the Superintendent assured me it would be done immediately, and requested an inspection as soon as possible. The mining boss is John McAloney; Superintendent, Andrew Lee. This mine was again visited in September, and found considerably improved.

ALLEN MINE.

This mine is located at Dell Roy, on the Connotton Valley R. R., and owned by Allen & Sons. It is a drift opening, and was worked on single entry plan until a few months ago, when they started on the double entry system, and have had sufficient proof for themselves that it is the best and cheapest plan of ventilating. The mine was not in good condition, there being so many leakages through their stoppings. The Superintendent informed me that they would be overhauled and

fixed, and that there should be no complaints in the future. The mining boss is John Moon; Superintendent, J. C. Allen.

No. 1 Mine

This mine is situate on the Connotton Valley R. R., at New Hazleton, and owned by the New York & Ohio Co. It is a drift opening, and worked on both single and double entry, and ventilated with a furnace. The mine was very poorly ventilated. A new air-shaft was recommended to be sunk, which has since been done, and the ventilation improved. This mine was visited twice. They work seven of the Harrison coal-cutting machines. The mining boss is James B. Miller; Superintendent, Andrew Lee.

No. 2 Mine.

This mine is located at New Hazleton, and owned by the same firm; is a drift opening, worked on double entry, and ventilated with a furnace. It was in good order when visited. It is the intention to put in several of the Harrison machines in this mine also. The mining boss is James B. Miller; Superintendent, Andrew Lee.

GUERNSEY COUNTY.

Akron and Cambridge Mine.

This mine is a shaft opening, sixty feet deep, located four miles south of Cambridge, and owned by the Akron & Cambridge Coal Co. It is worked on double entry, and ventilated by exhaust steam in winter and a fan in summer. The mine was in good order when visited. They work two of the Harrison coal-cutting machines, and are preparing to put in several more. They have a slip in this mine, running north-east and north-west, which makes the roof very bad for about sixty yards each side of it; it also makes the coal a great deal softer for the same distance. The mining boss is George Atherton.

Manufacturers' Mine.

This mine is situate at Byesville, three and one-half miles south of Cambridge, and owned by the Manufacturers' Coal Co., of Cleveland. It is a shaft opening, forty feet deep. They have only one pair of entries in the mine, which are driven eight degrees west of north on the butts of coal, thirty feet apart. From off these entries they break their rooms, leaving seventy-two feet of a rib between each room until they are driven in forty feet, then they start another room in this rib. The rooms are worked twenty feet wide, leaving twenty feet of a rib. The mine was in good condition all through. The mining boss is William A. Smith.

Nickolson.

This mine is located three miles south of Cambridge, and owned by the Ohio Coal Co. It is a drift opening, worked on single entry, and ventilated with a furnace

and exhaust steam pump. The present mining boss is William A. Davis, there having been a change made a few months since. He has had considerable difficulty of late with the coal running to the dip, which makes very heavy hauling. The mine was in good condition for air when visited. Superintendent is ——— Granger.

Norris Mine.

This mine is located on the B. & O. R. R., six miles east of Cambridge. It is a slope opening, eighty feet deep. The chutes are 1.100 feet from the mouth. The coal is hauled to the chutes from the bottom of the slope by an endless rope, which is a great labor-saving machine. They work on double entry, and ventilate with an exhaust pump. The mine was in good condition. They have a large horseback to contend with, cutting the coal down to half its thickness; they have driven about 160 yards of entry into it, but have not succeeded in getting anything better. The mining boss is S. P. Anderson; Superintendent, Wm. Norris.

Scott Mine.

This mine is a drift opening, situate on the B. & O. R. R., five miles east of Cambridge, and owned by the Scott Coal Co. They work on double entry, and ventilate with both furnace and exhaust pump. It was in very good condition when visited. The Superintendent is James C. Wilson.

Cambridge Drift.

This mine is situate on the B. & O. R. R., three miles east of Cambridge, and owned by the Cambridge Mining Co. They work on room and pillar system, and ventilate with furnace. They have worked the coal all out of the first hill, only the pillars of the main entry remaining, and are working in the second hill at present. They have put in a locomotive to haul the coal out through the first hill, which is a mile in length, and have put a furnace up in and also a door at the inside mouth of first hill. There was not sufficient current in motion to warrant them in putting an engine to work without a good furnace. The first furnace built proved inadequate. The Inspector, by request of the owners, suggested a suitable furnace, which was built during the summer, but the stack is not quite high enough for good results.

Guernsey Mine.

This mine is located on the B. & O. R. R., below Cambridge, and owned by Robbins & Brother. They work on single and double entry and natural ventilation, but have their air-shaft put down ready to put a furnace in. There was a good current of air sweeping through the mine when visited. The boss is David Collins; Superintendent, ——— Robbins.

BELMONT COUNTY.

Belmont Mine No. 1.

This mine is located at Bellaire, and owned by the Belmont Coal Co. It is a drift opening. They drive their main entries double on the butts or end of coal 85

feet apart. Every 250 yards they strike off face entries, from which they strike off butt entries every 110 yards, and the rooms are driven up 100 yards, leaving thirty feet of a pillar between it and the next butt entry. They ventilate with a furnace. The current was very feeble when visited, the furnace being too far away. They had located a new air-shaft, and made up their minds to sink it at once. The mining boss is Wm. Turnbull: Superintendent, Scott Heatherington.

Belmont No. 2.

This mine is situate at Bellaire, is owned by the same firm, and worked on the same principle, but it is far better ventilated. Their furnace is located at mouth of drift; have driven 2,000 yards through the hill for an inlet, so that the fresh air enters at the interior of the mine. The mining boss is Elmer Heatherington; Superintendent, Jacob Heatherington.

Weegee Mine.

This mine is located on the Ohio River, three miles below Bellaire, and owned by P. Schafer. It is a slope opening, and ventilated with a furnace. It is worked on single entry plan, in blocks, eighty yards wide. The mine was in a very bad condition, the roof being broken around the bottom of slope, making it very dangerous. Their main air-way was also closed in, and they were troubled with black-damp. They were requested to improve its condition, and promised to do so. It is the intention to drive one of the entries about 100 yards further and put down an air-way there. The mining boss is Samuel Kelly; Superintendent, P. Schafer.

Pittsburgh Coal Works.

This mine is situate at Bellaire, and owned by Rockinhauser & Steratt. They work on double entry, and ventilate with a furnace, the size of which is four and one-half feet high above bars, and six feet wide. There was a good current of air all through the mines, and this mining boss understands his business; his name is John Hines; Superintendent, Mr. Rockinhauser.

Stuart & Meehan Mine.

This mine is situate on the B. & O. R. R., at Stewartsville, and owned by Stuart & Meehan. They work on single entry, turning rooms on both sides. The current of air was very feeble when visited last spring, but a few months will finish the whole thing, therefore did not recommend any improvements made. The mining boss is Robert Hall; Superintendent, James Meehan.

Heslop Mine.

The above mine is located on the B. & O. R. R., about two miles above Bellaire, and owned by Heslop & Sheck, of Bellaire. It is a drift opening, worked on double entry, and ventilated with a furnace. There was a good current of air passing all through the mine without any difficulty, as is always the case when working on the above system, if they have good ventilating power. This mining boss claims

the credit of being the first man to introduce the double entry system into this region; his name is Cuthbart Heslop; Superintendent, Augustus Sheck.

Wheeling Creek Mine, No. 1.

This mine is located on the T. V. & Wheeling R. R., about two miles from Bridgeport, and was inspected twice during the year, as follows: August 7th and November 26th, 1883. It is a drift opening, and worked on double entry plan, each pair of entries being 150 yards apart and driven up 400 yards; then they strike off face entries again, and continue the butts, making it a block of coal 400 yards long and 150 yards thick. There was a good current of air in motion, but it was getting feebler the nearer I approached the faces. The furnace was at the mouth of mine, and had too long a pull, but they are busy at present making a new opening to come through near the face of workings, one of the best drift openings in the State. They are also putting down an air-shaft, eight feet in diameter, and contemplate putting in a large furnace. They have man-holes every forty yards along their main entries, so that men can step out of the way of moving cars, and the mining law should be amended so as to require this at all mines. On the second visit, the new opening was working and the old one abandoned. They have a locomotive hauling the coal down to the chutes from its mouth, a distance of half a mile. Their furnace was not built, but was to be commenced in a week or so. The mining boss is William Neil; Superintendent, J. E. Waters.

Wheeling Creek, No. 2.

This mine is located near No. 1, and owned by the same firm. The coal is about twenty-two feet lower in this hill than in No. 1, and lies in a trough. On the east side of the main entry it pitches at about eight degrees for 100 yards and levels off; on the west side of said entry it pitches at about eleven degrees for eighty yards, and strikes a fault. They were busy driving through it when visited. The mine was in excellent condition all through. The mining boss is Henry J. Wilson; Superintendent, J. E. Walters.

Ætnaville Mine.

This mine is a drift opening, situated at Martin's Ferry, on the C. & P. R. R., and owned by the Ætnaville Iron & Nail Co. They work on double entry, and ventilate with furnace. It was in good condition all through, and was informed by miners that it is always kept the same. The mining boss is William Herbert; Superintendent, Lewis Jones.

Flushing Mine.

This mine is located at Flushing, on the T. & V. R. R., is a drift opening, and owned by O. Young & Co. They work on double entry, and ventilate with a fan. The main entry is driven on butts of coal, and face entries are turned every 600 feet and butts every 400 feet. The mine was in good condition; a good current of air,

and excellent roads. The mining boss is William G. Williams; Superintendent, John L. Davies.

Rainey's Mine.

This mine is a drift opening, situate on the C. & P. R. R., three and a half miles from Bridgeport, and owned by the Rainey Coal Co., Cleveland, Ohio. They have two openings holed through, but both coals are dumped on the same chute. They work on single entry, and ventilate with a furnace. The mine was in good condition, with the exception of one entry, and that had but eight yards before it would strike through to a room, then the whole column of air would be passing through it. An accident occurred in this mine about the 1st of July, by which Mr. Hyer, the mining boss, was badly burned. It happened as follows: A room caved in while the man that worked in it was still in the face of it. Mr. Hyer rushed to the place immediately. He heard the cries of the man and ventured over the fall, and gas having accumulated there, it exploded with the above result. They had not discovered any gas there previous nor since.

There are a number of other mines in this county which come under the requirements of the mining law, most of which were visited, but they were not running at the time. The first visit to the mines of this county was made in the early part of the year. In addition to several large mines, there are a multitude of small ones, which occasionally work ten men or more, but they were not inspected. The small mines, which work only a few men and are not far advanced under the hill, are frequently found in bad order as to ventilation, for reliance is usually placed upon the natural forces to get forward air, and air-courses are neglected.

MEIGS COUNTY.

Dabney Mine.

This mine is a drift opening, located on the Ohio river, at Pomeroy, and owned by the Pomeroy Coal Co. It extends back from the river side into the third hill a distance of three miles. They work on double entry, and ventilate with a furnace. It was inspected twice during the year, and found in good order. The mining boss is Edmund Gregory; Superintendent, Thomas Middleton.

Peacock Mine.

This mine is also situate at Pomeroy, and is owned by the same company. They work in the 3rd and 4th hills, on the double entry plan, and ventilate with a furnace. In the third hill thirty-one miners are employed, and 13,800 cubic feet of air was in circulation. In the 4th hill they had seventy miners working, and 10,500 feet of air in circulation, which was well distributed through the mine. The mining boss is Evan Jenkins; Superintendent, Thomas Middleton.

Minersville Mine.

This is a drift opening, situate on the Ohio river, at Minersville, a mile above Pomeroy, and is owned by Mr. Ebenezer Williams. They work on double entry, and ventilate with both exhaust steam pump and furnace. It was in good order throughout—a good circulation of air and the roads well kept. Mining boss, Thomas W. Evans.

Syracuse Slope.

This mine is located on the Ohio river, at Syracuse, four miles above Pomeroy, and owned by W. E. Edwards. It was visited twice this year. The first time it was in very bad order, but on the second visit it was a great deal better as far as the air was concerned, but it is in a very filthy condition, the mud in the roads being up to one's ankles. They work on double entry, and ventilate with a furnace. The mining boss is Adam Duckworth; Superintendent, William E. Edwards.

Syracuse Shaft.

This mine is situate at Syracuse, on the Ohio river, and is well managed and ventilated. A large well-constructed furnace creates an ample current of air; the roads are well kept, and an air of neatness, taste and mining skill pervades the mine. The underground department is under the charge of Thomas Manwaring; John Blair, Superintendent.

Cheshire Mines.

These mines are operated on a limited scale; they were visited, but not inspected.

Antiquity Shaft.

This mine, which is a shaft 200 feet in depth, is situate near the village of Racine, on the banks of the Ohio river. It has been sunk for a number of years, and at the date of the passage of the mining law had but one opening. It suspended operations at this time, but resumed work a year or two ago, employing a force greater than ten miners at once. I visited the mine last year, and asked that the number of men at work underground be reduced to ten until a second opening was provided, and this was done. The mine was not visited during the present year.

Charter Oak.

This is an extensive mine, situate at Pomeroy. It is well opened and managed. It was inspected once, but at the present time is not working.

SUMMIT COUNTY.

Nimisila Mine

Is a drift opening, situate near the line of the Cleveland, Akron & Columbus R. R., about four miles from Clinton. It is a slope opening, about thirty yards deep. It

was not in very good condition when visited, having struck through into the old Franklin mine, and was troubled a great deal with foul air. They have also all the water from said old mine to pump out. It was impossible to make out on what plan they had been working the mine; it was gouged out in all shapes. There has been a change in the mining bosses lately. This mine was visited several times during the year. Boss, John Bowen; Superintendent, Joseph D. James.

Lake View Mine.

This mine is located six and one-half miles south of Akron; is a shaft opening, and owned by the Lake View Coal Co. They work on single entry, having abandoned the double entry, always a mistake, unless there is good reasons. They meet with so many local swamps, which makes it too expensive to blast away the bottom from both entries. They have struck the sand bar mentioned in my previous report in two other places—on the south-west side of it and north-east side. The water that flowed out of the first place has ceased, and comes out of other places. They have also driven through the bar and got good coal on the other side; the bar was in the shape of a V, a great deal wider in the roof than in the bottom, showing the presence of an ancient water-course. The mine was in good condition when visited. They have a good underway for men to travel through; they ventilate with exhaust steam. The mining boss is William Phillips; Superintendent, A. J. McCartney, Young-town, Ohio.

Burnett Mine.

This mine is situate on a branch of the N. Y., P. & O. R. R., three miles south-east of Wadsworth, and owned by the Brewster Coal Co. It is a slope opening, about fifty yards deep, at a pitch of one in three. They work on double entry, and ventilate with a furnace. There was a good current of air traveling through the mine, and in some instances men complained of it being too cold, and had to leave two break-throughs open from the face of entry. The mining boss is John Hutchinson; Superintendent, Frank Meacham.

Excelsior Shaft.

This mine is owned by the Excelsior Coal Co., and situate about three miles south-east of Wadsworth on a branch of the N. Y., P. & O. R. R. It is a shaft opening, twenty-six feet deep. They work on entry and windway plan, and ventilate with exhaust steam pump. The ventilation was very feeble when inspected. This is one of the worst mines in this locality for swamps and hills. The shaft was sunk on the side of a hill, the coal running down several feet below into a swamp; then it takes the hill for a certain height and descends again. It makes very difficult hauling, but if this company would expend less money for mules, and lay out more in blasting off some of the hills, they would have cheaper coal. The mining boss is George Reese; Superintendent, Fred. Reese.

DENNISON MINE.

This mine is located about one mile west of Sherman, on the N. Y., P. & O. R., and is owned by Barrett & Jacobs. It is a slope opening about 200 feet in length, at a pitch of ten inches to the yard; it was sunk in 1881 It is a very difficult mine to manage, the coal and roof running so irregular. In some of the rooms the roof would be composed of sandrock, but not very thick; above that is soapstone, and it would form the roof of coal in some instances. I also observed the conglomerate rock make its appearance above the coal, and also seen places where there was nothing but clay and sand for roof. The mine was ventilated very well, on the whole. They work on double entry, and ventilate with exhaust steam. The mining boss is D. R. James; Superintendent, Oliver Jacobs, Akron, Ohio.

STARK COUNTY.

MINGLEWOOD MINE.

This mine is a slope opening, 468 feet long, at a pitch of eight inches to the yard. It is situate at North Lawrence, on the Pittsburgh & Fort Wayne R. R. They work on double entry system and natural ventilation, but when visited on June 13th, 1883, was preparing a place to put an air-shaft down; it was to be six by eight and 120 feet deep. They calculated putting in a large furnace. The current of air was very feeble when visited. The coal generates fire-damp to some extent, and two men were burnt there lately by its explosion. The mining boss is John Gorman; the Superintendent is its owner, James Mullen.

JUSTUS MINE.

This mine is a shaft opening, 114 feet deep, situate about eight miles below Massillon, on the T. & V. R. R. It is owned by the Howells Coal Co. They experienced great difficulty in sinking this shaft, having had eighty feet of quicksand, and that boiling up in the center of the shaft to a height of several feet, but succeeded at last in getting it down to an excellent bed of coal. They work on double entry, and the work was kept in good order. The current of air was very feeble when visited, but their air-shaft was within eight feet of being down, and they calculated putting in a good furnace or fan, which would remedy the whole. The mining boss is Mathew English; Superintendent, Evan J. Evans.

ROSE HILL.

This mine is a shaft opening, 109 feet deep, situate at Navarre, on the Lake Erie R. R. The owners are the Howells Coal Co. They were not working on my visit, but I went down and seen Mr. Morgans, the mining boss, and he showed me where the shaft had been sunk on the edge of a large horseback, and had not succeeded in getting through it on the east side of shaft. Their calculation is to work on double entry as soon as they get in working order. Superintendent, Byron Howells.

Garfield Mine.

This mine is a shaft opening, situate on the T. & V. R. R., near Navarre, and owned by the Navarre Coal Co., of Elyria. They work on double entry, and have a good current of air all through the mine, but have very bad roof to contend with in some parts of the mine. The mining boss and Superintendent is Joseph Collier, of Navarre.

Beaver Run.

This mine is a slope opening, 340 feet in length, at a pitch of five inches to the yard. It is situate at Navarre, and owned by the Beaver Run Coal Co. They work on double entry, and ventilate with exhaust steam. It was in a fair condition when visited. They employ about 100 miners and eight daymen. The mining boss is George Squier; Superintendent, Bernard Keller, of Massillon, Ohio.

Willow, No. 5.

This mine is situate about two miles northwest of Massillon, on the T. & V. R. R., and owned by the Willow Bank Coal Co. It is a slope opening, ninety yards in length, at a pitch of nine inches to the yard. They work on single entry, and ventilate with a large basket hung in their air-shaft. It was in very good condition when visited. They employ about 150 miners and twelve daymen; it was sunk about two years since. The mining boss and Superintendent is Charles Brenkamp, of Massillon, Ohio.

Sippo Mine.

This mine is owned by the Sippo Coal Co., of Massillon, Ohio, and situate one and one-half miles west of Massillon, on the Wheeling & Lake Erie R. R. It is a slope opening, and ventilated with exhaust steam and furnace, and is the best ventilated mine in the Tuscarawas Valley. They have abandoned driving entries, owing to a large horseback circling around the mine, and although they have commenced drawing pillars, there was as much air found in the interior of the mine as at the inlet. The stoppings are about the best I have seen in the State; every breakthrough is stopped up carefully, and then plastered. The mining boss and Superintendent is George W. Phillips, of Massillon, Ohio.

Pigeon Run.

This mine was worked out during the year. In the last annual report of this office, the Assistant Inspector of Mines reported that the mine was in bad shape, owing to the pillars in three of the entries having been drawn, which caused the roof to leak and bring in surface water, so that coal in the back part of the mine could not be got at. Mr. M. J. Morris, the Superintendent, who drew these pillars, felt aggrieved at the report of the Assistant Inspector, and in a communication just

received requested to be heard in regard to his management. The following letter is inserted for the purpose of placing Mr. Morris on record in defence of his plan of mining. I desire to add, that there was no intentional purpose on the part of Mr. Klein to misrepresent Mr. Morris's management, and cheerfully give Mr. Morris's communication a place in the report for the purpose of explaining his plan of management:

Andrew Roy, Esq., State Mine Inspector, Columbus, O.:

MY DEAR SIR: I notice in your report for 1882 a statement by Messrs. Klein and Roderick, wherein they charge me with taking out the pillars of Nos. 1, 3 and 4 entries and leaving very poor pillars along the entry, causing the roof to break and bring in surface water, and also that I left coal in the back part of the mine. Having had charge of said mine three years, and without fault, would you please insert a few words in your next report in reply. The Pigeon Run mine was worked on the double entry system when I took charge of it. I found the entries were being driven very wide, exceeding twelve feet in many places. The cutting was made in the middle, or center of entry, blasting from each side. This I changed, making the main entry nine feet wide and cross-entries seven feet wide, the cutting being made on center pillar rib or side of each entry, thus making a solid wall from three to four yards thick. The rooms were turned nine feet wide and forty-six feet to inside mark from main entry; a six-foot cutting was made on face of coal against the inside mark, then went with an angle of forty-five degrees towards the cross-entries, and in this way until it reached its proper width, allowing thirty-two degrees to be driven toward main entry; thus you can see a very strong pillar was left to support the roof. Width of rooms, ten yards. Rooms were then turned every thirty-six feet, two yards left for pillars. This system was carried on throughout the whole mine. There were three different strata overlying the coal—a hard, white, and grey sandstone around and for quite a distance north and south of shaft. To the east, after going but a short distance, a soft blue soapstone shale came in and the coal took a sudden jump, the hills being very abrupt, and in a short distance the coal cropped out. In this No. 1 east entry eight rooms fell in in one night, destroying tools, cars, and everything in them, and flooded that part of the mine, and no doubt endangered the shaft, had there not been a change in the strata overlaying the coal from soft to hard material. This happened, I think, in Mr. Anthony Howell's management. This same dangerous cover followed the cropping all along the east side, and finally came across our working-face, going north; also the same steep hill was always present. The No. 6 entry, which caved in, was driven on the side of this hill, with this same soapstone for cover, with the swamp between No. 5 and No. 6 entries for a considerable distance; then followed the Nos. 6 and 8, which were driven to the cross, as was also the main entry. Room working was about abandoned, as no more coal existed in that direction. Here there was a large spring; coal about all mined, and roof resting on nothing but props and pillars, and a heavy force of water working upon it. The roof eventually gave away under its burden, and being on a side hill threw the weight on the lowest place, which gave way, and the whole side slid down and over the pillars. Had it been for want of pillars,

the No. 5 entry also would have caved in, as it was in the same condition, the coal being worked out. There was a change in strata overlying the coal in this case—instead of a soft soapstone shale, we had a hard, grey sandrock, which would not break, so, as a matter of fact, the pillars supported it and it staid in its position. Every practical man is aware that it does not require a strong pillar to break soapstone; the trouble I always had was to keep the roof up, not the pillars. I was aware of this pressure of water, as it was always surging like steam jets forced through the crevices in the rocks. That was the reason why I commenced drawing the pillars mentioned, not wishing to touch this particular part until I had most of the others in a safer condition drawn. Mr. Klein spoke very highly of the condition of the mine in June when he inspected it. In the report there was nothing but good air to be found; everything else was bad. As regards the pillars being too small, or that the mine was not properly worked, when I surrendered the mine two months previous to Mr. Roderick taking charge, everything was in good shape; had considerable water to take off, using three No. 9 Blake mining pumps, yet they did the work with ease, and all swamps were dry. I cannot say what was done after I left; and considering myself out of blame, I am,

Yours, respectfully,

M. J. MORRIS.

Clinton, Ohio, November 26, 1883

MEDINA COUNTY.

WADSWORTH, NO. 2.

This is a shaft, which was inspected in May; about eighty feet deep; situate one and one-half miles north of Wadsworth, and owned by the Silver Creek Coal Mining Co. It is worked on double entry plan, and ventilated with exhaust steam pump. They have an air-shaft sunk, but at the date of inspection their entry is not holed through to it. Their main basin of coal lies north of the present one, there being a large hill between them. They sunk their air-shaft in said second basin and are busy at present driving a rock entry through the hill to it. If they had sunk an air-shaft in the first basin they would have been obliged to sink another in the second basin, or else drive air-ways through the hill, which would be very expensive. The mine was in good order, there being a good current of air and good roads. The mining boss and Superintendent, George Head. Since this mine was inspected, Mr. Head was killed August 24 by the cage coming down upon him.

EXCELSIOR SLOPE.

This is a slope about sixty yards long, at a pitch of one in three, situate two and one-half miles south-east of Wadsworth, and owned by the Excelsior Mining Co. It is one of the largest mines in the Tuscarawas Valley, mining about 600 tons per day, of lump coal. They work on double entry, and ventilate with a furnace. It was in good order all through. The mining boss is George Lydyar; Superintendent, Fred. Rees, Doylestown, Ohio.

HUMPHREY AND COLEMAN.

This is a slope opening, 250 feet long; pitch, fourteen inches to the yard, situate one and one-half miles from Wadsworth, and owned by Wm. B. Coleman. There being complaints made that this mine was working up pretty close to the line of the old Weaver Slope, and that being full of water, I inquired into the matter, and Mr. Jordan, the mining boss, informed me that they were about 200 feet from said old mine. They had surveyed the mine about two months previous to my visit, and had the plat of the Weaver mine. They have not worked in that direction since, owing to the coal getting thin and of inferior quality. They are drawing pillars at present. When the workings of one mine are approaching the abandoned workings of another filled with water, there is no other situation in mining life which so readily inspires a feeling of uneasiness on the part of the underground workmen, and with reason, for there is no other situation so fraught with peril to their lives. The Superintendent is Wm. B. Coleman.

WAYNE COUNTY.

FOX LAKE MINE.

This mine is situate about two miles from Clinton, on the Cleveland, Akron & Columbus R. R., and owned by the Fox Lake Coal Co., of Cleveland. It is a shaft opening, and worked part on double and part on single entry plan. Complaints having been made that the mine was in bad condition, it was visited on July 14th, 1883, and after a thorough inspection I am constrained to say that the mine was in good order and the complaint without foundation. I questioned a great many of the miners before I met Mr. Evans, the mining boss, and they all agreed that Evans was a good man, and was doing all he could to keep the mine in fit order to work. But his ventilating power is not strong enough at all seasons of the year, it being exhaust steam. They should have a furnace, by all means, for such a large mine. They have met with a large horseback on the north side of the mine, that threw a great many men out of work, and the boss had to push them all in on the one side, so that the ventilation appeared really worse than it was. The mining boss is Evan J. Evans.

TUSCARAWAS COUNTY.

NO. 1 MINE, PIKE RUN.

This mine is a drift opening, situate about one and one-half miles from Tuscarawas Station, and owned by the T. & V. Co. It is a drift opening, and worked on double entry system, ventilated by a Champion fan four feet in diameter. It was in excellent condition; a good current of air kept up well to the faces, and the roads in first-class condition. The mining boss is George Parfitt: Superintendent, J. E. Waters, Bridgeport, Ohio.

Monarch Mine.

This mine is located at Dennison, on the Panhandle R. R., two miles from Uhrichsville, and owned by the Dennison Coal Co. They work on double entry, and ventilate with a furnace. It was in good condition, but not satisfactory to the mining boss, and he intends having it one of the best ventilated mines in the State, soon. The mining boss is J. C. Smith; Superintendent, A. R. Graham, Dennison, Ohio.

No. 2, Pike Run.

This mine is situate one and one-half miles from Tuscarawas Station, near No. 1 mine, but is owned and operated by the Tuscarawas Coal Co. It is a drift mine, and is well opened, well ventilated, has good roads, and is dry and comfortable. A Murphy or Champion fan produces an abundant current of air, and the entries are all double. The mining boss and superintendent is John L. Davis, a veteran miner and experienced colliery manager.

LAWRENCE COUNTY.

New York Mine.

This is a drift opening, situate six and one-half miles from Ironton, on the Toledo, Cincinnati & St. Louis R. R., and owned by the New York Iron & Steel Co., Ironton, Ohio. They work on single entry plan, and ventilate with a furnace. The mine was found in good order when visited. The mining boss is John Phillips; Superintendent, B. M. Caldwell.

Lawrence Mine

Is situate on the same railroad, about a mile east of New York mine; is a drift opening, and ventilated with a furnace. It was in moderate condition only, when visited, but should have been better, if proper care had been taken in putting the stoppings up. The air was scattered around too much; it ought to have been conducted around in one column, or else make regular splits, not allowed to scatter around in all directions. It is worked on single entry. The mining boss and Superintendent is Henry Perring, Ironton, Ohio.

Hanging Rock.

This mine is located about three miles from Hanging Rock depot; is a drift opening, and owned by Means, Kyle & Co. They work on single entry, and all the entries are driven through the hill, with the exception of one, which was ordered stopped until they had their air-ways driven up and some doors hung. It was almost impossible for the boss and myself to keep a light to the face of said entry; all other places were in very good order. The mining boss is John Dinkle; Superintendent, E. B. Willard.

BELFONT.

This mine is a drift. It has been thoroughly overhauled, a new opening made, and everything about it, inside and outside, improved. This mine now ranks with the best in the State.

All the mines of Lawrence county are opened on the same system—that of driving single entry, but a building is sometimes made between one pillar and the road, from the debris of the roof or floor, and a hollow space left next to the pillar for a windway, in order to get forward the necessary current of air.

The Sheridan mines were visited, but they are not working. They are situate a few miles above Ironton, on the bank of the Ohio River.

THE HOCKING VALLEY SYNDICATE.

A syndicate, called the Columbus & Hocking Valley Coal & Iron Company, was organized in the early part of the present year, which consolidated sixteen of the mines of the Hocking Valley, located in Perry, Hocking and Athens counties. Besides the coal mines, the company own five large blast-furnaces in the Valley, to wit: the Gore, the Wynona, the Crafts, the Basil and the Buchtel. The business of the company is divided into three (3) departments, namely, the coal department, the iron department, and the land department. The head-quarters of the company are located in Columbus, and T. Longstreth is manager of the coal department, Walter Crafts of the iron department, and John R. Buchtel of the land department.

The mines are divided into three divisions, known as the Straitsville division, the Monday Creek division and the Snow Fork division. The Straitsville division, which consists of seven mines, is in charge of William Job as superintendent. The mines are now known by numbers, as follows: No. 3 (Rock Hill), No. 5 (Troy Mine), No. 7 (Central Mine), No. 9 (Job Mine), No. 11 (Straitsville), No. 33 (Old Mine), No. 35 (Plummer Hill). These mines are all situate in Perry county, in and around the village of New Straitsville. They employ an underground force of fully 600 men and boys.

The Monday Creek division is in charge of Thomas Berry, superintendent, and consists of the following mines: No. 15 (Sand Run Mine), No. 17 (Carbon Hill Mine), No. 19, Longstreth's (Monday Creek Mine), No. 31 (Longstreth's Nelsonville Mine). These mines usually employ 550 to 600 miners. They are located in Hocking and Athens counties.

The Snow Fork division, employing nearly 700 miners, is in charge of Thomas N. Black as superintendent. The mines in this division are as follows: No. 21 (Furnace Mine), No. 23 (East Hill Mine), No. 25 (Half Moon Mine), No. 27 (Buchtel Shaft), No. 29 (Murray City Slope), located in Athens and Hocking counties.

In describing these mines in future reports of this office, the numbers of the present company rather than the former names will be used. The superintendents are practical men, having come up from the pick; are men of superior mining intelligence, and are making a success of the mines under their charge The organization of the syndicate was looked upon by the miners with a jealous eye, who feared it had been organized to reduce their wages.

PERRY COUNTY.

REND'S MINE

Is situate at Corning, on the Ohio Central R. R.; is owned by W. P. Rend; is a shaft opening, and worked on double entry at present, but when opened out first they worked on single entry. It was not in as good condition as it should be, but the mining boss informed me that he would have it up to the mark in a few weeks. His name is David S. Williams; Superintendent, Thomas Corcoran, Corning, Ohio.

NO. 3 MINE.

The above mine is located at Corning, and was visited twice this year, as follows: March 27th and June 26th, 1883. It is owned by the Ohio Central Coal Co., worked on double entry, and ventilated with a Murphy fan. It is a shaft opening, and was in very good order on the first visit; but complaints having been made that it was in bad condition, it was visited a second time, and found in very good order, but the complaint was not made without foundation. When the complaint was made they were turning the course of the air; the fan was blowing or forcing, and they had reversed it to an exhaust, consequently had to turn all their doors and put in some new ones, hence the reason of complaint. They only need one more door, when everything will be in first-class condition again. The mining boss is D. B. Wilson; Superintendent, Thomas Corcoran.

UPSON MINE.

This mine is a drift opening, located at Shawnee, and owned by the Upson Coal Co. They work on double entry, and ventilate with a furnace. They have one of the best constructed furnaces in the valley, six feet wide, three and a half feet above bars, and length of bars fifteen feet; the arch being twenty-four feet in length; air-shaft, ninety-five feet deep, and a stack on top thirty-two feet high. There was 19,000 cubic feet of air per minute moving, with a very small fire. The mine was in good condition all through. The mining boss is Rees E. Williams; Superintendent, Walter Upson.

FANNY FURNACE MINE.

This mine is owned by the Licking Iron Co., and located at Shawnee. It is a drift opening, and worked on double entry. They have no furnace, the furnace of Smith's mine ventilating both mines, having holed through to said mine. It was in good condition throughout. The mining boss is William Richards, Shawnee, Ohio.

SMITH MINE.

This mine is owned by the Shawnee Valley Coal Co.; is located at Shawnee, and one of the best managed mines in the State. They work on double entry, and ventilate with a furnace six feet wide and four feet high above bars. There were

20,000 cubic feet of air per minute in motion when tested, with a very moderate fire. The endless rope mentioned in my last report works with satisfaction, and proves to be very economical. The mine was in very good condition, the air well distributed, and excellent roads. The mining boss is Thomas Phillips, Shawnee, Ohio; Superintendent, John Hamilton.

Star Mine.

This mine is situate at Shawnee, and owned by G. A. Blood. The mine was ormerly called the Manly mine, but was abandoned about a year ago, and was leased by Mr. Blood a few weeks since. They have had several mining bosses here since it was first opened out, and each one had his own plan of working it, consequently the mine was butchered up among them. It was not in very good condition for air when inspected, but the present mining boss promises to bring it up to the requirements of the law as soon as possible. The Superintendent is Samuel Butts; mining boss, Alva Day, Shawnee, Ohio.

No. 5 Mine.

This mine is located at Straitsville, and was visited twice this year. It is owned by the Columbus & Hocking Coal and Iron Co., and was formerly called the Troy new mine. It was not in very good order when visited first; the air was baffling, having no furnace to create a regular circulation, and orders were given to put up a furnace immediately. They had an air-shaft ready. They work on double entry plan. Complaints having been made that there was no improvement in the condition of the mine, it was visited the second time on August 17th, 1883, and found no better, there having been no furnace built since the previous visit. They had not the required amount of ventilation, but, what there was, was well conducted around the mine. A letter was written to Mr. Job, the Superintendent, asking that a furnace be built, and was informed the following week that they were preparing to do so. The present mining boss is James W. Hepple; Superintendent, Wm. Job.

No. 5 Mine.

This mine is what was formerly called the Troy old mine; is owned by the same firm, and situate at Straitsville, opposite the new mine. It was visited twice this year, and found in good condition both times. They work on double entry, and ventilate with a furnace. The track of this mine was also in good condition. The coal of both these mines is dumped on the same chute. The Superintendent is Wm. Job; mining boss, Job Storey.

No. 7 Mine.

This mine is owned by the Columbus & Hocking Coal and Iron Co., and located at Straitsville. It is a drift opening, and was visited twice during the year—on April 2nd and September 7th, 1883. They work on double entry, and ventilate with a furnace. It was in good order both times. They work two of the Lechner

coal-cutting machines, and employ about seventy-five men. The present mining boss is Charles Welch; Superintendent, William Job.

No. 9 Mine.

This is a drift opening, located about one mile west of New Straitsville, owned by the same firm, and was formerly called the Job mine. They have three openings, but the coal of each is hauled to the same hopper with a locomotive. They work on double entry. The old opening was not in as good condition as the mining boss desired it to be, but it was the best that could be done under the circumstances, it being an old mine and butchered up considerably. They were busy driving an entry to it from one of the new openings, and expected to be through in about a month. The new opening was in very good order under the circumstances, the furnace not being built yet, but they contemplate doing so soon. The mining boss is Zephaniah Williams; Superintendent, William Job.

No. 33 Mine.

This mine is situate at New Straitsville, and owned by the same firm. They are working two openings at present, and the mine locomotive which hauls the coal to the hopper runs through two hills, a distance of one and three fourths miles. The old opening is ventilated with a furnace, and is in very good order. The new opening is opened out in good style, on double entry plan, but had nothing but natural ventilation at the date of visit. They had their air-shaft down, but not the furnace built. The mining boss informed me that they would have it ready in a few weeks. His name is Alfred Simons; Superintendent, William Job.

Consolidated Mine.

This is a drift opening, situate at New Straitsville, and owned by the Consolidated Coal Mining Co. They work on single entry, and ventilate with a furnace. It was not in very good order when visited. They had to take ten men out of Powers' entry a few days previous to being visited, owing to the air being bad. The air was also very sluggish in many other parts of the mine. The boss promised to have it remedied in a few days. Name of superintendent, George W. Brashears; mining boss, Peter Gallagher.

Chicago Mine.

This mine is situate at New Straitsville, and owned by W. P. Rend. They work on donble entry, and ventilate with a furnace. It is a pleasure to go into this mine, as it is in such good order; a good current of air in circulation, and the roads perfectly dry. It is by far the best ventilated mine in the Straitsville district. When Mr. Weatherburn, the present efficient superintendent of this mine, after being first appointed superintendent, persisted in working on the double entry principle, there arose a hue and cry against him by ignorant but ambitious miners, that

this plan of mining was too expensive, and complaints were made to his employer, by miners who wanted his place, about his extravagant system of working. His employer requested me to inspect the mine, having made up his mind to remove Mr. Weatherburn in case I did not approve of the manner of mining in practice. After carefully inspecting the mine, I urged that Mr. W. be kept; that the cause of complaint was utterly groundless; that Mr. W. was a superior man, and that before many years every mine at New Straitsville would adopt this method of working coal. Mr. W. was superior to his associates, which is sometimes an injury to a man for the time being.

No. 5.

This mine is a shaft opening, located at Rendville, and owned by W. P. Rend, of Chicago. It is worked on double entry and natural ventilation. It was visited twice during the year. They had been changing the course of the air a day or two previous to my visit. They wanted to make their hoisting shaft an upcast and their slope a downcast, but on my visit both were downcasts. The fact of the mine being holed through to No. 3 mine, and a fan in said No. 3, explained the whole matter. There were no complaints of bad air. The mining boss is Henry Beynon; Superintendent, Thomas Corcoran.

No. 13.

This mine is located at Corning, and owned by the Ohio Central Coal Co. It is a shaft opening, worked on double entry, and ventilated with a fan. The mine was in very good order throughout. They employ about eighty miners and ten daymen. The mining boss is William Penman; Superintendent, Thomas Corcoran, of Corning.

No. 7.

This mine is situate at Corning, and owned by the Sunday Creek Coal Co. It is a shaft opening, worked on double entry plan, and ventilated with a furnace. It is a model mine for ventilation and tram roads; everything kept in good order. The Superintendent is Fred. Miller; mining boss, Charles E. Smith.

No. 11.

This mine is a shaft opening, situate at Corning, and operated by the Sunday Creek Mining Co. They had nearly drawn all the pillars of this mine when they succeeded in getting a new territory of coal, which they had previously failed to do. They are at present opening up through the old mine to start on said territory. They have started on double entry, and are ventilating with a fan. They employ thirty-four miners and three dayman at present. The mining boss and Superintendent is Charles E. Smith.

Star Mine.

This mine is situate at Shawnee, and owned by G. A. Blood. It is a drift opening, and worked part on single entry and part on double entry. It was visited twice during the year, and not in the best of order either time as regards ventilation, but they have it in such a shape at present that it will take but a few weeks to put it in good order. They employ about sixty miners and ten daymen. The mining boss is Alva Day; Superintendent, Samuel Butts, Shawnee, Ohio.

JEFFERSON COUNTY.

This mine is situate on the Ohio river, and owned by the Rush Run Coal Co. It is a shaft opening, 260 feet deep, worked on single entry, and ventilated with a furnace. They have not put their second opening down yet, but are busy at it at present, and expect to have it down in a few months. The current of air was very feeble when visited. The mining boss is James Cooper; Superintendent, Joseph Cooper.

Diamond Mine.

The above mine is located on the C. & P. R. R., at the mouth of Yellow Creek. It is a drift opening, worked on double entry, and ventilated with a furnace. It was in good condition—a strong current of air all through, and the roads in excellent order. They haul out about 300 tons of lump coal daily with only four mules, and the mine is in a long distance. It is owned by S. N. & W. G. McCulloch, and superintended by Mr. Isaac Thomas.

The shaft mines of Steubenville have been minutely described in previous reports of this office. During the yearthe district wasnot visited, the mines being idle, with the exception of one, which was reported monthlyto the office.

HOCKING COUNTY.

No. 19 Mine.

This mine is located at Monday Creek, and owned by the Columbus & Hocking Coal and Iron Co. They have four openings, situate close to one another, and their coal is all dumped on the one chute. These mines were visited twice during the year, the first time June 27th, and second time August 22nd, 1883. They work on single entry, and some of the openings are ventilated with furnaces. On the first visit the opening on the west side was in bad condition, their main air-way having closed in for several hundred feet, but two entries had been holed through to one another a few hours previous to my visit, which would make the air better. They were also busy cleaning up said air-way. On the second visit it was in better condition, but the east side opening was in bad order, one entry being several hundred feet ahead of air. As long as they continue the single entry system they will have

bad air. They work several of the Lechner coal-cutting machines. The mining boss is William Engles; Superintendent, Thos. Berry.

This Superintendent stubbornly persists in keeping behind the times, and in making experiments in the art of mining which our forefathers a century ago had abandoned as failures in the art of mining.

No. 29.

This mine is situate three and one-half miles east of Buchtel, at Murray City, and owned by the Columbus & Hocking Coal and Iron Co. It is a slope opening, worked on double entry, and ventilated with a furnace six feet wide and four feet above bars, the arch being twenty-eight feet long. It is a model mine for ventilation. The main entries are driven on butts of coal. They have an endless rope for hauling the coal out of the slope. The mining boss is William Black; Superintendent, James Black.

Snake Hollow.

This mine is located at Nelsonville, and owned by Brooks & Son. It is a drift opening, worked on single entry, and employs about fifty men and ten coal-cutting machines of the Harrison make. They have a locomotive for hauling the coal out of the mine for a distance of one and one-fourth miles. It was in good condition, with the exception of one entry, and that would be all right in a few days. The mining boss is Robert Beatty; Superintendent, W. B. Brooks, Jr.

Thoroughfare Mine.

This is a drift opening, situate at Nelsonville, and owned by the same firm as Snake Hollow. They work on single entry, and it was in bad condition nearly all through. The main entry was ordered to be dropped, owing to bad air, but later in the evening Mr. Brooks, the Superintendent, asked for a month's time, so as to drive their main entry into a hollow that was ahead of them, in order to put down an air-shaft, and the request was granted. The mining boss is L. L. Scott; Superintendent, W. B. Brooks, Jr.

Sand Run, No 15.

This mine is situate at Sand Run, and owned by the Columbus & Hocking Coal and Iron Co. They have two openings, but both coals are dumped on the same hopper. The main entries on the south side are driven double and the butts single. There was not a strong current of air passing through the mine, there being no furnace—nothing but natural ventilation. The south side was in better condition, there being a furnace. There was only one entry working on my visit, that one being a little ahead of the current, which will soon be through to an air-shaft already sunk. The mining boss of both places is Frank Koehne; Superintendent, Thomas Berry, Nelsonville, Ohio.

Sacket, Smart & Co.'s Mine.

This mine is located at Sand Run, and owned by R. H. Sacket & Co., of Columbus, Ohio. This is a drift opening, worked on single entry, said entries being driven through the hills for ventilation. Men suffer a great deal, before they hole through, for air, and will continue to suffer so long as this plan remains in force. They have very bad roof in some parts of this mine. The mining boss is D. K. Nutter; Superintendent, R. H. Sacket. This mine has been troubled with horsebacks, which has made it difficult and costly to ventilate well.

No. 19.

This is the old Carbon Hill mine of J. H. Somers. It was visited twice during the year, but was idle on the second visit, and was inspected but once. It is kept in good order, being worked on the double entry plan and ventilated by furnace power. The miners of this mine have always taken an interest in the ventilation, sending monthly reports to this office when called up. They keep up a committee for this purpose, whose various reports to this office have always been candid and fair—awarding to the mining boss merit wherever merit was due, and in no case acting in a critical or unfriendly manner toward the parties in charge of the mine as regards the ventilation.

No. 31,

Or Longstreth's Monday Creek mine, was once inspected during the summer, and found in very bad condition in its ventilation. The mine was worked on the single entry system, cross-cuts or air-ways being driven from one entry to another for air. The distance these places were ahead of the air was hundreds of feet, and the current at best was by far too feeble. The miners complained, with good reason, that the mining law had brought them no better air. I notified Mr. Berry personally, and by letter, of the wretched condition of the mine, also wrote Mr. Longstreth, the manager of the Columbus & Hocking Valley Coal and Iron Co., who own the mine, on the same subject, and asking that the air be improved according to law. It is not pleasant to record such facts, but the truth must be told. The Inspector has been as forbearing as possible with all such mines, but in this case, as well as some others, forbearance has been accepted as licence for neglect. How can we expect peace, friendly relations, and an avoidance of strikes in such mines. When the parties responsible for the state of the atmosphere in this mine read the above, they will have every excuse but the right one to offer as an apology. The condition of this mine can admit of no possible excuse or apology.

ATHENS COUNTY.

South Side Mine.

This mine is located at Nelsonville, and owned by C. L. Poston & Co. It is a drift opening, worked on single entry in squares of 400 feet, and ventilated with a

furnace nearly at the mouth of the mine. They have a locomotive hauling the coal out of the mine, and have a constant current of air traveling along the main entry where their locomotive works. On my visit they had about 19,000 cubic feet per minute in motion. The mine was in very good order, on the whole; places that were not up to the mark were nearly all through the hill. The mining boss is J. C. Millinger; Superintendent, C. L. Poston.

Old Mine.

This mine is owned by the same firm, and situate at Nelsonville, and worked on the same principle. There was but one entry being driven when visited, which was a long distance ahead of air, but was informed by both boss and miners that they expected to hole through every day to the Mining Co.'s mine, which would remedy the whole. It is managed by the same parties. As in all mines worked in squares by single entry plan, the ventilation is good after the holing is made, and bad until it is made. The excellent current of air formed by the furnace would, if properly distributed, ventilate the mine thoroughly at all times

Johnson's.

Johnson Brothers & Patterson are the operators of this mine, which is situate at Nelsonville. It is level-free, and has been opened within a year or two. The mine is well opened, and was ventilated reasonably well. Mine boss, Joseph Slater Superintendent, David Patterson.

Maple Hill Mine.

This mine is a drift opening, situate about three miles south-east of Nelsonville, and owned by W. A. Shoemaker & Co., of Columbus. The greater part of the mine is worked on single entry and natural ventilation in winter, but they have an excellent furnace six feet wide, four feet high above the bars, and twelve feet long, which they use in the summer. The mine was in good order, with the exception of the first east entry, which has not been very good. The Superintendent is T. P. Marshall; mining boss, G. W. Mitchel.

Hall's Mine.

This mine is situate south east of Nelsonville, and owned by G. E. Hall. It is a drift opening, worked on single entry, and ventilated from the Longstreth mine, both mines being holed through to one another. It was in very good trim, with the exception of one entry, and that was nearly through to an air-course. They employ about forty-five miners. The Superintendent is John B. Down, Nelsonville.

Little Brier Hill Mine.

This mine is situate on the Hocking Valley R. R., at Snow Fork Junction; is a drift opening, worked on single entry and natural ventilation, and not in the best

of order, the first east face entry being several hundred feet ahead of air, and no air-course being driven. The mining boss was away when it was visited, but orders were left to improve its condition immediately. They employ about forty-two miners and two daymen. The boss is Lewis Powell, of Nelsonville.

Big Brier Hill.

This mine is situate about 200 yards from Little Brier Hill, and owned by the same company. They work on single entry, and have no outlet, consequently the ventilation was bad—not a particle of current, only when the drivers are hauling, and it is a wonder how men work there at all. Orders were left to get the mine up to the requirements of the law immediately. They employ about twenty-one miners. The mining boss is Lewis Powell, Nelsonville.

JACKSON COUNTY.

Globe Mine.

This mine is a slope opening, situate at Jackson, Jackson county, and owned by the Globe Iron Co. They work on single entry, and ventilate with both exhaust pump and furnace. Their air-shaft is eighty feet deep, nine feet long, and six feet wide. The shaft is divided into two compartments, from top to bottom, with sheet-iron, the smoke and steam ascending one side, and ladders in the other as a means of ingress and egress in case of necessity. The mine was in good order all through. They employ about forty men. The mining boss is John R. Rowlands; Superintendent, E. Crandall.

Kyle Mine.

This mine is a slope opening, located at Jackson, Jackson county, and owned by Kyle, Shotts & Co. They work on single entry and ventilate with a furnace, but had no fire when visited, consequently the current was very feeble. They employ about forty miners and seven daymen. The mining boss is Yancey Lynch; Superintendent, George W. Shotts.

Eureka Mine

Is a shaft opening, situate at Jackson, Jackson county, and owned by the Eureka Coal Co. It is a hard matter to determine on what system this mine has been worked; it is gouged out in all shapes, leaving no pillars of any consequence to sustain the roof. There has been a change made in the mining bosses lately. They ventilate with a furnace, but a very poor one; it is their intention to build a new one soon. The present mining boss is John R. Griffiths; Superintendent, J. A. Long.

Comet Mine.

This mine is a shaft opening, situate near Wellston, and owned by the Comet Coal Co., of Dayton, Ohio. It is worked on single entry, and ventilated with exhaust steam pump. It is in bad condition, with scarcely enough air in motion to move the anemometer in the most of places. There was sufficient air at their new air-shaft, which was a downcast, but it ascended the upcast before it went into circulation. Orders were left to improve its condition immediately. The mining boss is B. F. McCloud, Wellston, Ohio.

Milton Mine.

This mine is located at Wellston, and owned by the Milton Furnace & Coal Co. It is a shaft opening, and ventilated with a good furnace. They work on double entry, and the mine was in good order all through. The mining boss is Vinton Pearce; Superintendent, H. S. Willard, Wellston, Ohio.

No. 3, or Patterson Slope.

This mine is situate at Corse, about one mile east from Wellston. It is a slope opening, 170 feet in length, at a pitch of one foot in three, and owned by the Ohio Southern Coal & Iron Co. It was visited twice this year, as follows: May 23rd and August 28th, 1883. They work on double entry, and ventilate with a furnace. On my first visit it was not in the best of condition, having poorly-constructed doors and stoppings, and the air was leaking considerably, but the mining boss informed me that he would have the doors changed as soon as possible. Having been notified that Mr. Evan Thomas, the mining boss, was killed, I went there on August 28th, Mr. Thomas having been killed the day previous. I found Mr. Jones, the Superintendent, and several of the miners on top of mine, and we all went in the mine together, and found everything just as it was left when the accident happened. The miner that was with Mr. Thomas when killed had gone to his room that morning, and found that some slate had fallen at the mouth of the room; he immediately notified Mr. Thomas of the fact, and both went back together and found that there was a large stone lying across the road and resting on the gob. They went to work to break it through the middle by cutting it, and when about half way through Mr. Thomas crossed in under it with the intention of breaking it from the opposite side, but just as he went in under it the stone broke and killed him instantly.

Eliza Mine.

This mine is located at Wellston, and owned by the Eliza Furnace Co. It is a shaft opening, about eighty feet deep, and ventilated with furnace. The west side of the mine was worked on double entry and east side on single entry. It was in good order all through. The mining boss is Thomas McGuire; Superintendent, Harvey Wells.

Drew & Wasson.

This mine is a slope opening, situate on the Ada Switch, about two miles from Coalton, and owned by Drew & Wasson. They work on single entry, and ventilate with a furnace. It was visited twice during the year; the first time it was in bad condition, not having a furnace built, but the air-shaft was down, and brick had been ordered for the furnace, and they were expecting its arrival every day. The air-ways were also up well, and all that was needed was a good furnace so as to create a current. On the second visit everything was in good order; a good furnace built and a good current moving. The mining boss is Wesley Evans; Superintendent, William Thompson.

Jones Coal Co. s Mine.

This mine is a shaft opening, located at Glen Roy; is about eighty feet deep, and owned by Jones & Co., of Jackson. They work on entry and windway plan, and ventilate with exhaust steam, but have commenced their second opening or air-shaft, and mean to put in a furnace. The mine was not in very good condition for air, but if said shaft was down there ought to be no complaint. The mining boss is Miles Jones; Superintendent, Thomas M. Jones, of Jackson.

Emma Mine.

This is a shaft opening, seventy feet deep, and was visited twice this year. It is owned by the Emma Co., and is situate at Glen Roy. They work on single entry, and ventilate with a furnace. It was not in extra condition when visited the first time, but was in good condition the second—a good current of air traveling all through the workings. The mining boss is Evan T. Davies; Superintendent, Moses D. Jones, of Jackson.

Star Mine.

This mine is located at Jackson, and is owned by the Star Furnace Co. It is a shaft opening, and was inspected twice this year—on June 22nd and October 23rd, 1883. They work on double entry, and ventilate with a furnace, and the workings were found in good order both times—a good current of air, and the roads perfectly dry. The mining boss is Henry Price, Jackson, Ohio; Superintendent, Isaac Brown.

Standard Mine.

This is a shaft opening, situate at Glen Roy, and owned by the Standard Coal Co., of Jackson, Ohio. It is a new opening; had but lately commenced shipping coal. They had not their air-ways through to the upcast when visited, and the air was not in very good order, but the mining boss promised to get things in order as quickly as possible. The mining boss is David Jones; Superintendent, Moses Morgan, Jackson, Ohio.

Eagle Mines.

These mines are situated between Jackson and Coalton, on the Ohio Southern R. R., and owned by the Eagle Coal Co. They have three drift openings, two of which are situate close together, the third being one-half a mile away. No. 1 is worked on single entry, and ventilated with a furnace, and was in good condition. No. 2 is also worked on single entry and natural ventilation, and kept in very fair condition. No. 3 only employed six men, therefore I did not visit it. The mining boss is J. W. Ferris; Superintendent, D. W. Evans, Jackson, Ohio.

Thorn Hill Mine.

This is a drift opening, owned by the Sterling Coal Co., and situate at Coalton, Ohio. They work on entry and windway system and natural ventilation. It was in very bad condition when inspected, and orders were left to improve its condition. One of the owners promised to have it fixed immediately. The mining boss is L. Hutchinson; Superintendent, C. Thornhill.

Mohler & Kisinger Mine.

This is a slope opening, situate on the Ada switch, two miles from Coalton, and owned by Mohler & Kisinger, of Jackson, Ohio. They work on single entry and natural ventilation. It was in very bad condition when visited, and it is a wonder how men work there without complaining. There was not sufficient current fifty yards from the bottom of the inlet to move the anemometer—all went to the upcast before circulating through the mine. The mining boss was away the day it was visited, but a letter was written to the company informing them of the condition of the mine, and requesting them to improve its condition immediately. The mining boss is Marion Kisinger, Jackson, Ohio.

Hurd Slope, No. 1,

Is situate on the Ada switch and owned by the Hurd Coal Co It is a slope opening, 150 feet in length, at a pitch of one in three. They work on single entry plan, and ventilate with a furnace. It was in good order all through—an excellent current of air, and good roads. The mining boss is George Bartlett; Superintendent, J. C. Hurd, Jackson, Ohio.

No. 2 Slope—Jones & Morgan.

This mine is situate at Coalton, and owned by Jones & Morgan, of Jackson. They work on single entry, and ventilate with furnace. It was in good condition throughout. The mining boss is Joseph Harper; Superintendent, Moses D. Morgan

No. 3 Mine.

This is a slope opening, located at Coalton, and owned by the same firm as No. 2. They work on single entry, and ventilate with both exhaust steam and furnace

The mine was found in first-class order. The mining boss is Joseph Harper; Superintendent, Moses D. Morgan.

THEO. FLUHART & CO.'S MINE,

Situate one mile south of Wellston, is well opened; has a good furnace and abundant ventilation. The entries are double, and the workings are carried systematically forward. Name of mining boss, John McMillan; Superintendent, Theodore Fluhart.

WELLSTON COAL & IRON CO., NOS. 1 AND 2.

These mines, situate at Wellston, are about half a mile apart, and are holed through on each other. The air in the old mine, No. 1, is not as good in some places as it might be. The name of the Superintendent is George Willege.

KELLEY MINE,

Situate at Coalton, is well ventilated and managed. The mine has been described in detail in my last annual report. The bosses have been changed recently, Thomas Cole assuming charge of the inside workings, Mr. J. R. James having resigned.

GARFIELD MINE.

This mine is situate half a mile below Coalton, on the T. C. & St. L. R. R., and has changed owners during the year, being now owned by Patterson Brothers. It is a drift opening; is ventilated by furnace, and is worked on entry and air-way.

DARLING, NO. 1 AND NO. 2.

These mines are situate at Coalton, and were among the first opened in the Coalton district. The plan of working described in my last annual report is followed. Until recently the mines were under the charge of John Hall, Pimlott and Hall being the owners, but Mr. Hall has recently sold out. The mines are holed through on each other, and are ventilated by furnace power.

KELLY MINE.

This mine is a drift opening, situate at Coalton, Jackson county, and owned by the Kelly Coal Co. They work on single entry, and ventilate with a good furnace four and one-half feet high above the bars, and five feet wide. The mine was in good condition when inspected. They employ about sixty miners and nine daymen. The mining boss is Thos. Cole.

EMMA MINE.

This is a shaft opening, situate at Glen Roy, and owned by the Emma Coal Co., of Jackson county. They work on single entry, and ventilate with an excellent

furnace, four and one-half feet wide, and three and one-half feet high above the bars. This is the best ventilated mine in Jackson county. It was in perfect order throughout when inspected. They employ fifty miners and seven daymen. The mining-boss is Evan Davies; Superintendent, Moses Jones.

Standard Mine.

This is a shaft opening, located at Glen Roy, and owned by Jones & Morgan, of Jackson county. It was sunk in 1883, into a good basin of coal nearly four feet thick. They work on single entry and natural ventilation, but will soon have the amount of coal worked out to command another opening. The mine was in very good order. The mining boss is David Jones; Superintendent, Moses Morgan.

GLOSSARY OF TECHNICAL MINING TERMS.

The following glossary of mining terms was read before the Columbus meeting of the last Ohio Institute of Mining Engineers held in Columbus. A correction of some of the terms may be made at a future meeting of the Institute. The object of the glossary is to prepare a standard of mining terms for the use of mining engineers and mining experts in the State of Ohio:

A.

Air-box—A wooden box used for taking air forward to the workings.

Air-course—A gallery or other passage way used for the time for the passage of a current of air.

Air-crossing—A bridge or overcast where one current of air passes another without coming in contact with it.

Airway—(See air-course).

After-damp—Gas formed from the products of an explosion of fire-damp, composed mainly of carbonic acid and free nitrogen gas.

Air-shaft—A shaft used for ventilating mines; it may either receive or discharge the circulating current.

Air-split—The division of the main current of air into two or more streams.

Anemometer—An instrument for measuring the speed with which air moves in mines.

Anticlinal—An arch in the strata from which they dip in opposite directions.

Air-stalk—The chimney on top of the upcast shaft.

B.

Basin—A low place or hollow in the strata, from which the coal rises in opposite directions. A coal field.

Bad Air—Air contaminated with the noxious or poisonous gases of mines.

Bank—A coal mine—sometimes small.

Black Damp—Carbonic acid gas.

Blackband—Carbonaceous shale iron of a dark-brown color.

Blower—A jet of fire-damp escaping from coal or its associate strata, which produces a hissing sound.

Bucket—A wooden box for raising rock in a shaft in course of sinking. The clack of a lifting pump.

Bell mound—The cast of a tree found in the roof shale of a coal bed.

Bank Boss—(See mine boss) inside foreman of a mine.

Boss Miner—(See mine boss).

Brasses—Iron pyrites found in coal.

Block Coal—A coal seam that mines in rectangular blocks without the use of gun powder.

Butts—The end slips of the coal.

Blast—A discharge of gunpowder in coal.

Bearing In—Cutting under—undermining in the coal.

Billy Fairplay—A machine placed under a coal screen to receive and weigh the slack which falls through the screen bars.

Breakthrough—A narrow passage cut through a coal pillar for ventilation.

Butt Entry—An entry driven at right angles with the end slips of the coal.

Bone Coal—Hard, slaty coal, unfitted for commercial purposes. It is often met at the bottom of the seam.

Blossom—The black coal stain found in the alluvial cover of a coal seam, indicating the existence of the seam.

Boundary Pillar—A pillar left between adjoining properties in mines.

Bear-in—(See undermining).

Bonnet—The cover of a cage.

Bottom—The floor of the coal—the bottom of the shaft or slope.

Brattice—A partition made of plank to force air forward or prevent it from returning by the shortest route to the upcast.

Brattice-cloth—A trap-door made of canvas or other heavy cloth.

Breeding Fires—Fires formed in the gob by spontaneous combustion.

Buntons—The cross-timbers of a shaft which support the guides.

C.

Cage—That part of the elevator of a coal shaft for raising or lowering coal and men.

Catches—The fans or traps or levers placed on top of a pit upon which the cages rest.

Coal Bed—An extended deposit of coal.

Coal Seam—(See coal bed).

Coal Field—A region of country in which coal is known to exist.

Coal Measures—The strata associated with coal beds.

Coal Cutter—A machine used for cutting coal.

Coal Miner—One who digs coal.

Coal Digger—(See coal miner).

Crop Coal—Coal of inferior quality near the surface.

Cartridge—A paper or other tube filled with blasting-powder.

Crib—A pillar formed of wooden props laid horizontally.

Crush—The breaking or giving way of the superincumbent strata of a mine.

Creep—The heaving of the floor of mines.

Crab—An iron rod forked at one end, attached to loaded coal cars coming up out of a slope.

Cross-cut—(See breakthrough).

Choke-damp—The gases formed by an explosion of fire-damp.

Colliery—Two or more mines operated by one company.

Coal-pipe—(See bell-mound).

Circulation—The movement of the air-currents of a mine.

Check-weighman—A person employed by the miners to see their coal weighed.

Current—The moving stream of air of a mine.

Cross-entry—An entry running at an angle with the main entry.

Chain-pillar—The pillar between double entries.

Check—(See ticket).

Cap—The crown-piece of a prop—the elongation of a light brought in contact with fire-damp.

Car—Mine car.

Cave-in—A fall underground reaching up to the surface.

Charge—(See shot).

D.

Davy Lamp—(See safety-lamp).

Dead-work—The expense of operating a mine, less the cost of digging the coal and royalty.

Dip—The inclination of the strata.

Dip-entry—The gallery of a mine following the line of greatest dip.

Draw-slate—A thin stratum of roof shale, which falls with the coal or soon afterward.

Down-throw—A slip in the coal strata which throws the coal down.

Drain—A ditch cut in the coal floor.

Drift—A level-free mine, driven in a hill.

Dry-burning Coal—Non-coking coal.

Drill—An iron rod several feet in length, having a sharp chisel at one end for boring in rock or coal.

Double Entry—Two entries driven on parrallel lines, separated by a pillar of coal a few feet in thickness.

Drum—A large cylinder, around which the rope is wound.

Driver—A person who drives a horse or mule in a mine.

Downcast—The shaft, or shaft compartment through which fresh air is sent into the workings of a mine.

Danger Signal—A signal consisting of a board, shovel, or other material placed in the front of a room or entry containing an explosive mixture of fire-damp.

Day Shift—Miners who work during the day in a mine or portion of a mine which runs day and night.

Dump—(See tipple).

Dump-house—The building where the loaded mine cars are emptied into the chutes.

Dumb-furnace—A ventilating furnace, where the return current of air is delivered into the air-shaft without passing over the furnace fire.

Dumb-drift—The passage-way into the upcast shaft for a return current of air.

Dip-heading—(See dip-entry).

Deputy—Under mine boss.

E.

Engine-pit—A shaft through which water is pumped.

Entry—A narrow gallery or heading driven forward to open up the mine.

Explosion—The ignition of a dangerous volume of fire-damp.

F.

Fall—A mass of shale fallen from the roof.

Face—A place in a mine where the coal is dug out—the end of a mine or other working place.

Face Slip—The front slip of a coal seam.

Face Entry—The gallery of a mine driven at right angles with the face slips of the coal.

Fan—A machine for blowing air into or exhausting air out of a mine.

Fault—The disturbed condition of a coal bed.

Feeder—A stream of water or gas issuing from the coal or incumbent strata.

Fire-damp—The explosive gas of coal mines.

Fire-viewer—A person whose duty it is to examine the workings of a mine with a safety-lamp.

Floor—The bottom of a coal seam.

Flue—(See furnace).

Furnace—A brick fireplace erected at the bottom of the upcast shaft for the purpose of creating a current of air.

Fresh Air—Air free from the presence of deleterious gases.

Fine Coal—(See slack).

Foreman—(See bank boss).

G.

Gases—The deleterious air of mines.

Gob—The rubbish left in the mine.

Gouge—To work a mine without plan or system.

Guides—The rods placed in a shaft for guiding the cages in their ascent and descent.

H.

Half-course—Working at half-angle across the slips of the coal.

Half-pitch—Dipping or rising 18 inches to the yard.

Hauler—(See driver).

Heading—(See entry).

Heave—The creeping or rising of the coal floor.

Hitcher-on—The person employed at the bottom of a shaft or slope to put on loaded cars and take off empty cars.

Holing—Undermining the coal.

Hill—An arch or high place in a mine.

Horse-gin—A large drum fitted upon an upright axle, and having a wooden arm, used in raising the debris of shafts in course of sinking, operated by a horse.

Hopper—The railway coal car.

Horseback—A saddle-like roll which rises in the floor of mines for two or three feet in height. This fault is now indiscriminately applied to every mining trouble or fault by American miners.

I.

Incline Plane—A tram-road having sufficient pitch for the loaded cars to pull up the empty ones by gravitation.

Indicator—A signal operated by the hoisting engine of a coal shaft, which warns the hoisting engineer of the position of the ascending cage in the shaft.

Intake—The current of air of mines moving toward the working places of the miners.

Ingoing Current—(See intake).

Iron Pyrites—Thin layers of sulphur combined with iron, frequently found in coal.

L.

Lease—The right to mine coal or other minerals in consideration of certain royalties.

Level—The line of stake of the strata.

Level-free—A mine that discharges water by gravitation.

Legs—The props of a bent of timbers.

Loaded Track—The track on which the full cars run.

Long-wall—The system of working away all the coal of a mine without leaving any pillars.

Long Work—(See long-wall).

Loose End—One side of a room having no pillars.

Landing—The top of a shaft or slope where the cars are taken off.

Lump Coal—Coal that has been screened; it is also called screened coal.

M.

Manager—The officer having charge of the superintendence of mines outside and inside.

Mainway—A passage-way at the bottom of a shaft so that persons can pass from one side to the other without passing under the cages.

Measuring-day—The day of the month on which the mine boss measures the work of miners.

Mine—A subterraneous excavation from which coal or other minerals is extrated.

Miner—A digger of coal or other minerals.

Mining Engineer—A person skilled in the management and engineering of mines.

Mother Coal—Mineral charcoal.

Main Entry—An entry driven at right angles with the face slips of the coal.

Mitchell Tipple—An ingenious tipple for dumping mine cars.

Mouth—The opening or entrance of a mine, whether shaft, slope or drift.

N.

Narrow Work—All working places driven narrower than rooms. Narrow work is generally confined to entries and air-courses.

Needle—A long, small rod, used by miners in blasting.

Night Shift—Miners who work at night.

Nigger-head—A hard, round piece of rock, sometimes met in coal seams.

Nut Coal—The small coal which passes through the screen bars as the coal is being discharged from the mine cars into the railroad cars or hoppers.

O.

Overman—(See bank boss).

Overwind—To pull the cage up to the pully wheels of the head-frame.

Ostler—The person who feeds the horses or mules and keeps the stable in order.

Outcrop—The coal near the surface.

Operator—Any party working a mine.

Outlet—The opening of a mine.

P.

Pit—(See shaft).

Pit Boss—(See bank boss).

Pitch—The dip or rise of the strata.

Pay-day—The day on which miners are paid—usually the 15th of each month.

Parting—A switch or short double track in the mine to allow loaded and empty cars to pass each other.

Pillar—A column of coal left in the mine for the support of the superincumbent strata.

Pillar and Room—Working away a coal seam by leaving pillars between each room.

Post—A wooden prop for keeping up the roof of a mine.

Prop—(See post).

Pick—The iron tool, with steel points, used by the miner in undercutting the coal seam. It is 12 to 15 inches in length, sharpened at both ends, and has a handle 28 to 30 inches long.

Pumper—A person employed to pump water in a mine by hand-power.

Pully Wheels—The large wheels on top of the pit-head frame, over which the winding rope passes.

Powder—Blasting-powder.

R.

Regulator—A sliding door for the purpose of regulating the quantity of air passing to certain divisions of a mine.

Return—The air of a mine moving between the working places and the upcast shaft.

Roadman—A person whose duty it is to keep the roads of a mine in order.

Roll—A local depression in the roof of mine.

Roof—The strata lying immediately above the coal bed.

Royalty—The rate per ton charged by the owner of coal or other minerals to the lessee of the mine.

Rib—A thin pillar of coal left between rooms.

Room—A working place in the mine.

Rib-shot—A shot on the rib side or pillar of a room.

Range—A lift or square of workings.

Road—The mine track.

S.

Safety-lamp—A miner's lamp covered with iron wire gauze, having 784 apertures to the square inch, for the purpose of examining the workings of a mine discharging fire-damp.

Scraper—A long piece of iron flattened at one end and turned up, for the purpose of cleaning out the debris of a bore-hole.

Screen—A wooden frame, built at an angle of 25 to 30 degrees, having iron bars securely fixed in the frame, from ½ of an inch to 2 inches apart, over which the coal as it comes from the mine is passed, for the purpose of separating the nut and slack from the lump coal.

Shaft—A hole sunk in the ground to coal or other mineral beds or veins.

Shift—A day's work when miners are working by the day.

Shot—The discharge of powder in a hole drilled to throw down coal.

Sinker—A miner who works in a shaft while it is in course of sinking.

Slack—Small or refuse coal which is unmerchantable.

Slip—A fault in the coal strata—the face and butt joints of the coal seam.

Slope—An angling shaft.

Strike—The cessation of work by miners or other laborers for the redress of some grievance, real or imaginary.

Sump—A reservoir or pond, formed at the bottom of the pumping shaft of a mine for holding water.

Syphon—Pipes placed in a mine to discharge water over a hill.

Shutes—The slanting passage frame way from the tipple to the railroad hoppers, in which the screen bars are placed.

Synclinal—A hollow or basin in the floor of the mine, from which the coal rises in opposite directions.

Safety-gates—Automatic gates placed on top of a shaft to guard the entrance.

Safety-catches—Spring catches, attached to a cage to prevent it from falling to the bottom in case the winding rope should break.

Swamp—A sinuous trough-shaped basin found in mines.

Squeeze—(See crush).

Shearing—Cutting a perpendicular groove in the coal seam.

T.

Tip—(See tipple).

Tipple—The table from which the mine cars are dumped into the chutes.

Tram-road—The railroad from the dump to the mouth of the mine.

Tubing—Hollow cast-iron segments placed in a shaft to dam back water or sink through quicksand.

Turn—The order in which empty cars are placed in the rooms of miners.

Timbers—The wooden structures planted in a shaft, slope or drift until solid ground is reached.

Track—The road for hauling coal.

Track-layer—One who lays track in a mine.

Tunnel—An entry driven through rock in a mine.

Trimmer—The person who sorts the coal in the railway cars after it is dumped into them.

Trap-door—A door to guide and direct the current of air in a mine.

Trapper—A boy employed to open and shut a trap-door.

Tub—A box used for raising rock in sinking for coal or other minerals.

Trough—(See swamp).

Ticket—The numbered check which the miner puts on his loaded car to inform the weigh-master to whom the coal belongs.

U.

Upthrow—A slip in the strata which throws a coal seam upward.

Upcast—The shaft or compartment through which the return air of a mine is delivered into space.

Undermining—Cutting a groove in the bottom of the coal bed.

V.

Vein—A bed or seam of coal. This word is misapplied, but it has become so general a term for a bed or seam of coal that it is here inserted with its accepted meaning.

Ventilator—(See fan).

Ventilation—The renewing of the circulating streams of air of mines.

W.

Water-gauge—An instrument used by superintendents of mines for ascertaining the resistance or pressure that is spent in friction between two adjoining parts of an air-way. It is a glass tube, bent like the letter U, with a scale of inches and parts of inches.

Washing-machine—A machine employed at mines for washing the slack or nut coal, in order to separate the impurities from the coal.

Water-level—A passage-way for the discharge of water.

Wind-way—A narrow air-way.

Workings—The excavation of a mine.

Working-face—The place where the miner digs out the coal.

Working-place—(See working-face).

Weigh-master—The person who weighs the coal.

White-damp—Carbonic oxide gas.

Waste—Abandoned workings.

Water Lodgment—(See sump).

FINANCIAL STATEMENT.

FIXING UP NEW OFFICE.

The office of Inspector of Mines, together with that of the Commissioner of the Bureau of Labor Statistics, was removed to room 76, in January, 1880. The new office required many repairs, for which purpose the General Assembly appropriated the sum of $300, which was expended as follows:

1883.			
March	20.	Philip Knopf, painting	$69 75
April	5.	Bowe & Beggs, carpets	160 94
	14.	Ohio Furniture Co., furniture	69 31
		Total	$300 00

A special appropriation of two hundred and fourteen dollars and seventy-nine cents ($214.79) was provided by the last General Assembly for the payment of sheriffs' costs in Mahoning and Trumbull counties, growing out of suits instituted in 1877, to compel obedience to the mining law. These costs were paid as follows:

1883.			
April	18.	Sheriff Mahoning county	$86 20
	18.	Hon. Stephen Laird, order of sheriff Trumbull county	128 59
		Total	$214 79

STATEMENT OF CONTINGENT EXPENSES OF OFFICE FROM NOVEMBER 16, 1882, TO FEBRUARY 14, 1884.

1882.			
Dec.	7.	Postage, L. D. Myers	$20 00
	19.	Janitor, H. S. Falor	5 75

	1883.		
Jan.	3.	Janitor, H. S. Falor	5 60
	17.	Postage, L. D. Myers	20 00
	26.	Cleaning carpet, J. Kniesly	6 00
Feb.	13.	Janitor, H. S. Falor	5 60
March	6.	Postage, L. D. Myers	25 00
	7.	Carpenter-work, J. L. Flowers	5 00
	20.	Janitor, Jos. Fossett	5 00
April	3.	" "	5 00
	18.	Ice, Allen & Riddell	9 50
May	2.	Janitor, Jos. Fossett	2 50
	22.	Order book, O. S. Journal	2 50
	25.	Postage, L. D. Myers	25 00
	31.	Janitor, D. T. Roy	5 00
June	5.	Two keys for office, S. H. Holmer	70
July	17.	Subscription Colliery Guardian	10 00
	17.	Letter heads, Hann & Adair	1 40
Aug.	15.	Janitor, D. T. Roy	12 50
	15.	Letter press, A. H. Smythe	6 50
	15.	Postage, L. D. Myers	10 00
Oct.	1.	Janitor, D. T. Roy	5 00
	1.	Washing towels, E. Coulter	50
	15.	Janitor, Isaac Stroud	5 00
Nov.	15.	Ice, Allen & Riddell	9 00
	23.	Janitor, Isaac Stroud	5 00
Dec.	5.	Postage, L. D. Myers	10 00
	18.	Janitor, Isaac Stroud	5 00
	1884.		
Jan.	17.	Janitor, Isaac Stroud	5 00
	23.	Postage, L. D. Myers	10 00
Feb.	14.	Janitor, Isaac Stroud	5 00
			$248 05
		Ice, Allen & Riddell	3 00
		Total	$251 05

STATEMENT OF TRAVELING EXPENSES OF ANDREW ROY, INSPECTOR OF MINES, FROM NOVEMBER 16, 1882, TO FEBRUARY 14, 1884.

	1882.		
Dec.	19.	Visiting and inspecting mines	$49 55
	1883.		
Jan.	9.	Visiting and inspecting mines	41 10
	24 to 28.	" " in Perry and Lawrence counties	29 25
Feb.	5 to 8.	" " Summit county	6 00
Feb.	16 to March 28.	Visiting and inspecting mines in Athens, Summit, Belmont, Guernsey, Meigs and Perry counties	89 48

April 5 to 29.	Visiting and inspecting mines in Vinton and Jackson counties	17 80
May 1 to 14.	To visiting and inspecting mines, Mahoning Valley	25 85
22 to 26.	" " in Perry and Lawrence counties	14 30
June 7 to 9.	To visiting and inspecting Washington Furnace mines	6 30
June 11 to 14.	To visiting and inspecting Stark county mines	12 05
June 19 to 26.	Visiting and inspecting mines in Guernsey county	24 93
July 2 to 24.	Visiting and inspecting Ironton mines	8 50
August 1 to 9.	Visiting and inspecting mines in Guernsey and Carroll counties	20 95
Aug. 15 to 28.	Visiting and inspecting mines in Athens and Jackson counties	21 70
Sept. 5 to 15.	To visiting and inspecting mines in Perry and Meigs counties	23 60
Oct. 15 to Nov. 15.	Visiting and inspecting mines in Mahoning Valley, Jackson, Belmont and Columbiana counties	62 30
	Total	$453 60

STATEMENT OF TRAVELING EXPENSES OF JACOB J. KLEIN, ASSISTANT INSPECTOR OF MINES, FROM NOVEMBER 15, 1882, TO FEBRUARY, 1884.

1882.			
Dec. 7.	Traveling expenses		$35 55
1883.			
Jan. 4.	Traveling expenses		30 20
27.	"		39 94
	Total		$105 69

J. J. Klein resigned his position as Assistant Inspector of mines January 26, 1883, and John P. Williams was appointed his successor on the same day. The following is the statement of Mr. Williams' traveling expenses from the date of appointment:

JOHN P. WILLIAMS, *Assistant.*

1883.			
Feb. 16 to 19.	To visiting Mahoning Valley mines		$12 85
19 to 22.	"	Salineville mines	6 94
22 to 24.	"	Portage county mines	4 69
Feb. 27 to Mar. 4.	"	Belmont county mines	12 80
March 4 to 8.	"	Guernsey county mines	10 50
8.	Satchel for mines		4 90

March 8 to 13.	To visiting	Trumbull county mines	$12 80
13 to 18.	"	Carroll county mines	15 35
19 to 24.	"	Meigs county mines	19 95
Mar. 24 to Apr. 2.	"	Perry county mines	19 85
April 3 to 10.	"	Mahoning Valley mines	16 85
16 to 28.	"	mines in Jackson and Vinton counties	27 00
April 28 to May 11.	"	Trumbull county mines	15 80
May 11 to 21.	"	Summit county mines	12 40
May 21 to June 4.	"	Columbiana mines	12 35
June 6 to 12.	"	Mahoning Valley mines	10 50
12 to 18.	"	Stark county mines	13 95
18 to 25.	"	Jackson county mines	12 30
25 to 30.	"	mines in Perry and Hocking counties	12 80
July 1 to 7.	"	Mahoning Valley mines	7 80
7 to 13.	"	Columbiana mines	4 30
13 to 16.	"	mines in Wayne and Summit counties	5 25
16 to 23.	"	Lawrence county mines	14 90
23 to 28.	"	Jackson county mines	4 40
July 28 to Aug. 4.	"	Salineville mines	14 20
August 6 to 14.	"	mines in Jefferson and Belmont counties	16 55
15 to 18.	"	Athens county mines	6 10
18 to 24.	"	mines in Hocking and Perry counties	10 50
24 to 30.	"	Wellston and Coalton mines	8 40
Aug. 30 to Sept. 5.	"	Trumbull county mines	10 15
Sept. 6 to 15.	"	Perry county mines	13 00
15 to 24.	"	Mahoning Valley mines	15 65
Sept. 24 to Oct. 4.	"	mines in Perry and Hocking counties	18 25
Oct. 4 to 9.	"	Stark county mines	13 85
10 to 15.	"	Meigs county mines	11 75
16 to 23.	"	Jackson county mines	11 85
23 to 27.	"	mines in Tuscarawas and Belmont counties	12 90
O t. 27 to Nov. 3.	"	Salineville and Leetonia mines	12 80
Nov. 3 to 15.	"	Trumbull county mines	17 95
16 to 19.	"	Mahoning county mines	5 40
Dec. 1 to 6.	"	Portage county mines	8 45
6 to 17.	"	Trumbull county mines	5 25
18 to 29.	"	mines in Stark and Tuscarawas counties	21 10
1884.			
Jan. 3 to 9.	"	mines at Corning	13 70
9 to 21.	"	mines at Nelsonville, Shawnee and Straitsville	25 15
21 to 29.	To visiting	mines in Trumbull county	13 20
Jan. 29 to Feb. 7.	"	Jackson county mines	14 25
Feb. 7 to 13.	"	mines in Mahoning county	8 90
			$600 03

THE COAL TRADE.

The following statistics of the coal production of the principal coal producing States of the United States and Great Britain are compiled from the 11th annual review of the trade by Fred. E. Saward, Esq., the intelligent editor of the Coal Trade Journal of New York.

The following statement of the production of coal in the United States for the years 1882 and 1883 is compiled from the most reliable sources by Mr. Saward:

States.	Tons, 1882.	Tons, 1883.
Alabama	800,000	1,400,000
Arkansas	50,000	75,000
California	200,000	200,000
Colorado	547,749	1,000,000
Dakota	.....	50,000
Georgia	175,000	200,000
Idaho	.....	10,000
Illinois	9,115,653	10,508,791
Indiana	1,976,470	2,400,000
Indian Territory	150,000	175,000
Iowa	3,127,700	3,881,300
Kansas	750,000	850,000
Kentucky	1,300,000	1,650,000
Maryland	*1,294,316	2,306,172
Michigan	130,000	135,000
Missouri	2,000,000	2,250,000
Montana	30,000	50,000
New Mexico	146,421	250,000
Ohio	9,450,000	†8,229,429
Oregon	30,000	60,000
Pennsylvania, Anthracite	29,120.096	31,793,027
" Bituminous	‡22,000,000	24,000,000
Tennessee	850,000	1,000,000
Texas	.....	100,000
Utah	250,000	250,000
Virginia§	100,000	225,000
Washington Territory	225,000	260,000
West Virginia	2,000,000	2,250,000
Wyoming Territory	631,081	700,000
Totals	86,849,436	96,159,719

* Coal over West Virginia C. & P. R. R. to B. & O., deducted and credited to West Virginia.
† Roy's figures; too small, we think.
‡ There were 3,219,000 tons coke, representing 4,830,000 tons coal, made in 1882.
§ The district around Pocahontas opened in 1883.

Few who read the statistics of the coal production have an approximate idea of the growth of the coal industry in the United States. Below are a few statistics covering a few years only, which show the progress made in the coal production.

ANTHRACITE.

Year.	Total Production.	Increase.	Decrease.
1878	17,605,262	.....	.....
1879	26,142,689	8,537,427	.....
1880	23,437,242	.....	2,705,447
1881	28,500,016	5,062,774	.....
1882	29,120,096	620,080	.....
1883	31,793,027	2,672,931	.....

Increase in five years—14,187,765 tons.

BITUMINOUS—CUMBERLAND, CLEARFIELD AND BLOSSBURG REGIONS.

Year.	Cumberland.	Clearfield.	Blossburg.	Total.	Increase.	Decrease.
1878.....	1,679,322	1,295,201	652,577	3,627,120	.....	.....
1879.....	1,730,709	1,631,120	874,010	4,235,893	608,719	.....
1880.....	2,136,160	1,739,873	921,555	4,797,588	561,649	.....
1881.....	2,261,918	2,401,987	1,178,581	5,842,486	1,044,898	.....
1882.....	1,790,466	2,838,970	1,165,604	5,795,040	.....	46,446
1883.....	2,544,173	2,857,710	1,217,870	6,619,753	824,713	.....

Increased production of coal in U. S. from 1880 to 1884, is upwards of 40,000,000 tons; or 10,000,000 tons annually.

In 1870, total production of coal in U. S..... 32,860,690 tons.
In 1883, " " " ..... 96,159,719 tons.
Increase in 13 years, 195 per cent. or..... 63,299,029 tons.

OHIO.

It is unfortunate that the law does not provide for the more correct collection of mining districts. We give below the output from 1872:

Year.	Tons.	Year.	Tons.
1872.....	5,315,294	1878.....	5,500,000
1873.....	5,450,028	1879.....	6,000,000
1874.....	3,267,585	1880.....	7,000,000
1875.....	4,864,259	1881.....	8,250,000
1876.....	3,500,000	1882.....	9,450,000
1877.....	5,250,000	1883.....	8,229,429

A description of the coal resources of this State would cover more space than we can give in this hand-book. It must suffice, therefore, if we recapitulate the statements heretofore printed. The coals of Ohio are all of the Bituminous variety, and are known by various and general names, as Block coal, gas coal, Cannel coal, etc., and by many special names, as Mahoning Valley coal, Hocking Valley coal, Salineville coal, etc., according to the localities from which they are drawn. The best furnace coal is the Block coal of the Mahoning Valley; the best steam coal is

the Hocking Valley and Jackson county; the best coke is made from the coals at Leetonia, Washingtonville, in Columbiana county; the best house coal is found in Jackson county; the best gas coal, so far as recent tests would seem to indicate, is the Barnesville coal of Belmont county. The following are Mr. Roy's figures of the output for the calendar year 1883, divided into lump and nut coal; as he says, 'official figures would probably show a larger tonnage.'

Counties.	Lump Coal.	Nut Coal.
Athens	723,500	109,015
Belmont	469,339	106,987
Carroll	156,096	17,519
Columbiana	504,670	67,412
Coshocton	63,000	17,000
Gallia	8,058	2,098
Guernsey	171,555	2,100
Hocking	502,160	86,990
Holmes	20,000	4,000
Jackson	407,854	42,645
Jefferson	192,444	9,578
Lawrence	122,326	36,467
Medina	263,780	27,000
Meigs	359,445	3,112
Mahoning	223,740	20,031
Muskingum	32,600	1,800
Perry	1,557,799	117,400
Portage	69,000	3,500
Stark	323,594	35,181
Summit	155,000	15,500
Tuscarawas	320,216	33,850
Trumbull	437,612	20,000
Vinton	38,500	6,500
Wayne	140,304	8,543
Small mines	100,000	12,000
Total	7,362,592	866,837

CLEVELAND, OHIO.

The total receipts of coal at Cleveland, from 1828 to 1852, amounted to 662,862 tons; having increased from thirty tons in 1828 to 137,926 tons in 1852. We have no details from that date until 1865, but the following will serve to show the growth of the trade:

Year.	Tons.	Year.	Tons.
1865	465,550	1874	1,215,353
1866	583,407	1875	1,414,124
1867	668,026	1876	1,250,581
1868	759,104	1877	1,363,345

Year.	Ton.	Year.	Ton.
1869	922,757	1878	1,310,838
1870	904,600	1879	1,576,807
1871	1,165,940	1880	1,750,000
1872	1,348,160	1881	1,928,383
1873	1,599,212	1882	1,922,595

The receipts for 1883 are divided as below:

Bituminous coal by rail	1,351,318 tons.	
Bituminous coal by canal	150,000 "	
Bituminous coal at Newburgh (18th ward)	500,000 "	
		2,000,318 tons.
Anthracite coal received		89,591 "

Lake shipments of Bituminous coal:

	1878.	1879.	1880.	1881.	1882.	1883.
To ports in British Province..	61,869	46,174	60,527	31,497	97,833	270,235
To domestic ports	597,412	580,610	654,953	828,110	510,467	754,891

We find that trade has generally been very even and satisfactory in character throughout the year past; the figures above given indicate the course of trade, and it will be seen that the local consumption of fuel for manufacturing and domestic uses was about one million tons. We notice that 137,000 tons of Connellsville coke were used at this city last year.

CINCINNATI, OHIO.

The coal received at this city includes Youghiogheny; Ashland, Ky.; the Pomeroy from the vicinity of Pomeroy, Ohio; Hocking Valley, Ohio; Jackson county, O.; Muskingum Valley, Ohio; Ohio River; the Kanawha from West Virginia, including the Splint, Bituminous and Cannel, and the Anthracite from Pennsylvania. The years end with August:

Year.	Net tons.	Year.	Net tons.
1854	302,148	1869	944,444
1855	383,555	1870	1,122,222
1856	277,777	1871	850,814
1857	537,037	1872	1,140,399
1858	555,555	1873	1,010,018
1859	458,988	1874	1,305,285
1860	540,740	1875	1,311,488
1861	462,962	1876	1,489,108
1862	314,814	1877	1,468,619
1863	296,296	1878	1,441,754
1864	591,680	1879	1,269,339
1865	609,889	1880	1,787,230
1866	667,514	1881	1,492,817
1867	683,195	1882	2,197,407
1868	648,148	1883	2,025,859

During the past 30 years Cincinnati has made marvelous strides in the receipt and consumption of coal. In 1853–54 her receipts were 302,148 tons; in 1882-3 they were 2,025,859 tons, an increase of 670 per cent. The above total for 1882–3, though large, did not equal that of 1881–2, which reached 2,197,407 tons. The year was singularly favorable for navigation, and had the steady operation of manufactories been coupled with a close winter in 1882–83, trade would have been exceptionally good; but the open weather seriously impaired domestic consumption, and prices were decidedly below the previous year. Shipments show an increase over 1881–82, being 383,005 tons, against 380,074 tons, respectively.

Cincinnati's supply comes mainly from Pittsburgh. In 1882–83 she received 62 per cent. from this source, and for the last five years this percentage has only once fallen below 60. Of late years, however, Kanawha River coal has come in as an increasingly important factor, its proportion of the annual supply rising from 17.4 per cent. in 1877–78 to 24.8 per cent. in 1882–83. Meanwhile, native Ohio coals—which have heretofore occupied a scarcely considerable position, being 5.4 per cent. the past year—are slowly working their way into the market, especially those from the Jackson and Hocking fields. How largely these important sources of supply will enter into Cincinnati's consumption in the future is as yet problematical.

TOLEDO, OHIO.

The coal trade at this city has grown very much within the past year or two, for we find that while the receipts were 100,000 tons in 1873, they had grown to 441,212 tons in 1880, to 709,702 tons in 1881, 1,782,810 tons in 1882, and 2,082,660 tons in 1883. It is almost altogether the Bituminous coal from Ohio's practically inexhaustible fields, and it is not too much to predict that there will be a business of 3,000,000 tons done in 1884. The details of the receipts were as below:

	Tons, 1882.	Tons, 1883.
By Columbus, Hocking Valley and Toledo Railroad	835,608	1,085,608
By Ohio Central Railroad	480,378	511,241
By L. S. & M. S. Railroad	322,330	325,000
By Lake	80,126	67,907
By Canada Southern Railroad	20,556	28,243

The shipments by Lake amounted to 375,000 tons at least, but the details are not fully preserved. The Ohio Central Barge and Coal Co., shipped 200,000 tons, of which 125,000 tons were delivered at Duluth. The C., H., V & T. shipped 150,000 tons by Lake. Business by rail extends to all parts of the West and North-west, and Duluth, Chicago and Milwaukee have all come to know something of Ohio and its cheap fuel during the past year.

COAL MINING IN THE MAHONING VALLEY, OHIO.

Year.	Tons.	Year.	Tons.
1863	337,000	1874	1,000,000
1864	420,000	1875	1,000,000
1865	550,000	1876	1,200,000
1866	620,000	1877	1,200,000

Year.	Tons.	Year.	Tons.
1867	680,000	1878	1,250,000
1868	750,000	1879	1,250,000
1869	800,000	1880	1,250,000
1870	850,000	1881	1,300,000
1871	900,000	1882	1,000,000
1872	950,000	1883	1,200,000
1873	1,000,000		

COAL MINING IN THE HOCKING VALLEY, OHIO.

Year.	Tons.	Year.	Tons.
1871	302,766	1877	800,793
1872	604,881	1878	913,907
1873	806,872	1879	1,108,878
1874	485,075	1880	1,230,851
1875	753,016	1881	1,524,221
1876	782,315	1882	1,812,833

This is the business of the Hocking division of the C., H. V. & T. R. R. alone, and the tonnage for 1883 is said to have been 2,000,000 tons. In addition should be put the C. & H. V. R. R., opened in 1877; the Ohio Central, opened in 1880; Straitsville division of the B. & O., opened in 1879. Put Ohio Central at 850,000 tons for 1883, and B. & O. at 450,000 tons, gives a total of this district of 3,300,000 tons.

PENNSYLVANIA.

THE PRODUCTION OF ANTHRACITE COAL.

The shipment of Anthracite as reported by J. H. Jones, accountant of the Anthracite coal statistics, was as stated below. Coal used in and about the mines not included in these statements; the amount will average eight per cent. of the shipments.

Year.	Schuylkill.	Lehigh.	Wyoming.	Total.
1862	3,372,583	1,351,054	3,145,770	7,869,407
1863	3,911,683	1,894,713	3,759,610	9,566,006
1864	4,161,970	2,054,669	3,960,836	10,177,475
1865	4,356,959	2,040,913	3,254,519	9,652,391
1866	5,787,902	2,179,364	4,736,616	12,703,882
1867	5,161,671	2,502,054	5,325,000	12,988,725
1868	5,330,737	2,502,582	5,968,146	13,801,465
1869	5,775,138	1,949,673	6,141,360	13,866,180
1870	4,968,157	3,239,374	7,974,660	16,182,191
1871	6,552,772	2,235,707	6,911,242	15,699,721
1872	6,694,890	3,873,339	9,101,549	19,669,778
1873	7,212,601	3,705,596	10,309,755	21,227,952
1874	6,866,877	2,773,836	9,504,408	20,145,121
1875	6,281,712	2,834,605	10,596,155	19,712,472
1876	6,221,934	3,854,919	8,424,158	18,501,011

Year.	Schuylkill.	Lehigh.	Wyoming.	Total.
1877	8,195,042	4,332,760	8,300,377	20,828,179
1878	6,282,226	3,237,449	8,085,587	17,605,262
1879	8,960,329	4,595,567	12,586,293	26,142,689
1880	7,554,742	4,463,221	11,419,279	23,437,242
1881	9,253,958	5,294,676	13,951,383	28,500,016
1882	9,459,288	5,689,437	13,971,371	29,120,096
1883	10,074,726	6,113,809	15,604,492	31,793,027

DIVISION OF SHIPMENTS 1882–1883.

Interest.	Tons, 1882.	Tons, 1883.
Philadelphia and Reading Railroad	7,000,113	10,487,003
Lehigh Valley Railroad	5,933,719	6,271,773
Central Railroad of New Jersey	4,211,052	*1,745,399
Delaware, Lackawanna and Western Railroad	4,638,717	5,079,123
Delaware and Hudson Canal Company	3,203,168	3,512,971
Pennsylvania Railroad Company	2,332,974	2,773,419
Pennsylvania Coal Company	1,469,821	1,541,145
New York, Lake Erie and Western Railroad	330,510	382,194
Totals	29,120,096	31,793,027

The Pennsylvania Railroad interest includes Shamokin coal, Lykens Valley coal, and some Wyoming coal. Reading is of the various grades of Schuylkill. Lehigh Valley is three-fourths Lehigh, and balance Wyoming. Central Railroad of New Jersey is about equally divided between Lehigh and Wyoming. Delaware and Hudson; Delaware, Lackawanna and Western Company; Pennsylvania Coal Company, all from Wyoming region. 'Erie' coal is from Wyoming. In addition to this may be put 80,000 tons of Loyalsock Anthracite from Sullivan county. Details of the business of the various companies will be found on the following pages.

STATISTICS OF BITUMINOUS AND SEMI-BITUMINOUS COAL PRODUCTION OF PENNSYLVANIA IN 1883.

IN TONS OF 2,000 LBS.

Blossburg	1,217,870	
Barclay	371,010	
McIntyre	184,552	
Total Northern Pennsylvania region		1,773,432
Broad Top	196,534	
East Broad Top	97,378	
Snow Shoe	257,230	
Clearfield	2,857,710	
Total Central Pennsylvania region		3,408,852

* C. R. R. of N. J. is for five months only; after June 1st the tonnage was figured in with that of the P. and R. Co., as lessee.

Allegheny Mountain	458,468
West Pennsylvania Railroad	399,010
South-west Pennsylvania Railroad	123,761
Westmoreland	1,399,702
Pittsburgh	611,177
Johnstown Iron Works	775,000
Add for coke (3,136,400 tons) as coal	5,118,240
Total West Pennsylvania region, on P. R. R.	8,985,348
Total of above	14,167,632

In addition to this, Somerset county, 250,000; McKean county, 100,000, and the western counties of the State, sufficient to make the sum total 24,000,000 tons, including coal for making coke.

The above includes only a portion of the output of the bituminous mines. The total product for the year 1883 will, according to Mr. Saward, considerably exceed 20,000,000 tons, but statistics are not at hand. The following are the estimates of the State Bureau of Industrial Statistics:

Tons, 1883.	I.	II.	III.	IV.	V.	VI.
Tons produced (estimated)	7,495,085	4,039,335	1,549,365	2,320,000	.....	214,549

Facts of the Vth District are included in report of the first; the fifth was taken from the first about two months before the close of the year.

MARYLAND.

The Cumberland (George's Creek) coal field, located in Allegheny county, at the western extremity of the State of Maryland, supplies an important proportion of the semi-Bituminous coal reaching the seaboard markets. The connections with the tide-water markets are (1) via the Baltimore & Ohio Railroad, from the town of Cumberland 178 miles, and Piedmont, 206 miles west from Baltimore. (2) The Chesapeake and Ohio Canal, from Cumberland to Georgetown, 184 miles, and Alexandria, 191 miles. The boats carry 110 tons, and make the trip in four or five days. The canal is owned by the State of Maryland, and is managed by a Board of Public Works. (3) The Pennsylvania State Line Branch, which taps the Cumberland and Pennsylvania Railroad near Mt. Savage (this gives an outlet to the Pennsylvania Railroad and its connections, for South Amboy, N. J). The George's Creek and Cumberland Railroad, from the mines of the Maryland and American Coal Companies near Lonaconing, to Cumberland (thence by canal) and to the Pennsylvania Railroad. The W. Va. Central Railroad developes the territory south of the B. & O. road, and joins that line at Piedmont, W. Va., and the coal is sold as Cumberland coal. In the first instance, all the coal produced in this district passes over the several routes named, and the tonnage last year was as below:

Cumberland and Pennsylvania Railroad	1,371,728 tons.
Cumberland Branch	338,625 "
George's Creek and Cumberland Railroad	495,819 "
West Virginia Central Railroad	333,304 "
Mined on line of B. & O. Railroad	4,697 "

It is then delivered to the following for delivery to various markets east and west:

Baltimore and Ohio Railroad	1,336,660 tons.
Chesapeake and Ohio Canal	680,119 "
Pennsylvania Railroad	419,288 "
Local Trade	108,108 "

Baltimore and Ohio Railroad began carrying this coal in 1842; the Chesapeake and Ohio Canal in 1850; the Pennsylvania State Line Branch in 1872; the George's Creek and Cumberland in August, 1881; the West Virginia Central in October, 1881. We recapitulate the tonnage of ten years past, to show the fluctuations of trade:

Year.	B. & O.	C. & O.	P. S. L.	Total.
1873	1,780,710	778,802	114,589	2,674,101
1874	1,576,160	767,064	67,671	2,410,895
1875	1,302,237	879,838	160,698	2,342,778
1876	1,070,775	632,410	131,866	1,835,081
1877	818,450	584,996	170,884	1,574,339
1878	924,254	609,204	145,864	1,679,322
1879	1,075,198	501,247	151,264	1,730,709
1880	1,319,589	603,125	213,460	2,136,160
1881	1,478,502	504,818	278,598	2,261,918
1882	1,085,249	269,782	185,435	1,540,466
1883	1,434,766	680,119	419,288	2,544,173

ILLINOIS.

The collection of the coal statistics of this State has much improved of late, and as a consequence we are enabled to give a list of the coal-producing counties and their output in the fiscal year ending in 1883.

Counties.	Tons, 1883.	Counties.	Tons, 1883.
Bureau	77,381	Marshall	6,640
Clinton	48,000	Menard	134,275
Coles	13,000	Mercer	144,434
Edgar	14,419	Montgomery	25,000
Fulton	265,664	Morgan	600
Greene	7,005	Peoria	415,458
Grundy	526,888	Perry	289,305
Henry	223,578	Randolph	68,560
Jackson	192,226	Rock Island	596,101
Jasper	1,006	St. Clair	790,552
Johnson	11,780	Saline	270,125
Kankakee	32,500	Sangamon	861,620
Knox	40,968	Scott	18,806
La Salle	1,010,857	Shelby	8,184
Livingston	225,400	Stark	15,340

Counties.	Tons. 1883.	Counties.	Tons, 1883.
Logan	80,000	Tazewell	109,366
McDonough	189,350	Vermillion	416,339
Macon	75,634	Warren	15,530
McLean	60,000	Washington	45,000
Macoupin	1,233,200	Will	699,427
Madison	767,200	Williamson	144,800
Marion	120,000	Woodford	104,000

Of the 639 mines there are 183 which produce less than 1,000 tons annually; there are 238 which produce less than 10,000 tons annually; there are 148 with an output of from 10,000 to 50,000 tons a year, while 70 produce over 50,000 tons. The largest business is that of the Chicago, Wilmington and Vermillion Co., which raised a total of 780,187 tons; next is the Ellsworth Coal Co., which raised 604,000 tons.

St. Louis, Mo., obtains by far the largest proportion of its fuel supply from Belleville, St. Clair county, Illinois. Chicago receives a large portion of its coal supply from the Wilmington District, where are several important coal mining companies, and we have the official statement that the output in the calendar year 1883 was 1,204,984 tons, against 1,258,280 tons in the preceding year.

WEST VIRGINIA.

Col. Wm. P. Craighill, in charge of the improvements on the Kanawha River, W. Va., makes the following report of the coal shipments by the several collieries for the year ending June 1, 1883:

	Names of Operators.	By Rail.	By River.	Total.
1.	Winefrede Coal Co	199,868	1,325,791	1,525,659
2.	Robinson Coal Co	631,107	917,300	1,548,407
3.	Crown Hill Splint Coal Co	610,260	272,604	882,864
4.	Dana Brothers	.....	1,899,789	1,899,789
5.	Mount Morris Coal Co	700,000	.....	700,000
6.	Eagle Coal and Coke Works	1,497,810	.....	1,497,810
7.	Coal Valley Coal Co	1,015,960	.....	1,015,960
8.	The St. Clair Co	190,000	.....	190,000
9.	Bennington Colliery	.....	394,000	394,000
10.	Campbell's Creek Coal Co	.....	3,070,463	3,070,463
11.	Kanawha Mining Co	613,933	337,296	951,229
12.	Cedar Grove Coal Co	.....	520,000	520,000
13.	Peabody Coal Co	.....	1,012,234	1,012,234
14.	Crescent Coal Mines	2,016,000	.....	2,016,000
15.	M. T. Davis & Co	1,102,892	.....	1,102,892
16.	Kanawha Cannel Coal Co	50,000	608,000	658,000
17.	F. Faulkner	775,202	8,355	783,557
18.	Cannelton Coal Co	1,068,045	.....	1,068,045
19.	Henson & Talley	239,629	.....	239,629
20.	Marmet Mining Co	.....	1,601,188	1,601,188
21.	Pioneer Coal Co	.....	1,848,715	1,848,715

	Names of Operators.	By Rail.	By River.	Total.
22.	Wyoming Manufacturing Co.....	242,564	.....	242,564
23.	Geo. Straughan (Coal Valley).....	762,227	.....	762,227
24.	Geo. Straughan (North Coalburg)..	.....	980,000	980,000
25.	Logan Coal and Salt Co.....	.....	400,000	400,000
26.	Carver Brothers.....	1,313,340	.....	1,313,340
27.	Other parties...	261,418	174,723	436,141
	Figures are in bushels.	13,290,255	15,370,458	28,670,713

The shipments by water have increased 66 per cent. in two years, and on the completion of Dam No. 2 there will be a still further increase. It is interesting to note also that the rail tonnage (by C. & O. Railway) has doubled in two years.

The output from the other coal regions of this State are not at hand.

INDIANA.

In our last Annual we gave the details of the production of coal in this State for 1881, by counties, at 1,771,536 tons, and had the authority of Mr. T. Wilson, Jr., State Inspector of Mines, for the output of 1882 at 1,976,470 tons. He writes us that the details for 1882 have not yet been printed, and his manuscript is in the hands of the State officers; it has not been published for the reason that the appropriation therefor failed to pass. He puts the output during the year 1883 at some 2,400,000 tons.

IOWA.

Many of the operations are now upon a large scale, some operations having a capacity of 700 tons a day. Mining ranges from three to five cents per bushel, according to the thickness of the seam worked. Seams included in this schedule are from four to seven feet in thickness. Keokuk, Mahaska, Marion, Monroe, Wapello, Lucas and Webster counties have coal ranging from five and a half to nine feet in thickness, whilst all the other coal-producing counties, with the exception of the western portion of the State, have coal from three to four feet in thickness. The western portion of the State referred to includes Page, Taylor, Adams and Cass counties, in which is being worked the surface vein. Beyond doubt, in a few years the State of Iowa will become a coal mining State of no small magnitude. A few years since the State was considered to have no coal to amount to anything. Within the limits of the Iowa coal fields there are thirty-eight counties, of which twenty-six are producing coal to a greater or less extent. The mining industry of the State has become one of considerable magnitude, and also a great source of wealth. The coal seams are being developed as rapidly as railroad transportation can be obtained; a great many new mines are being opened, and yet the prospecting goes on, and every indication leads to the belief that the State will double her present number of mines as well as her mining population in a few years. Mr. Parke C. Wilson, the Inspector of Mines, reports the production during the three years named, ending with June 30th, as follows:

Counties.	Tons, 1881.	Tons, 1882.	Tons, 1883.
Mahaska	917,495	701,397	927,387
Keokuk	463,010	511,849	500,040
Lucas	458,274	413,217	487,821
Polk	473,893	327,819	558,821
Boone	337,724	286,891	466,981
Webster	184,300	218,478	248,560
Wapello	131,815	207,721	237,821
Appanoosa	107,348	97,976	128,896
Monroe	98,113	90,325	93,435
Marion	93,997	90,927	90,985
Greene	81,530	62,531	88,851
Jasper	42,435	40,189	45,833
Dallas	47,884	36,001	38,008
Jefferson	39,124	22,121	38,887
Warren	12,989	11,081	12,828
Scott	3,804	3,711	3,714
Hardin	1,317	1,125	1,203
Adams	3,708	1,091	3,891
Hamilton	1,787	871	1,998
Wayne	77	51	1,892
Van Buren	987	216	1,678
Davis	489	301	527
Page	685	118	748
Taylor	87	84	94
Henry	67	65	65
Cass	36	41	43
Total	3,500,000	3,127,700	3,881,300

COLORADO.

The output of coal in Colorado, for a series of years, is said to have been as follows, in net tons:

Year.	Tons.	Year.	Tons.
1873	69,977	1879	322,732
1874	77,372	1880	575,000
1875	98,838	1881	706,744
1876	117,666	1882	1,061,479
1877	160,000	1883	1,200,000
1878	200,630		

ALABAMA.

The census reports show that whereas 11,000 tons was the output in the census year ending in 1870, the quantity ten years later was 323,972 tons. The production is increasing rapidly of late years, as the following schedule will show:

Year.	Tons.	Year.	Tons.
1874	49,889	1879	290,000
1875	75,806	1880	340,000
1876	102,640	1881	400,000
1877	172,182	1882	800,000
1878	194,268	1883	1,000,000

GREAT BRITAIN.

The quantity of coal produced in Great Britain is stated by the keeper of the mineral statistics to be 156,499,977 tons for the year 1882. The returns for the year 1883 will not come in until about May of this year. Production has grown fully sixty per cent. in twenty years. The total in 1860 was 83,200,000 tons, with an export trade of 7,400,000 tons. The total exports of coal during 1883 (including coal for steamers engaged in the foreign trade, 6,000,000 tons), were 28,771,848 tons, or nearly equal to the amount of Anthracite coal marketed in the United States during the same period of time. We append a few details of the coal production:

Year.	Tons.	Year.	Tons.
1870	112,875,725	1877	134,610,763
1871	117,352,028	1878	132,607,866
1872	123,386,750	1879	134,008,288
1873	127,012,767	1880	146,969,409
1874	125,043,257	1881	154,184,300
1875	131,867,105	1882	156,499,977
1876	133,344,766		

The distribution of the coal mined is estimated as having been partly as below:

	Tons.		Tons.
In Iron and Steel making	33,500,000	Gas Works	7,000,000
Domestic consumption	35,000,000	Locomotive use	3,000,000
Exported	20,000,000	Textile industries	15,000,000
Glass W'ks, Potteries, etc.	12,500,000	Steamships	10,000,000
Used at collieries	7,000,000	Engineering works	5,000,000

There were 3,814 collieries, employing 503,877 persons in the year 1882. Prices at the pits averaged about eight shillings a ton.

The receipts of coal at London for a series of years have been as below:

Year.	By Sea.	By Canal.	By Rail.	Total.
1872	2,762,712	6,615	4,449,141	7,218,468
1873	3,548,918	8,236	4,999,268	7,556,422
1874	2,665,630	11,195	5,147,413	7,824,288
1875	2,727,719	5,982	4,689,785	7,423,486
1876	3,134,846	4,594	5,065,452	8,204,892
1877	3,273,443	4,696	5,173,237	8,451,375
1878	3,170,601	4,608	5,426,204	8,501,413
1879	3,198,309	2,977	5,593,290	8,794,576
1880	3,508,526	2,910	6,547,395	10,058,811
1881	3,714,708	508	6,200,272	9,915,488
1882	3,826,520	7,984	6,546,271	10,372,791
1883	4,074,489	8,513	7,083,313	11,166,315

Of the receipts in 1883 some 2,858,813 tons were afterward conveyed beyond the limits, leaving 8,307,502 tons as consumed in the city.

The exportations of coal from Great Britain have been as below:

1871	12,851,957	1878	15,483,816
1872	13,211,961	1879	16,435,642
1873	12,712,222	1880	18,702,551
1874	13,927,205	1881	19,591,598
1875	14,475,036	1882	20,958,824
1876	16,299,077	1883	22,771,348
1877	15,420,050		

THE COAL PRODUCTION OF THE WORLD.

We have tabulated the following schedule from the best sources, and the figures may be taken as essentially correct:

Countries.	Square miles of Coal Area.	Tons, 1870.	Tons, 1881.	Tons, 1882.
Great Britain	11,900	110,431,192	154,184,300	156,499,977
United States	192,000	32,868,690	76,221,934	86,849,846
Germany	1,770	34,003,004	61,540,485	65,333,925
France	2,086	13,179,708	19,765,983	20,803,332
Belgium	510	13,697,118	16,873,551	17,590,989
Austria	1,800	8,355,944	19,000,000	19,000,000
Russia	30,000	829,745	3,412,397	3,600,000
Spain	3,501	661,927	850,000	900,000
Nova Scotia	300	625,769	1,124,270	1,365,811
Australia	24,840	868,564	1,775,224	2,109,282
India	2,000	500,000	4,000,000	4,000,000
Japan	5,000	.....	800,000	800,000
Vancouver's Island	390	29,863	325,000	335,000
New Zealand	.....	.....	337,262	370,000

Chili, 50,000; Sweden, 90,000; Italy, 220,000.

LAWS RELATING TO MINES AND MINING.

SECTION 290. For the purpose of facilitating an efficient and thorough inspection of mines in Ohio, and to provide an adequate inspecting force therefor, the state is hereby divided into mining districts, as follows:

The counties of Lawrence, Gallia, Meigs, Washington, Morgan, Hocking, Athens, Vinton, Jackson, Scioto, Pike, Ross, Pickaway, Fairfield, Fayette, Greene, Clinton, Highland, Adams, Brown, Clermont, Hamilton, Butler, Warren, Montgomery, and Preble, shall compose the first district.

The counties of Monroe, Belmont, Harrison, Jefferson, Tuscarawas, Carroll, Guernsey, Noble, Muskingum, Perry, Licking, Coshocton, Knox, Holmes, Franklin, Delaware, Morrow, Marion, Union, Madison, Clarke, Champaign, Logan, Hardin, Allen, Van Wert, Mercer, Auglaize, Shelby, Miami, and Darke, shall compose the second district.

The counties of Columbiana, Mahoning, Trumbull, Ashtabula, Lake, Geauga, Portage, Stark, Summit, Cuyahoga, Lorain, Medina, Wayne, Richland, Ashland, Huron, Erie, Crawford, Wyandot, Seneca, Sandusky, Ottawa, Lucas, Wood, Hancock, Putnam, Paulding, Henry, Defiance, Williams, and Fulton, shall compose the third district.

The governor shall appoint one chief inspector, who, with the approval of the governor, shall appoint three district inspectors of mines; the chief inspector shall hold his office for the term of four years, and the district inspectors shall hold their office for the term of three years, from the first day of May after their respective appointments, and until their successors are appointed and qualified; the first appointments hereunder shall be made within thirty days from the passage of this act; in case of the resignation, removal, or death of the chief inspector, or any district inspector, the vacancy shall be filled in the manner above provided for original appointments for the unexpired term, only of the position so made vacant. No person shall be appointed chief inspector of mines unless he is possessed of a competent knowledge of chemistry, the geology of Ohio, and mineralogy, in so far as

those sciences relate to mining, and has a practical knowledge of mining engineering, and the different systems of working and ventilating mines, and the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp, and of the best means of preventing and removing the same; and no person shall be appointed district inspector of mines unless he be a practical miner of at least five years' experience, and a resident of the district for which he is appointed, for at least two years, and is possessed of a practical knowledge of the best mode of working and ventilating mines, of the means of detecting the presence of bad or foul air, noxious and poisonous gases, and of the best means of preventing and removing the same.

SEC. 291. Before entering upon the discharge of the duties of their respective offices, the chief inspector and district inspectors shall give bond to the state, the former in the sum of five thousand dollars, and the latter in the sum of two thousand dollars each, to be approved by the governor, conditioned for the faithful performance of their duties respectively; said bonds, with an oath of office on each, and approval of the governor indorsed thereon, shall be forthwith deposited with the secretary of state; the inspectors, while in office, shall not act as agent, manager, or mining engineer for any operator, or in any way be interested in operating any mine.

SEC. 292. The chief inspector and district inspectors shall give their whole time and attention to the duties of their offices respectively; it shall be the duty of the district inspectors to examine all the mines in their respective districts as often as possible, to see that all the provisions and requirements of this chapter are strictly observed and carried out; they shall particularly examine the works and machinery belonging to any mine, examine into the state and condition of the mines as to ventilation, circulation and condition of air, drainage, and general security; they shall make a record of all examinations of mines in their respective districts, showing the date when made, the condition in which the mines are found, the extent to which the laws relating to mines and mining are observed or violated, the progress made in the improvement and security of life and health sought to be secured by the provisions of this chapter, number of accidents, injuries received, or deaths, in or about the mines (and for this purpose every person having charge of any mine, whenever loss of life occurs by accident connected with the working of such mine or by explosion, shall give notice thereof forthwith by mail or otherwise to the inspector of mines, and to the coroner of the county in which such mine is situated, who shall hold an inquest upon the body of the person or persons whose death has been caused, and inquire care

fully into the cause thereof and shall return a copy of the finding and all the testimony to the inspector); the number of mines in their respective districts, the number of persons employed in or about each mine, together with all such other facts and information of public interest concerning the condition of mines, development and progress of mining in their respective districts, as they may think useful and proper, which record shall, on or before the first Monday of every month, be filed in the office of the chief inspector, to be by him recorded, and so much thereof as may be of public interest, to be included in his annual report; in case of any controversy or disagreement between a district inspector and the owner or operator of any mine, or the persons working therein, or in case of conditions or emergencies requiring counsel, the district inspectors may call on the chief inspector for such assistance and counsel as may be necessary; should the district inspector find any of the provisions of this chapter violated, or not complied with, by any owner, lessee, or agent in charge of any mine, he shall immediately notify such owner, lessee, or agent in charge, of such neglect or violation, and unless the same is, within a reasonable time rectified, and the provisions of this chapter fully complied with, he shall institute a prosecution under the provisions of section six thousand eight hundred and seventy-one (6871) of the revised statutes. For the purpose of making the inspection and examinations provided for in this section, the chief inspector and the district inspectors shall have the right to enter any mine at all reasonable times, by night or by day, but in such manner as shall not unnecessarily obstruct the working of the mine; and the owner or agent of such mine is hereby required to furnish the means necessary for such entry and inspection; the inspection and examination herein provided for, shall extend to fire-clay, iron ore, and other mines, as well as coal mines.

SEC. 293. The chief inspector shall issue such instructions, make such rules and regulations for the government of the district inspectors, not inconsistent with the powers and duties vested in them by law, as shall secure uniformity of action and proceedings throughout the different districts; and he may order one district inspector to the assistance of any other district inspector or make temporary transfers of district inspectors, when in his judgment the efficiency or necessity of the service demands or permits; and he may, with the consent of the governor, remove any district inspector at pleasure; the district inspectors are hereby invested with all the power and authority of county auditors, as sealer of weights and measures in the different counties of this state, and they shall be entitled to receive on payment therefor, from the secretary of

state, the same copies as is provided by section one hundred and forty-three of the revised statutes to be furnished to county auditors; and for any service performed as such sealer they shall receive the same compensation as now provided by section ten hundred and sixty-two of the revised statutes; but said inspectors shall exercise said authority in connection with weights and measures, only at mines in their respective districts; the chief inspector shall render such personal assistance to the district inspectors as they, from time to time, may require, and shall make such personal inspection of mines as he may deem necessary and his other duties will permit; he shall keep in his office and carefully preserve all maps, surveys, and other reports and papers required by law to be filed with him, and so arrange and preserve the same as shall make them a permanent record of ready, convenient and connected reference; he shall compile and consolidate the reports of district inspectors, and annually make report to the governor of all his proceedings, as well as those of the district inspectors, the condition and operation of the different mines of the state, the number of mines and the number of persons employed in or about such mines, the amount of coal, iron ore, limestone, fire-clay, or other mineral mined in this state, and for the purpose of enabling him to make such report, the owner, lessee, or agent in charge of such mine, or who is engaged in mining, is hereby required to give accurate information as to the foregoing facts on blanks to be furnished by the chief inspector under penalty of one hundred dollars, to be recovered at the suit of the chief inspector in the name of the state of Ohio, for refusal to furnish such information on demand of the chief inspector; he shall also include in such report such facts relative to the mineral resources of the state, and the development of the same, as shall in his judgment be of public interest; he shall enumerate all accidents, and the manner in which they occurred, in or about mines, and give all such other information as he thinks useful and proper, and make such suggestions as he deems important relative to mines and mining, and any other legislation that may be necessary on the subject for the better preservation of the life and health of those engaged in such industry.

SEC. 294. The chief inspector shall have an office in the state house, in which shall be carefully kept the maps and plans of all mines in the state, and all records, correspondence, papers, and apparatus and property pertaining to his duties, belonging to the state, and shall be handed over to his successor in office; the district inspectors shall keep their offices in such place in their respective districts as will be most central and convenient to the mining region of their respective districts, and shall keep and preserve in their offices all maps, plans, surveys, and

other papers belonging to their offices, in such manner as shall be of easy access and convenient reference to persons entitled to examine them. The district inspectors shall receive an annual salary of twelve hundred dollars ($1,200) per annum, and the chief inspector shall receive the same salary as is now provided for inspector of mines under section twelve hundred and eighty-four of the revised statutes.

SEC. 295. There shall be provided for the inspectors all instruments and chemical tests necessary for the discharge of their respective duties under this chapter, which shall be paid for on the certificate of the chief inspector, and shall belong to the state.

SEC. 296. The owner or agent of any mine having an excavation of not less than fifteen thousand cubic yards, shall make, or cause to be made, an accurate map or plan of the working of such mine on a scale of not less than two hundred feet to the inch, showing the area mined or excavated, and the location and connection with such excavation of the mine, of the lines of all adjoining lands, and the name or names of each owner or owners, so far as known, marked on each tract, and the owner or agent shall annually thereafter make, or cause to be made, an addition to said map, showing the progress and plan of the working of such mine during the previous year up to the date of survey; provided, that said additions shall be made semi-annually whenever the mine inspector deems it necessary and so directs. The map shall be kept at the office of such mine, and open to the inspection of the mine inspector, or his assistants, at all reasonable times, and at the request of the inspector the owner or agent shall file a correct copy of such map with said mine inspector at Columbus, and in case of refusal on part of the owner or agent to make and file such map, the inspector is authorized and required hereby to cause such map or maps to be made in duplicate, at the expense of said owner or agent, the cost of which shall be recoverable against the owner or agent in the name of the state mine inspector; and in case of refusal by said owner or agent to make, or cause such map and the additions thereto to be made, for sixty days after notice by the mine inspector, said agent or owner shall be liable to a fine of five dollars for each and every day until said map is made, which shall be collected in the name of the state of Ohio, at the suit of the state mine inspector, and the amount so recovered shall be paid into the township school fund of the township when collected. And when any mine is exhausted or abandoned, and before the pillars are drawn in any portion of the mine, the owner or agent thereof shall cause to be made a correct map of such mine, showing the area and working of the same to the day of abandoning, or of drawing pillars for the purpose of abandoning, and

file such map within ninety days thereafter at the office of the county recorder in the county where such mine is located; said map shall have attached thereto the sworn certificate of the mining engineer making the map, and of the mine boss in charge of the underground workings of said mine; such map shall be properly labeled and filed by the recorder, and be preserved as a part of the records of the land on which such mines are located, and the recorder shall receive for said filing from said owner or agent a fee of fifty cents.

SEC. 297. It is unlawful for the owner or agent of any coal mine worked by a shaft, wherein over fifteen thousand square yards have been excavated, to employ or permit any person to work therein, unless there are, to every seam of coal worked in each mine, at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available to the persons employed in the mine; but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until fifteen thousand yards have been excavated in such mine; and to all other coal mines, whether slopes or drifts, two such openings or outlets must be provided within twelve months after fifteen thousand yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for agent or owner of such mine to permit more than ten persons to work therein at any one time. In case a coal mine has but one shaft, slope, or drift, for the ingress or egress of the men working therein, and the owner thereof does not own suitable surface ground for another opening, he may select and appropriate any adjoining land for that purpose and for approach thereto, and shall be governed in his proceeding in appropriating such land by the provisions of law in force providing for the appropriation of private property by corporations, and such appropriation may be made, whether he is a corporator or not; but no land shall be appropriated under the provisions of this chapter until the court is satisfied that suitable premises can not be obtained by contract upon reasonable terms.

SEC. 298. The owner or agent of every coal mine, whether shaft, slope, or drift, shall provide and maintain for every such mine, an amount of ventilation of not less than 100 cubic feet, per minute, per person employed in such mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless, and expel the poisonous and noxious gases from each and every working-place in the mine, and no working-place shall be driven more than 120 feet in advance of a break-through, or air-way; and all break-throughs,

or air-ways, except those last made near the working-faces of the mine, shall be closed up and made air-tight, by brattice, trap doors, or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the mine, where the persons employed in such mine are at work, and all mines governed by the statute shall be provided with artificial means of producing ventilation, such as forcing, or suction fans, exhaust steam, furnaces, or other contrivances, of such capacity and power as to produce and maintain an abundant supply of air, and all mines generating fire-damp, shall be kept free from standing gas, and every working-place shall be carefully examined every morning with a safety lamp by a competent person or persons, before any of the workmen are allowed to enter the mine.

SEC. 299. The owner or agent of every coal mine operated by shaft, in all cases where the human voice cannot be distinctly heard, shall forthwith provide and maintain a metal tube from the top to the bottom of such shaft suitably calculated for the free passage of sound therein, so that conversation may be held between persons at the bottom and top of the shaft; there shall also be provided an approved safety-catch, and a sufficient cover overhead, on all carriages used for lowering and hoisting persons, and in the top of every shaft an approved safety gate, and an adequate brake shall be attached to every drum or machine used for lowering or raising persons in all shafts or slopes; and there shall also be provided in every shaft a traveling or passage way from one side of a shaft bottom to the other, so that persons working therein may not have to pass under descending cages.

SEC. 300. No owner or agent of any coal mine operated by a shaft or slope shall place in charge of any engine used for lowering into or hoisting out of such mine persons employed therein, any but experienced, competent, and sober engineers; and no engineer in charge of such engine shall allow any person, except such as may be deputed for that purpose, by the owner or agent, to interfere with it or any part of the machinery, and no person shall interfere or in any way intimidate the engineer in the discharge of his duties; and in no case shall more than ten men ride on any cage or car at one time, and no person shall ride upon a loaded cage or car in any shaft or slope.

SEC. 301. All safety-lamps used for examining coal mines, or which are used in any coal mine, shall be the property of the owner of the mine, and shall be under the charge of the agent thereof, and in all mines, whether they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine, shall be so hung and adjusted that they will shut of their own accord and can not stand open,

and the mining boss shall keep a careful watch over the ventilating apparatus and the airways, and he shall measure the ventilation at least once a week, at the inlet and outlet, and also at or near the face of all the entries, and the measurements of air so made shall be noted on blanks, furnished by the mine inspector; and on the first day of each month, the mining boss of each mine shall sign one of such blanks, properly filled, with the said actual measurements, and forward the same to the mine inspector.

SEC. 302. No boy under twelve years of age shall be allowed to work in any mine, nor any minor between the ages of twelve and sixteen years, unless he can read and write, and in all cases of minors applying for work, the agent of such mine shall see that the provisions of this section are not violated.

SEC. 303. In case any coal mine does not, in appliances for the safety of the persons working therein, conform to the provisions of this chapter, or the owner or agent disregards the requirements of this chapter, any court of competent jurisdiction may, on application of the inspector, by civil action, in the name of the state, enjoin or restrain the owner or agent from working or operating such mine, with more than ten miners at once, until it is made to conform to the provisions of this chapter; and such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 304. When written charges of gross neglect of duty or malfeasance in office against any inspector is made and filed with the governor, signed by not less than fifteen coal miners, or one or more operators of mines, together with a bond in the sum of five hundred dollars, payable to the state, and signed by two or more responsible freeholders, and conditioned for the payment of all costs and expenses arising from the investigation of such charges, the governor shall convene a board of examiners, to consist of two practical coal miners, one chemist, one mining engineer, and one operator, at such time and place as he deems best, giving ten days' notice to the inspector or against whom the charges are made, and also to the person whose name appears first in the charges, and the board, when so convened, and having been first duly sworn, truly to try and decide the charges made, shall summon any witnesses so desired by either party, and examine them on oath, which may be administered by any member of the board, and depositions may be read on such examination, as in other cases; and the board shall examine fully into the truth of such charges, and report the result of their investigation to the governor; and the board shall award the costs and expenses

of such investigation against the inspector or the persons signing the bond according to their finding, against said inspector or in his favor, which costs and expenses shall include the compensation of such board, of five dollars per day for each member, for the time occupied in the trial, and in traveling from and to their homes; and the attorney-general shall forthwith proceed to collect such costs and expenses, and pay the same into the state treasury, being in the first instance paid out of the state treasury, on the certificate of the president of such board.

SEC. 305. In all coal mines in the state, the miners employed and working therein, the owners of the land or other persons interested in the rental or royalty of any such mine, shall at all proper times have full right of access and examination of all scales, machinery or apparatus used in or about such mine to determine the quantity of coal mined, for the purpose of testing the accuracy and correctness of all such scales, machinery or apparatus; and such miners, landowners, or other persons, may designate or appoint a competent person to act for them, who shall at all proper times have full right of access and examination of such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person on behalf of the miners collectively, or one person on behalf of the landowners or other persons interested in the rental or royalty jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such persons shall make no unnecessary interference with the use of such scales, machinery or apparatus; and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to inspect not oftener than once in every month, the mine and the machinery connected therewith, and to measure the ventilating current, and if the owner, agent or manager so desires, he may accompany said committee by himself or two or more persons which he may appoint for that purpose; the owner, agent or manager shall afford every necessary facility for making such inspection and measurement, but the committee shall not in any way interrupt or impede the work going on in the mine at the time of such inspection and measurement, and said committee shall, within ten days after such inspection and measurement, make a correct report thereof to the inspector of mines, on blanks to be furnished by said inspector for that purpose; and if such committee make to the inspector a false or untrue report of the mines, such act shall constitue a violation of this section.

SEC. 306. The provisions of this chapter shall not apply to or affect any coal mine in which not more than ten men are employed at the

same time; but on the application of the proprietor of or miners in any such mine, the inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this chapter that he deems necessary for the safety of the health and lives of miners.

SEC. 6871. Whoever knowingly violates any of the provisions of sections two hundred and ninety-eight, two hundred and ninety-nine, three hundred, three hundred and one, three hundred and two, and three hundred and five, of the revised statutes, or does any act whereby the lives or health of the persons or the security of any mine and machinery are endangered, or any miner or other person employed in any mine governed by the statute, who intentionally and willfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of a mine in relation to the security of the mine in the part thereof where he is at work, and for fifteen feet back from the face of his working-place, shall be fined not more than fifty dollars, or imprisoned in the county jail not more than thirty days, or both.

TO PREVENT THE PAYMENT OF WAGES IN SCRIP, OR SELLING GOODS TO EMPLOYES AT EXCESSIVE PRICES.

SEC. 7015. A person who, or a firm, company, or corporation which, issues, uses, or circulates any scrip, token, check, draft, or certificate of indebtedness, payable otherwise than in money, or designed, intended, or calculated to be issued, used, or circulated as money, or in lieu of the lawful money of the United States, or pays the wages of labor in goods or supplies through the intervention of scrip, or any other evidence of indebtedness, or otherwise, at higher prices than current cash rates for like goods and supplies at the nearest retail market, increased by the cost of transportation from such nearest retail market to the place of sale, or sells goods or supplies to laborers on orders, or other evidence of indebtedness, issued to such laborers by their employers, or by any arrangement with their employers, by which such laborers are to receive such goods or supplies on their wages at such higher rates, shall be fined not more than one hundred nor less than five dollars.

SEC. 7016. Whoever compels, or in any manner seeks to compel, or attempts to coerce, an employe of any person, firm, or corporation, to purchase goods or supplies from any particular person, firm, or corporation, shall be fined not more than one hundred nor less than twenty dollars, or imprisoned not more than sixty days, or both.

SEC. 7017. The prosecuting attorney of any county, upon complaint made to him of any violation of either of the two preceding sections within his county, shall cause such complaint to be investigated before the grand jury.

TO PREVENT INTIMIDATION OF WORKMEN IN THE EXERCISE OF ELECTIVE FRANCHISE.

SEC. 7065. Whoever, not being a candidate for office, disburses or gives, or promises to give, any money, or other thing of value, or gives or treats to any spirituous, malt, or other liquors, directly or indirectly, to influence an elector in giving or withholding his vote, or, with intent to induce him to vote contrary to his inclinations, seeks by violence, or threats of violence, or threats to enforce the payment of a debt, or to begin a criminal prosecution, or to injure the business or trade of an elector, or, if an employer of laborers, or an agent of such employer, threatens to withhold or reduce the wages of, or to dismiss from service, any laborer in his employ, or refuses to allow to any such employe time to attend at the place of election and vote, or whoever sells or offers to sell his influence with electors for a valuable consideration, or, with or by means of any thing of value, seeks to influence the vote of an elector, or to influence him to vote, or to refrain from voting, shall be fined not more than two thousand nor less than one hundred dollars, or imprisoned in the penitentiary not more than three years.

SCHOOL LAWS—ATTENDANCE ENFORCED.

SEC. 4023. Every parent, guardian, or other person having charge or control of any child between the ages of eight and fourteen years, shall be required to send such child to a common school for at least twelve weeks in each school year, at least six weeks of which shall be consecutive, unless the board of education, or the board of directors, as the case may be, having control of the school district or sub-district in which such parent or guardian resides, excuse such child from attendance, when it appears to the satisfaction of such board that the child's bodily or mental condition is such as to prevent its attendance at school, or application to study, for the time required, or that its time and labor are essentially necessary for the support of an indigent parent, brother, or sister, or that it is being otherwise furnished with the means of education for a like period of time, or has already acquired branches of learning ordinarily taught in common schools; but if the common school of the district or sub-district in which such parent or guardian resides

is distant two miles from his residence by the nearest traveled road, he shall not be liable to the provisions of this section, and the subsequent sections of this chapter.

SEC. 4024. No manufacturer, owner of mills or mines, agent, overseer, contractor, landlord, or other person, shall employ any child under fourteen years of age during the established school hours of the locality, who has resided in this state during the school year next preceding the commencement of such employment, and is under the control of a parent or guardian, and is not dependent upon its own resources for support, unless such child has attended some common or private school for the term of at least twelve weeks during the school year next preceding the commencement of such employment, and delivers to its employer a certificate of that fact from the clerk of a board of education, or a clerk of a board of directors, or the teacher of the school which it attended; nor shall such employment continue for a longer period than forty weeks during any school year from the time this act takes effect, unless such child deliver to such employer a certificate of excuse from the proper authority, for any of the reasons mentioned in the preceding section.

SEC. 4025. Each board of education shall ascertain, on the second Monday of February and the second Monday of September, or within fifteen days thereafter, each year, in such manner as it may deem most expedient, the condition of all children under fourteen years of age within its jurisdiction employed at any daily labor, or who are not in attendance at any common or private school, and shall report all violations of this chapter to its clerk, who shall at once proceed to prosecute each and every such offense.

SEC. 4026. If it be shown to the satisfaction of the board of education that the parent or guardian has not the means wherewith to purchase for his child or children the necessary school-books to enable him to comply with the requirements of this chapter, the board may furnish the same, free of charge, to be paid for out of the contingent fund at the disposal of the board.

SEC. 4027. A parent, guardian, or other person, who fails to comply with the provisions of this chapter, shall be liable to a fine of not less than two nor more than five dollars for the first offense, nor less than five nor more than ten dollars for each subsequent offense; such fine shall be collected by the clerk of the board of education, in the name of the state, in an action before any court having competent jurisdiction; and the money so collected by each clerk shall be paid to the county

treasurer, and be applied to the use of the common schools of his district.

SEC. 4028. The clerk of the board of education shall prosecute every offense against the provisions of this chapter, when a member of the board of education, or any tax-payer of the district in which the offending parties reside, files with him an affidavit setting forth the facts which constitute the offense; and if he neglect to do so within fifteen days after such affidavit is filed, he shall be liable to a fine of not less than ten nor more than twenty dollars for each case of such neglect, to be collected in the name of the state, in an action before any court of competent jurisdiction, by any person feeling aggrieved thereby.

SEC. 4029. Two weeks' attendance at half-time or night school shall be considered, within the meaning of this chapter, equivalent to an attendance of one week at a day school.

WORKINGMEN'S LIENS.

[Laws of Ohio, vol. 80, page 183.]

SEC. 3206*a*. Laborers and employes of any person, association of persons or corporation, whether such employment be at agriculture, mining, manufacture or other manual labor, shall have a lien upon the real property of their employers for their wages, which is hereby declared to be superior to the following liens taken or attaching during the existence of such unpaid labor claims, to-wit: liens of attachment, liens of mortgage given or taken at a time of actual insolvency of the debtor, or with a view of preferring creditors or to secure a pre-existing debt, and superior to all claims for homestead, or other exemptions, except under section fifty-four hundred and thirty; and in all cases where property of an employer is placed in the hands of an assignee, receiver or trustee, claims due for labor performed within the period of three months prior to the time such assignee, receiver or trustee is appointed, shall be first paid out of the trust fund, in preference to all other claims against such employer, except claims for taxes and the costs of administering the trust. The lien herein provided shall be deemed to be waived by the laborer or employe, as to any portion of such labor, unless within thirty days from the expiration of three months from the performance of such portion, he shall file with the recorder of the county, where the labor was performed, an itemized statement verified by affidavit, of the amount, kind and value of the labor performed within said period, with all credits and offsets, and the amount then due him therefor, which verified statement, when so filed, shall be recorded in a book kept for

the purpose, and shall become and operate as a lien upon the real property of the employer without any specific description thereof, for the period of one year from and after the filing thereof, and if an action is brought to enforce the lien within that time, it shall continue in force until finally adjudicated; and the proceedings to enforce such lien shall be the same as in other cases of lien, against the owner of the property and all other persons interested; provided, that if several persons have or obtained liens under the provisions of this section, against the property of the same employer, they shall have no priority among themselves, but all shall be paid pro rata, nor shall they have priority over those obtaining liens under sections thirty-one hundred and eighty-four, thirty-one hundred and eighty-five, thirty-one hundred and eighty-six and thirty-one hundred and eighty-seven of this chapter, but the persons obtaining liens under said sections thirty-one hundred and eighty-four, thirty-one hundred and eighty-five, thirty-one hundred and eighty-six and thirty-one hundred and eighty-seven, shall have priority as provided therein.

SEC. 3206*b*. The provisions of the foregoing section shall apply to and include any laborer who indirectly performs labor for a general employer, or the results of whose labor is immediately enjoyed by a general employer, whenever such general employer assumes payment of such laborer's wages by passing a credit therefor upon his books of account or otherwise, and whenever the provisions of this section apply, all proceedings hereunder shall be the same as provided in the preceding section. But nothing in the foregoing section shall be so construed as to affect or impair any valid and subsisting lien existing at the time of the passage of this act.

MINING LAWS OF ILLINOIS.

AN ACT

Providing for the Health and Safety of Persons Employed in Coal Mines.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That the owner, or agent, or operator of each and every coal mine in this State shall make, or cause to be made, at the discretion of the inspector, or person acting in that capacity, an accurate map or plan of the workings of such coal mine, and of each and every vein thereof, showing the general inclination of the strata, together with any material deflections in the said workings, and the boundary lines of said coal mines, and deposit a true copy of said map or plan with the inspector of coal mines, to be filed in his office, and

another true copy of said map or plan with the recorder of the county in which said coal mine is situated, to be filed in his office, both of which said copies shall be deposited as aforesaid within three (3) months from the day when this act shall go into effect; and the original, or a copy of such map or plan, shall also be kept for inspection at the office of such coal mine; and during the month of January, of each and every year after this act shall go into effect, the said owner, agent or operator shall furnish the inspector and recorder, as aforesaid, with a statement and further map or plan of the progress of the workings of such coal mine, continued from the last report to the end of the December month just preceding; and the inspector shall correct his map or plan of said workings in accordance with the statement and map or plan thus furnished; and when any coal mine is worked out or abandoned, that fact shall be reported to the inspector, and the map or plan of such coal mine in the office of said inspector shall be carefully corrected and verified. The several coal mine inspectors in this State shall furnish copies of all maps or plans of mines, to be filed with the Bureau of Labor Statistics. [As amended by an act approved June 18, 1883].

SEC. 2. Whenever the owner, agent or operator of any coal mine shall neglect or refuse to furnish the said inspector and recorder, as aforesaid, with the statement, the map or plan, or addition thereto, as provided for in the first section of this act, at the times and in the manner therein provided, the said inspector is hereby authorized to cause an accurate map or plan of the workings of such coal mine to be made at the expense of said owner, agent or operator, and the cost thereof may be recovered by law from said owner, agent or operator, in the same manner as other debts, by suit in the name of the inspector and for his use.

SEC. 3. In all coal mines that are or have been in operation prior to the first day of July, in the year of our Lord 1879, and which are worked by or through a shaft, slope or drift, if there is not already an escapement shaft to each and every said coal mine, or communication between each and every coal mine, and some other contiguous mine, then there shall be an escapement shaft or other communication, such as shall be approved by the mine inspector, making at least two distinct means of ingress and egress for all persons employed or permitted to work in such coal mine. Such escapement shaft or other communication with a contiguous mine as aforesaid, shall be constructed in connection with every vein or stratum of coal worked in such coal mine, which shall be at least three and one-half feet high and at least five feet wide, and in no instance shall the height of said roadway be less than

the thickness of the vein or stratum of coal through which it is driven; and the time to be allowed for such construction shall be one year when such mine is under one hundred (100) feet in depth; two years when such mine is over one hundred (100) feet in depth and under three hundred (300) feet, and three years when it is over three hundred (300) feet and under four hundred (400) feet, and four years when it is over four hundred (400) feet in depth, and five years for all mines over five hundred (500) feet, from the first day of July, A. D. 1879; and in all cases where the working force of one mine has been driven up to or into the workings of another mine, the respective owners of such mines, while operating the same, shall keep open a roadway at least five feet high and five feet wide, thereby forming a communication, as contemplated in this act; and for a failure to do so shall be subject to the penalty provided for in section 10 of this act, for each and every day such roadway is unnecessarily closed; each and every such escapement shaft shall be separated from the main shaft by such extent of natural strata as shall secure safety to the men employed in such mines, such distance to be left to the discretion of the mine inspector or person acting in that capacity; and in all coal mines that shall go into operation for the first time after the first day of January, A. D. 1880; and in all cases where such mine or mines shall hereafter be put in operation in this State, the owner thereof or the lessee or occupant of the same, shall construct such an escapement shaft as is now required by law in this State at the rate of two hundred feet per annum until such escapement shaft shall have been fully completed: *And provided, further*, that nothing in this section shall be construed to extend the time heretofore allowed by law for constructing escapement shafts in mines going into operation for the first time before said first day of January, A. D. 1880. [As amended by an act approved June 18, 1883].

SEC. 4. The owner, agent or operator of every coal mine, whether operated by shaft, slope or drift shall provide and maintain for every such mine a sufficient amount of ventilation, to be determined by the inspector, at the rate of one hundred cubic feet of air per man per minute, measured at the foot of the down cast, which shall be forced and circulated to the face of every working place throughout the mine, so that said mine shall be free from standing gas of whatsoever kind; and in all mines where fire-damp is generated, every working place where such fire-damp is known to exist shall be examined every morning with a safety lamp, by a competent person, before any other persons are allowed to enter. The ventilation required by this section may be produced by any suitable appliances, but in case a furnace shall be used for ventilat-

ing purposes, it shall be built in such a manner as to prevent the communication of fire to any part of the works, by lining the upcast with incombustible material for a sufficient distance up from said furnace: *Provided*, it shall not be lawful to use a furnace for ventilating purposes, or for any other purpose, that shall emit smoke into any compartment constructed in, or adjoining, any coal hoisting shaft or slope where the hoisting shaft or slope is the only means provided for the ingress or egress of persons employed in said coal mines. That it shall be unlawful, where there is but one means of ingress and egress provided at a coal shaft or slope, to construct and use a ventilating furnace that shall emit smoke into a shaft, as an upcast, where the shaft or slope used as a means of ingress and egress by persons employed in said coal mines is the only means provided for furnishing air to persons employed therein. [As amended by an act approved June 21, 1883.]

SEC. 5. The owner, agent or operator shall provide that bore-holes shall be kept twenty feet in advance of the face of each and every working place, and if necessary, on both sides, when driving towards an abandoned mine or part of a mine suspected to contain inflammable gases, or to be inundated with water.

SEC. 6. The owner, agent or operator of every coal mine operated by shaft shall provide suitable means of signaling between the bottom and top thereof, and shall also provide safe means of hoisting and lowering persons in a cage covered with boiler iron, so as to keep safe, as far as possible, persons descending into and ascending out of such shaft; and such cage shall be furnished with guides to conduct it on slides through such shaft, with a sufficient brake on every drum to prevent accident in case of the giving out or breaking of the machinery; and such cage shall be furnished with spring catches intended and provided, as far as possible, to prevent the consequences of cable-breaking or the loosening or disconnecting of the machinery; and no props or rails shall be lowered in a cage while men are descending into or ascending out of said mine: *Provided*, that the provisions of this section in relation to covering cages with boiler iron shall not apply to coal mines less than one hundred (100) feet in depth, where the coal is raised by horse-power. No person under the age of fourteen years, or females of any age, shall be permitted to enter any mine to work therein. Any party or person neglecting or refusing to perform the duties required to be performed by sections three (3), four (4), five (5), six (6), seven (7) and eight (8), shall be deemed guilty of a misdemeanor, and punished by fine in the discretion of the court trying the same, subject, however, to the limitations

as provided by section ten of this act. [As amended by an act approved June 18, 1883.]

SEC. 7. No owner, agent or operator of any coal mine operated by shaft or slope shall place in charge of any engine, whereby men are lowered into or hoisted out of the mines, any but an experienced, competent and sober person not under the age of eighteen years; and no person shall ride upon a loaded cage or wagon used for hoisting purposes in any shaft or slope, and in no case shall more than twelve persons ride on any cage or car at one time, nor shall any coal be hoisted out of any coal mine while persons are descending into such coal mine; and the number of persons to ascend out of or descend into any coal mine on one cage shall be determined by the inspector; the maximum number so fixed shall not be less than four, nor more than twelve, nor shall be lowered or hoisted more rapidly than six hundred feet to the minute.

SEC. 8. All boilers used in generating steam in and about coal mines shall be kept in good order, and the agent, owner or operator, as aforesaid, shall have said boilers examined and inspected by a competent boilermaker, or other qualified person, as often as once every six months, and oftener if the inspector shall deem it necessary, and the result of every such examination shall be certified, in writing, to the mine inspector; and the top of each and every shaft, and the entrance to each and every intermediate working vein, shall be securely fenced by gates properly covering and protecting such shaft and entrance thereto; and the entrance to ever abandoned slope, air or other shaft shall be securely fenced off; and every steam boiler shall be provided with a proper steam gauge, water gauge and safety valve; and all underground, self-acting or engine planes, or gangways, on which coal cars are drawn and persons travel, shall be provided with some proper means of signaling between the stopping places and the end of said planes or gangways, and sufficient places of refuge at the sides of such planes or gangways shall be provided at intervals of not more than twenty feet apart.

SEC. 9. Whenever loss of life, or serious personal injury, shall occur by reason of any explosion, or of any accident whatsoever, in or about any coal mine, it shall be the duty of the person having charge of such coal mine to report the facts thereof, without delay, to the mine inspector of the district in which said coal coal mine is situated; and if any person is killed thereby, to notify the coroner of the county also, or, in his absence or inability to act, any justice of the peace of said county; and the said inspector shall, if he deem it necessary from the facts reported, immediately go to the scene of said accident, and make such suggestions and render such assistance as he may deem necessary for the

safety of the men. And the inspector shall investigate and ascertain the cause of such explosion or accident, and make a report thereof, which he shall preserve with the other records of his office; and to enable him to make such investigations he shall have the power to compel the attendance of witnesses, and administer oaths or affirmations to them, and the cost of such investigations shall be paid by the county in which such accident has occurred, in the same manner as costs of coroners' inquests are now paid. And the failure of the person in charge of the coal mine in which any such accident may have occurred, to give notice to the inspector or coroner, as provided for in this section, shall subject such person to a fine of not less than twenty-five dollars ($25), nor more than one hundred dollars ($100), to be recovered in the name of the People of the State of Illinois, before any justice of the peace of such county, and such fine, when collected, shall be paid into the county treasury for the use of the county in which any such accident may have occurred. [As amended by an act approved June 18, 1883].

SEC. 10 In all cases in which punishment is provided by fine under this act for a breach of any of its provisions, the fine for a first offence shall not be less than fifty dollars ($50), and not more than two hundred dollars ($200), and for the second offence not less than one hundred dollars ($100) or more than five hundred dollars ($500), in the discretion of the court, except as specially provided for in section nine of this act.

SEC. 11. This state shall be divided into five inspection districts, as follows, viz.: The first district shall be composed of the counties of Boone, McHenry, Lake, DeKalb, Kane, DuPage, Cook, LaSalle, Kendall, Grundy, Will, Livingston, Kankakee and Iroquois. Second district, the counties of JoDaviess, Stephenson, Winnebago, Carroll, Ogle, Whiteside, Lee, Rock Island, Henry, Bureau, Mercer, Stark, Putnam, Marshall, Henderson, Warren, Knox, Hancock, McDonough, Schuyler, Adams and Brown. The third district, the counties of Fulton, Peoria, Woodford, Tazewell, McLean Ford, Mason, Cass, Menard Logan, DeWitt, Piatt, Champaign and Vermilion. The fourth district, the counties of Pike, Scott, Morgan, Sangamon, Calhoun, Greene, Jersey, Madison, Bond, Macoupin, Montgomery, Christian, Fayette, Macon, Moultrie, Shelby, Effingham, Douglas, Coles, Cumberland, Jasper, Edgar, Clark, Crawford, Clay, Richland and Lawrence. The fifth district, the counties of St. Clair, Clinton, Washington, Marion, Jefferson, Wayne, Edwards, Wabash, Hamilton, White, Monroe, Randolph, Perry, Jackson, Franklin, Williamson, Saline, Gallatin, Union, Johnson, Pope, Hardin, Alexander, Pulaski and Massac. The Governor shall, upon the recommendation of a board of examiners, selected for that purpose, composed of two prac-

tical coal miners, two coal operators, and one mining engineer, to be appointed by the Bureau of Labor Statistics of this state, all of whom shall be sworn to a faithful discharge of their duties, appoint five properly qualified persons to fill the offices of inspectors of coal mines of this state (being one inspector for each district provided for in this act), whose commissions shall be for the term of one year, but they shall at all times be subject to removal from office for neglect of duty, or malfeasance in the discharge of duty, as hereinafter provided for; and the inspectors so appointed shall have attained the age of thirty years, be citizens of this state, and have a knowledge of mining engineering sufficient to conduct the development of coal mines, and a practical knowledge of the methods of conducting mining for coal in the presence of explosive gases, and of the proper ventilation of coal mines. They shall have had a practical mining experience of ten years, and shall not be interested as owner, operator, stockholder, superintendent or mining engineer of any coal mine during their term of office, and shall be of good moral character and temperate habits, and shall not be guilty of any act tending to the injury of miners or operators of mines during their term of office. They shall be provided by the state with the most approved modern instruments for carrying out the intention of this act. The inspectors, before assuming the duties of their several offices, shall take an oath of office, as provided for by the constitution, and shall be required to enter into a bond to the state in the sum of five thousand dollars ($5,000), with sureties to be approved by the Governor, conditioned upon the faithful performance of their duties in every particular, as required by this act; said bond, with the approval of the governor endorsed thereon, together with the oath of office, shall be deposited with the secretary of state. The salaries of the inspectors provided for by this act shall be eighteen hundred dollars ($1,800) per annum, each, and the Auditor of Public Accounts is hereby authorized to draw his warrant on the treasury in their favor, quarterly, for the amount specified in this section for the salary of each inspector: *Provided*, that the county board of any county may appoint an assistant inspector for such county, who shall act under the direction of the district inspector in the performance of his duties, and shall receive not less than three dollars ($3), nor more than five dollars ($5) per day, for the time actually employed, to be paid out of the county treasury; and he may be removed by such county board at any time. [As amended by an act approved June 18, 1883.]

SEC. 12. The inspectors provided for by this act shall devote their whole time and attention to the duties of their office, and make personal

examination of every mine within their respective districts, and shall see that every necessary precaution is taken to insure the health and safety of the workmen employed in such mines, and that the provisions and requirements of the mining laws of this State are faithfully observed and obeyed and the penalties of the same enforced. They shall also make annual reports to the Bureau of Labor Statistics of their acts during the year in the discharge of their duties, with their recommendations as to legislation necessary on the subject of mining, and shall collect and tabulate upon blanks furnished by said Bureau all desired statistics of the mines and miners within their districts, to accompany said annual report; they shall also furnish such information as they may have obtained on this subject, when called for, to the State Geologist. Upon a petition signed by not less than three reputable coal operators, or ten coal miners, setting forth that any inspector of coal mines neglects his duties, or that he is incompetent, or that he is guilty of malfeasance in office, or guilty of any act tending to the injury of miners or operators of mines, it may be lawful for the Bureau of Labor Statistics of this State to issue a citation to the said inspector to appear, at no less than fifteen days' notice on a day fixed, before them, when the said Bureau shall proceed to inquire into and investigate the allegations of the petitioners; and if the said Bureau find that the said inspector is neglectful of his duty, or that he is by reason of causes that existed before his appointment, or that have arisen since his appointment, incompetent to perform the duties of said office, or that he is guilty of malfeasance in office, or guilty of any act tending to the injury of miners or operators of mines, the said Bureau shall declare the office of inspector of the said district vacant, and a properly qualified person shall be appointed to fill the office in compliance with the provisions of this act; and the cost of said investigation by the said Bureau shall be borne by the removed inspector; but if the allegations of the petitioners are not sustained by the final decision of the said Bureau, the costs shall be paid by the petitioners. The board of examiners provided for in section eleven of this act, shall be appointed at the annual meeting of the Bureau of Labor Statistics, and shall hold their offices for one year. They shall meet annually at the State capital on the first Monday in September, in each year, and special meetings may be called at any time by the Bureau of Labor Statistics when the office of coal mine inspector becomes from any cause vacant. They shall receive as compensation the sum of three dollars ($3) per day, each, for time actually employed in the duties of their office, and actual traveling expenses, to be verified by affidavit: *Provided*, that in no case shall the per diem received

by any member of said board exceed the sum of thirty dollars ($30) per annum. The Auditor of Public Accounts is hereby authorized to draw his warrant in favor of each member of the board of examiners at the close of their annual session, for the full amount due them for attending annual and special sessions, and expenses, upon vouchers sworn to by them and approved by the Secretary of the Bureau of Labor Statistics, and the Governor. [As amended by an act approved June 18, 1883].

SEC. 13. It shall be lawful for the inspector provided for in this act, to enter, examine and inspect any and all coal mines and machinery belonging thereto, at all reasonable times, by day or by night, but so as not to obstruct or hinder the necessary workings of such coal mine, and the owner, agent or operator of every such coal mine is hereby required to furnish all necessary facilities for entering for such examination and inspection, and if the said owner, agent or operator aforesaid shall refuse to permit such inspection or to furnish the necessary facilities for such entry, examination and inspection, the inspector shall file his affidavit setting forth such refusal, with the judge of the circuit court in said county in which said mine is situated, either in term time or vacation, or, in the absence of said judge, with the master in chancery in said county in which said mine is situated, and obtain an order on such owner, agent or operator so refusing as aforesaid, commanding him to permit and furnish such necessary facilities for the inspection of such coal mine, or to be adjudged to stand in contempt of court and punished accordingly; and if the said inspector shall, after examination of any coal mine and the works and machinery pertaining thereto, find the same to be worked contrary to the provisions of this act, or unsafe for the workmen therein employed, said inspector shall, through the State's attorney of his county, or any attorney, in case of his refusal to act, acting in the name and on behalf of the State, proceed against the owner, agent or operator of such coal mine by injunction without bond, after giving at least two days' notice to such owner, agent or operator; and said owner, agent or operator shall have the right to appear before the judge or master to whom the application is made, who shall hear the same on affidavits, and such other testimony as may be offered in support as well as in opposition thereto; and if sufficient cause appear, the court, or judge in vacation, by order shall prohibit the further working of any such coal mine in which persons may be unsafely employed contrary to the provisions of this act, until the same shall have been made safe and the requirements of this act shall have been complied with, and the court shall award such costs in the matter of the said injunction as may be just; but any such proceedings so commenced shall be without

prejudice to any other remedy permitted by law for enforcing the provisions of this act.

SEC. 14. For any injury to person or property, occasioned by any willful violations of this act or willful failure to comply with any of its provisions, a right of action shall accrue to the party injured for any direct damages sustained thereby; and in case of loss of life by reason of such willful violation or willful failure as aforesaid, a right of action shall accrue to the widow of the person so killed, his lineal heirs or adopted children, or to any other person or persons who were, before such loss of life, dependent for support on the person or persons so killed, for a like recovery of damages for the injuries sustained by reason of such loss of life or lives.

SEC. 15. Any miner, workman or other person who shall knowingly injure any water-gauge, barometer, air-course or brettice, or shall obstruct, throw open any air-ways, or carry any lighted lamps or matches into places that are worked by the light of safety-lamps, or shall handle or disturb any part of the machinery of the hoisting engine, or open a door in the mine and not have the same closed again, whereby danger is produced either to the mine or those at work therein; or who shall enter into any part of the mine against caution; or who shall disobey any order given in pursuance of this act; or who shall do any willful act whereby the lives and health of persons working in the mine, or the security of the mine or mines, or the machinery thereof, is endangered, shall be deemed guilty of a misdemeanor, and, upon conviction, shall be punished by fine or imprisonment, at the discretion of the court.

SEC. 16. The owner, agent or operator of any coal mine shall keep a sufficient supply of timber, where required to be used as props, so that the workmen may at all times be able to properly secure the said workings from caving in; and it shall be the duty of the owner, agent or operator to send down all such props when required.

SEC. 17. All acts or parts of acts inconsistent with the provisions of this act are and the same are hereby repealed.

SEC. 18. That all mines hoisting coal by steam power from shaft or slope, having no other means of ingress or egress afforded to persons employed therein than by said shaft or slope, shall, within ninety days after July first, A. D. 1883, have all engine and boiler-houses roofed and sided with fire-proof materials, and they shall be situated not less than fifty feet from the mouth of the said shaft or slope; that the hoisting derricks erected over said hoisting shaft or near said slope, if inclosed, and all the coal chutes, buildings and constructions within a radius of fifty feet of the mouth of said hoisting shaft or slope, shall be covered

and sided with fire-proof materials, and the person in charge, the owners or operators thereof, shall provide a steam pump and have the same conveniently situated, and a sufficient supply of water and hose always ready for use in any part of the building, chutes or constructions within a radius of fifty feet of said coal-hoisting shaft or slope; and if the person in charge of any such coal shaft or slope shall refuse or neglect to comply with the provisions of this act, then the inspector of coal mines for the county in which the said shafts or slope are situated shall proceed, through the State's attorney of his county, or any attorney, in case of his refusal to act, acting in the name and on behalf of the State, against the owner, agent or operator of said shaft or slope, by information without bond, after giving at least two days' notice to such owner, agent or operator; and the said owner, agent or operator shall have the right to appear before the judge or master to whom the application is made, who shall hear the same on affidavits, and such other testimony as may be offered in support as well as in opposition thereto; and if it be found that the owner, agent or operator of said shaft or slope has refused or neglected to comply with the provisions of this act, the court, or judge in vacation, by order, shall prohibit the further working of any such coal shaft or slope until the owner, agent or operator shall have complied with the terms of this act. [An act approved June 21, 1883; in force July 1, 1883].

SEC. 19. That all miners and employes engaged in mining coal shall use copper needles in preparing blasts in coal, and not less than five (5) inches of copper on the end of all iron bars used for tamping blasts of powder in coal, and the use of iron needles and iron tamping bars not tipped with five inches of copper is hereby declared to be unlawful. Any failure on the part of a coal miner or an employe in any coal mine to conform to the terms and requirements of this act shall subject such miner or employe to a fine of not less than five dollars, nor more than twenty-five dollars, with costs of prosecution, for each offense, to be recovered by civil suit, before any justice of the peace; said fines, when collected, to be paid into the treasury of the county where the offense was committed, to the credit of the fund provided for the payment of the county inspector of mines. [An act approved June 21, 1883; in force July 1, 1883].

AN ACT

To Provide for the weighing of Coal at the Mines.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That the owner, agent or operator of

each and every coal mine or colliery in this State shall furnish, or cause to be furnished and placed upon the switch or railroad track adjacent to said coal mine or colliery, a "track scale" of standard manufacture, and shall weigh all coal hoisted from said mine or colliery before or at the time of being loaded on cars, wagons, or other vehicle of transportation: *Provided*, that in cases where track scales cannot be used, or the product of such mine or colliery will not justify the expense of a track scale, the owner, agent or operator of same shall be permitted to furnish (in lieu of a track scale) a platform scale of sufficient capacity to weigh each box as it is hoisted from such mine or colliery.

SEC. 2. All coal produced in this State shall be weighed on the scales as above provided, and the weight so determined shall be considered the basis upon which the wages of persons mining said coal shall be computed.

SEC. 3. It shall be lawful for the miners employed in any coal mine or colliery in this State to furnish a check weigher at their own expense, whose duty it shall be to balance said scales, and see that the coal is properly weighed, and keep a correct account of same, and for this purpose he shall have access at all times to the "beam box" of said scale while such weighing is being performed. The agent employed by persons mining coal, to act as check weighman, shall be an employe in the mines where the coal to be weighed was produced, and a citizen of the State and county wherein the mine is situated. He shall, on application to the owner, agent or operator of the the mine producing the coal to be weighed, be furnished with a written permit that shall entitle him to enter and remain in the room or place where the accounting by him of the weights of coal is to be done, and the said permit shall not be transferable: *Provided*, that the provisions of this act shall apply only to coal mines doing business on and shipping coal by railroad or by water.

SEC. 4. Any person, owner or agent operating a coal mine or colliery in this State, who shall fail to comply with the provisions of this act, or any person who shall obstruct or hinder the carrying out of its requirements, shall be deemed guilty of a misdemeanor, and punished accordingly.

AN ACT

To Revise the Law in Relation to Mines.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* Whenever any mine or mining place

shall be so situated that it cannot be conveniently worked without a road or railroad thereto, or ditch to drain the same or to convey water thereto, and such road, railroad or ditch shall necessarily pass over, through or under other land owned or occupied by others, the owner or operator of any such mine or mining place may enter upon such lands, and construct such road, railroad or ditch, upon complying with the law in relation to the exercise of the right of eminent domain; and the commissioners of highways of any county under township organization, and the county board in counties not under township organization, may, when the public good requires, cause to be laid out and opened public highways, or private roads or cartways, as the public good may require, in the same way as now is or may hereafter be provided by law for the laying out and opening of public highways or private roads or cartways, and may permit the owner, lessee or operator of any coal mine to lay down and operate a horse or dummy railway thereon, or upon any highway or private road or cartway now or hereafter laid out and opened for public or public and private use, but always in such a manner and way, and upon such place thereon, as to not unnecessarily interfere with ordinary public travel.

AN ACT

To Amend Chapter XXX of the Revised Statutes (1845), entitled "Criminal Jurisprudence."

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* If any person shall, by threat, intimidation, or otherwise, seek to prevent any other person from working at any lawful business on any terms that he may see fit, such person so offending shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be fined in any sum not exceeding one hundred dollars.

SEC. 2. If any two or more persons shall combine for the purpose of depriving the owner or possessor of property of its lawful use and management, or of preventing by threats, suggestions of danger, or other means, any person or persons from being employed by such owner or possessor of property, on such terms as the parties concerned may agree upon, such person so offending shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be fined in any sum not exceeding five hundred dollars, or imprisoned in the county jail not exceeding six months.

SEC. 3. If any person shall enter the coal banks of another without the expressed or implied consent of the owner or manager thereof, after notice that such entry is prohibited, such person shall, on convic-

tion thereof, be fined, in the discretion of the court, in any sum not exceeding five hundred dollars, or imprisoned in the county jail not more than six months.

SEC. 4. If any person shall enter the coal banks of another with intent to commit any injury thereto, or by means of threats, intimidations, or other riotous or unlawful proceedings, to cause or induce any person employed therein to leave his employment, such person shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be subject to a fine not exceeding five hundred dollars, or imprisoned in the county jail not exceeding six months, or both.

SEC. 5. This act to take effect and be in force from and after its passage.

MINING LAWS OF COLORADO.

AN ACT

To Regulate the Working and Inspection of Coal Mines.

SECTION 1. *Be it enacted by the General Assembly of the State of Colorado*, That the owner or agent of each coal mine or colliery in this State employing ten or more men, shall make, or cause to be made, within six months after the passage of this act, an accurate map, or plan, of the workings of such coal mine or colliery, on a scale not exceeding one hundred feet to the inch, and showing the bearings and distances of the workings with the general inclination of the strata and any material deflection in said workings, and the boundary lines of said coal mine or colliery, which shall be kept for the use of the inspector at the office in the county where such coal mine or colliery is located, and which shall be kept up every three months, and deposit a true copy of such map or plan with the inspector of coal mines, to be filed in his office; and said owner or agent shall cause, on or before the tenth day of January in every year, a statement of the workings of such coal mine during the year past, from the last report to the end of the December month just preceding, to be marked on the original map or plan of the said coal mine or colliery; *Provided*, if the owner or agent of any coal mine shall neglect or refuse, or from any cause fail for the period of one month after the time prescribed to furnish the said map or plan, as hereby required, or if the inspector shall find or have reason to believe said map or plan is inaccurate in any material part, he is hereby authorized to cause a correct map or plan of the actual workings of said coal mine to be made at the expense of the owner thereof, the cost of which shall be recover-

able from said owner as other debts are recoverable by law; *Provided*, that if the map or plan claimed to be incorrect shall prove to be correct in all material points, then aforesaid expenses shall be paid by the said inspector and may be recovered from him in like manner.

SEC. 2. It shall not be lawful after six months from the passage of this act for the owner or agent of any coal mine wherein over fifteen thousand square yards have been excavated to employ or permit more than fifteen persons to work therein, except in opening shafts or outlets, unless there are to every seam of coal worked in each mine at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available to the persons employed in the mine, and air shafts in which are constructed and maintained ladder ways shall be deemed and held to be an escape shaft within the provisions of this act, and no escape shaft shall be required; but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until fifteen thousand square yards have been excavated in such mine, and to all other coal mines, whether opened and worked by shafts, slopes or drifts, two such openings or outlets must be provided within twelve months after fifteen thousand yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for the agent or owner of such mine to permit more than fifteen persons to work therein at any one time. In case a coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein, and the owner thereof does not own suitable surface ground for another opening, he may select and appropriate any adjoining land for that purpose, and for approach thereto, and shall be governed in his proceeding in appropriating such land by the provisions of law in force providing for the appropriation of private property by corporations, and such appropriation may be made whether he is a corporator or not, but no land shall be appropriated under the provisions of this act until the court is satisfied that suitable premises cannot be obtained by contract upon reasonable terms. Escapement shafts or other communication with a contiguous mine as aforesaid, shall be constructed in connection with every vein or stratum of coal worked in such coal mine or colliery as provided herein.

SEC. 3. In all cases where the human voice cannot be distinctly heard, the owner or agent shall provide and maintain a metal tube from the top to the bottom of the slope or shaft, or telephone connection suitably adapted to the free passage of sound, through which conversation may be held between persons at the bottom and at the top of the

shaft or slope, also the ordinary means of signaling to and from the top and bottom of the shaft or slope; and in the top of every shaft an approved safety-gate and an approved safety-catch and sufficient cover overhead on every carriage used for lowering and hoisting persons; and the said owner or agent shall see that sufficient flanges or horns are attached to the sides of the drum of every machine that is used for lowering and hoisting persons in and out of the mine; and also that adequate breaks are attached thereto; the main link attached to the swivel of the wire rope shall be made of the best quality of iron and shall be tested by weights satisfactory to the inspector of mines of the State; and bridle chains shall be attached to the main link from the cross pieces of the carriage; and no single link chain shall be used for lowering or raising persons into or out of said mine; and not more than five persons for each ton capacity of the hoisting machinery used at any coal mine shall be lowered or hoisted by the machinery at any one time.

SEC. 4. The owner or agent of every coal mine, whether shaft, slope or drift, shall provide and maintain for every such mine an amount of ventilation of not less than 100 cubic feet per minute per person employed in such mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless and repel the poisonous and noxious gases from each and every working place in the mine, and breakthroughs or air-ways shall be driven as often as the inspector of mines may order at the different mines inspected by him, and all break-throughs or air-ways, except those last made near the working faces of the mine, shall be closed up and made air tight by brettice, trap-doors or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the mine where the persons employed in such mine are at work; and all mines governed by this statute shall be provided with artificial means of producing ventilation when necessary to provide a sufficient quantity of air, such as fanning or suction fans, exhaust steam furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air; but in case a furnace shall be used for ventilating purposes, it shall be built in such a manner as to prevent the communication of fire to any part of the works, by lining the upcast with incombustible material for a sufficient distance up from the said furnace. All mines generating fire-damp shall be kept free from standing gas, and every working place shall be carefully examined every morning with a safety-lamp by a competent person or persons before any of the workmen are allowed to enter the mine; and the person making such examination shall mark on the face of the workings the day of the month; and in all mines, whether

they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will shut up of their own accord and cannot stand open; and the owner or agent shall employ a practical inside overseer, to be called a "mining boss," who shall keep a careful watch over the ventilating apparatus, and the air-ways, traveling ways, pumps and timbers, also drainage; also shall see that the miners advance their excavations, also that all loose coal, slate and rock overhead are carefully secured against falling in or upon the traveling ways, and that sufficient timber of suitable lengths and sizes is furnished for the places where they are to be used and placed in the working places of the mines, and he shall measure the ventilation at least once a week, at the inlet and outlet, and also at or near the face of all the entries, and the measurement of air so made shall be noted on blanks furnished by the mine inspector, and on the first week day of each month the "mining boss" of each mine shall sign one of such blanks properly filled and forward the same by mail to the mine inspector, a copy of which shall be filed at the office of the coal company, subject to inspection by the miners.

SEC. 5. No person shall knowingly be employed as an engineer or take charge of any machinery or appliance whereby men are lowered into or hoisted out of any mine, but an experienced, competent and sober person; and no person shall ride upon a loaded wagon or cage used for hoisting purposes in any shaft or slope. No young person under twelve years of age, or woman or girl of any age, shall be permitted to enter any coal mine to work therein, nor any minor under the age of sixteen years unless he can read and write.

SEC. 6. All safety lamps used for examining coal mines shall be the property of the owner of the mine, and shall be under the charge of the agent thereof. The term "owner" in this act shall mean the immediate proprietor, lessee or occupier of any coal mine or colliery, or any part thereof; and the term "agent" shall mean any person having, on behalf of the owner as aforesaid, the care and management of any coal mine or colliery, or any part thereof.

SEC. 7. All boilers used in generating steam in and about coal mines and collieries shall be kept in good order, and the owner or agent as aforesaid shall have said boilers examined and inspected by a competent boilermaker or other well qualified person as often as once every six months, and the result of every such examination shall be certified in writing to the mining inspector; and every steam boiler shall be provided with a proper steam gague, [gauge] water gague [gauge] and safety valve; and all underground self-acting or engine planes or gangways on

which coal cars are drawn and persons travel shall be provided with some proper means of signaling between the stopping places and the ends of said planes or gangways; and sufficient places of refuge at the sides of such planes or gangways shall be provided at intervals of not more than fifty feet apart; and there shall be cut in the side of every hoisting shaft, at the bottom thereof, a traveling way sufficiently high and wide to enable persons to pass the shaft in going from one side of the mine to the other without passing over or under the cage or hoisting apparatus.

SEC. 8. Whenever loss of life or serious personal injury shall occur by reason of any explosion or of any accident whatsoever in or about any coal mine or colliery, it shall be the duty of the owner or agent thereof to give notice to the mine inspector, and if any person is killed thereby, to the coroner of the county also, and the inspector shall immediately go to the scene of said accident and render such assistance as he may deem necessary for the safety of the men, and shall ascertain by the testimony before the coroner or by taking other evidence, the cause of such explosion or accident, and file record thereof in his office.

SEC. 9. In all coal mines in the State, the miners employed and working therein, the owners of the land, or other person interested in the rental or royalty of any such mine, shall at all proper times have full right of access and examinations of all scales, machinery or apparatus used in or about such mine; to determine the quantity of coal mined for the purpose of testing the accuracy of all such scales, machinery or apparatus, and such landowners or other persons may designate or appoint a competent person to act for them, who shall at all proper times have full right of access and examination of such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person, on behalf of the landowners or other persons interested in the rental or royalty jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such persons shall make no unnecessary interference with the use of such scales, machinery or apparatus; and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to inspect, not oftener than once in every month, the mine and machinery connected therewith, and to measure the ventilating current, and if the owner, agent or manager so desires, he may accompany said miners by himself or two or more persons whom he may appoint for that purpose. The owner, agent or manager shall afford every necessary facility for making such inspection and measurement, but the said

miners shall not in any way interrupt or impede the work going on in the mine at the time of such inspection and measurement.

SEC. 10. Any miners, workmen or other persons who shall intentionally injure any shaft, lamps, instrument, air course or brettice, or obstruct or throw open air-ways, or open a door and not close it again, or carry lighted pipes or matches into places that are worked by safety lamps, or handle or disturb any part of the machinery, or enter any place of the mine against caution, or who intentionally and willfully neglects or refuses to securely prop the roof of any working place under his control, or disobey any order given in carrying out the provisions of this act, or do any other act whereby the lives or the health of persons, or the security of the mines or machinery is endangered, shall be deemed guilty of a misdemeanor, and may be punished by fine or imprisonment at the discretion of the court.

SEC. 11. In case any owner or agent disregards the requirements of this act, any court of competent jurisdiction may, on application of the inspector, by civil action in the name of the State, enjoin or restrain the owner or agent from working or operating such mine with more than twelve miners underground at one time, until it is made to conform to the provisions of this act; and such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 12. For an injury to person or property occasioned by any violation of this act, or any willful failure to comply with its provisions by any owner, lessee or operator of any coal mine or opening, a right of action against the party at fault shall accrue to the party injured for the direct damage sustained thereby, and in any case of loss of life by reason of such violation or willful failure, a right of action against the party at fault shall accrue to the widow and lineal heirs of the person whose life shall be lost, for like recovery of damages for the injury they shall have sustained.

SEC. 13. The provisions of this act shall not apply to or affect any coal mine in which not more than twelve men are employed under ground at the same time; but on the application of the proprietor of or miners in any such mine, the inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this act that he deems necessary for the safety and health of miners.

SEC. 14. Within four months of the date of the passage of this a[illegible] the judges of the district courts shall appoint four reputable coal miner[illegible]

of known experience, and practice at the time, and the Governor shall appoint one mining engineer of like repute and experience, and practice at the time, who shall constitute a board of five examiners, whose duty it shall be to inquire into the character and qualifications of candidates for the office of inspector of mines, under the provisions of this act. The examiners first appointed in pursuance of this section shall meet in the city of Denver on the 20th day of July next, and after being duly organized, having taken and subscribed before any officer duly authorized to administer the same the following oath, namely: We the undersigned do solemnly swear (or affirm) that we will perform the duties of examiners of applicants for appointment as inspector of coal mines, to the best of our abilities, and that in recommending or rejecting said applicants, we will be governed by the evidence of qualifications to fill the position under the law creating the same, and not by any consideration of political or personal favors; that we will certify all whom we may find qualified according to the true intent and meaning of the act, and none others, to the best of our judgments, shall proceed to the examination of those who may present themselves as candidates for said office; and they shall certify to the Governor the names of all such applicants as any four of the examiners shall find competent to fill the office, under the provisions of this act, which shall be filed in the office of the Secretary of State. The qualifications of candidates for said office of inspector of mines to be inquired into and certified by said examiners shall be as follows, namely: They shall be citizens of the United States, of temperate habits, of good repute as men of personal integrity, shall have attained the age of thirty years, and shall have had at least one year's experience in the working of the coal mines of Colorado, and five years of practical experience in the workings of coal mines in the United States, and have a practical knowledge of mining engineering, and of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp. The board of examiners shall receive six dollars per day, and the same mileage as is allowed to members of the legislature, to be paid out of the State treasury upon the filing of the certificates of the examining board in the office of the Secretary of State, as hereinbefore provided. The Governor shall, from the names so certified, appoint the person possessing the best qualifications to be inspector of coal mines, whose commission shall be for the term expiring January 1, 1887, or until his successor is appointed and confirmed by the Senate. As often as vacancies in said office of inspector of mines shall occur by

death, resignation or malfeasance in office, which shall be determined in the same manner as in the case of any other officer of the State government, the Governor shall fill the same by appointment for the unexpired term, from the names on file in the office of the Secretary of State, as hereinbefore mentioned as having passed examination. Every four years from January 1st. A. D., 1883, the Governor shall appoint one mining engineer as before, and shall notify the judges of four o the judicial districts of the State containing coal mines, selecting them in such order as to allow each district an equal share of such appointments, each to appoint one miner, and the five so appointed shall constitute a new board of examiners, whose duties, term of service and compensation shall be the same as those provided for by this section, and from the names that may be certified by them the Governor shall appoint the inspector of mines provided for in this act; nothing in this act shall be construed to prevent the re-appointment of any inspector of coal mines. The inspector of coal mines shall receive for his services an annual salary of two thousand dollars, and five cents per mile mileage for all distances traveled in the discharge of his official duties, to be paid quarterly by the State treasurer, and said inspector shall reside in the State and shall keep an office at the capitol or other building in which the offices of the State are located. Each inspector is hereby authorized to procure such instruments and chemical tests and stationery from time to time, as may be necessary to the proper discharge of his duties under this act, at the expense of the State, which shall be paid by the State treasurer upon accounts duly certified by him and audited by the proper department of the State. All instruments, plans, books, memoranda, notes, *et cetera*, pertaining to the office shall be the property of the State, and shall be delivered to their successors in office.

SEC. 15. The inspector of coal mines shall, before entering upon the discharge of his duties, give bond in the sum of five thousand dollars, with sureties to be approved by the judge of the district court in which he resides, conditioned for the faithful discharge of his duty, and take an oath (or affirmation) to discharge his duties impartially and with fidelity to the best of his knowledge and ability.

SEC. 16. No person acting as a manager or agent of any coal mine, or as a mining engineer for any coal mining company, or to be interested in operating any coal mine, shall at the same time act as an inspector of coal mines under this act.

SEC. 17. The inspector of coal mines shall devote the whole of his time to the duties of his office; it shall be his duty to enter into and thoroughly examine all coal mines in this State in which more than

twenty men are employed, at least once each quarter, to see that all the provisions of this act are observed and strictly carried out, and the inspector may enter, inspect and examine any coal mine in the State, and the works and machinery belonging thereto at all reasonable times, by night or day, but so as not to unnecessarily obstruct or impede the working of the mine, and the owner or agent of such mine is hereby required to furnish the means necessary for such entry and inspection; of which inspection the inspector shall make a record to be filed in his office, and which shall show the number of mines and development on the same during the past year, and of persons employed in and about each mine, and the extent to which the law is obeyed, the progress made in the improvement sought to be secured by the passage of this act, the number of accidents and deaths resulting from injuries received in the mines, as also statistics showing the output of coal and development made annually at each mine, with all facts concerning the production and transportation of coal to market and other facts of public interest coming under the provisions of this act, which record shall on or before the first Monday of November preceding the biennial sessions of the legislature, be filed in the office of the Secretary of State, to be by him included in the biennial report of his department.

SEC. 18. The neglect or refusal to perform the duties required t be performed by any section of this act, or the violation of any of the provisions hereof, shall be deemed a misdemeanor, and shall upon conviction be punished by fine of not less than one hundred dollars nor exceeding five hundred dollars, at the discretion of the court, and all penalties recovered under this act shall be paid into the treasury of the State.

Approved February 24, 1883.

LIST OF MINES.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Athens County.			
Lick Run, No. 1	Drift	W. B. Shoemaker & Co	Columbus.
Lick Run, No. 2	"	" "	"
Laurel Hill	"	Laurel Hill Coal Co	"
Johnson's	"	Johnson Bros. & Patterson	Nelsonville.
Section 29	"	W. B. Brooks & Son	"
Mining Company	"	Nelsonville Coal Mining Co	"
Poston's	"	C. L. Poston & Co	"
Longstreth's	"	T. Longstreth	"
Poplar Run, No. 1	"	"	"
Poplar Run, No. 2	"	"	"
Briar Hill	"	Ricketts & Matthews	"
Happy Hollow	"	Nelsonville Coal & Coke Co	"
Half-Moon	"	Akron Iron Co	Buchtel.
Furnace Bank	"	"	"
East Hill	Shaft	"	"
L. D. Mines	Drift	Lewis Steenrod	Nelsonville.
New Floodwood	Shaft	Hocking Iron Co	Floodwood.
Sheffield's	Drift	B. B. Sheffield & Bro	"
Hamley Run	Shaft	H. C. Will & Co	Columbus.
Salina	"	E. Michael	
Chauncey	"	Ewing Heirs	Chauncey.
Carbondale	Drift	Carbondale Coal Co	Mineral City.
Belmont County.			
Rainey's	Drift	Rainey Bank Coal Co	Cleveland.
Etna	"	Ætna Iron & Nail Co	Martin's Ferry.
Helling's	"	Henry Helling	" "
Laughlin's	"	Laughlin Nail Co	" "
La Belle	"	La Belle Glass Co	Bridgeport.
Wheeling Creek, No. 1	"	C., T. V. & W. R. R. Co	"
Wheeling Creek, No. 2	"	" "	"
Bernard's	"	G. W. Bernard & Co	Bellaire.
Belmont, No. 1	"	Jacob Heatherington	"
Belmont, No. 2	"	Belmont Coal Co	"
Franklin, No. 1	"	Steward & Meehan	Stewardsville.
Franklin, No. 2	"	" "	"
Kidd's	"	John Kidd	Shields.
Pittsburgh Coal Works	Slope	Rockenhausen & Sterritt	Bellaire.
Wegee	"	P. Schaefer & Co	Wegee.
Union	"	F. Davis & Son	Dilley's Bottom.
Sheck's	Drift	Heslop, Sheck & Co	Bellaire.
Kelley's	"	John Kelley	"
Carroll County.			
Sherodsville	Drift	New York and Ohio Coal Co	Dell Roy.
Empire, No. 1	"	" " "	"
Empire, No. 2	"	" " "	"
Empire, No. 3	"	" " "	"
Empire, No. 4	"	" " "	"
Allen's	"	Samuel Allen & Son	"
Osborne's	"	Osborne Coal Co	Salineville.
Robert's	"	Cleveland Iron Co	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Columbiana County.			
Cherry Valley, No. 1	Slope	Cherry Valley Iron Co	Leetonia.
Cherry Valley, No. 2	Drift	" "	"
Cherry Valley, No. 3	"	" "	
Shaft	Shaft	Ohio & Penn. Coal Co	Salineville.
Jone's	Drift	" "	"
Conrad's	"	" "	"
Empire	"	" "	"
Cleveland	"	" "	"
Hussay Hollow	"	" "	"
Farmer	"	Manufacturers' Coal Co	"
Granage & Anderson's	"	Granage & Anderson	"
Foster's	"	Columbiana Coal Co	"
Diamond Valley	"	Diamond Valley Coal Co	"
Wolf Run	"	A. Armstrong	Teegarden.
Shelton	"	Wm. Barrett	"
Maple Hill	"	Maple Hill Mining Co	"
State Line	"	State Line Coal Co.	East Palestine.
Prospect Hill	"	James Southern	"
Salt Well	"	Robert Ellis	New Lisbon.
Grafton	Shaft	Grafton Iron & Coal Co	Leetonia
New Shaft	"	Salineville Coal Co	Salineville.
Hay's Mine	Drift	W. J. Rainey Coal Co	"
Rock Hill	"	Niles Mining Co	Robbinsville.
Coshocton County.			
Beach Hill	Drift	Prosser & Cassingham	Coshocton.
Home Bank	"	W. G. Ricketts	"
Union	"	Union Coal & Mining Co	"
Hays	"	W. G. Hays	"
Franklin	"	Franklin & Coalport Coal Co	"
Gallia County.			
Cheshire Coal Works	Drift	C. A. Carl	Cheshire.
Guernsey County.			
Shaft	Shaft	Manufacturers' Coal Co.	Byesville.
Cambridge	Drift	Cambridge Coal & Mining Co.	Cambridge.
Scott's	"	Scott's Coal & Salt Works Co.	"
Norris	Slope	Wm. Norris	"
Nicholson's	Drift	Ohio Coal Co.	Marietta.
Guernsey	"	Guernsey Mining Co.	Cambridge.
Akron Shaft	Shaft	Akron Coal Co.	Byesville.
Harrison County.			
Philadelphia	Drift	Philadelphia Coal Mining Co.	Station 15.
Hocking County.			
Sand Run	Drift	J. H. Somers	Carbon Hill.
Carbon Hill	"	"	"
Crafts	"	Craft Iron Co	Greendale.
Black Diamond, No. 1	"	Peter Hayden	Haydenville.

LIST OF MINES.—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Hocking County—Cont'd.			
Black Diamond, No. 2	Drift	Peter Hayden	Haydenville.
Gore	"	Thomas Iron Co	Gore.
No. 19	"	W. B. Brooks	Nelsonville.
Helen Mines	"	Ohio Central Iron Co	"
Longstreth's	"	T. Longstreth	"
Sacket's	"	Sacket & Smart	Carbon Hill.
Orbiston	"	Hocking Iron Co	Orbiston.
Lee Furnace	"	"	Monday.
Hocking	"	"	"
Popaler Run	"	T. Longstreth	Columbus.
Murray City Slope	Slope	Murray City Coal Co	"
Holmes County.			
Mayers'	Drift	Bowen Bros	Millersburg.
Jackson County.			
Star	Shaft	Star Furnace	Jackson.
Tropic	"	Tropic "	"
Globe	Slope	Globe Iron Co	"
Kyle	"	Kyle, Shotts & Co	"
Huron	Shaft	Huron Iron Co	"
Eureka	"	J. A. Long & Co	"
Price's	Drift	Price Bros	"
Newport	"	Newport Coal Co	"
Carr	"	Jas. Carr	"
Chapman	"	H. L. Chapman	"
Levely's	"	J. C. Evans	"
Worth	"	Mohler & Kisinger	"
Springfield	"	Springfield Coal Co	"
Diamond	"	H. L. Chapman	"
Forest	"	Forest Coal Co	"
Ada	"	Hall Coal Co	"
Slope	Slope	Mohler & Kisinger	Coalton.
Wilson	"	Wilson, Whelden & Co	"
Indiana	"	Drew & Wasson	Jackson.
McKitrick	"	McKitrick Bros	"
Hurd	Shaft	Hurd Coal Co	"
Eagle	Drift	Eagle "	"
Heppel's	"	John Hippel	Coalton.
Hull's	"	John Hall	"
Darling	"	"	"
Morgan's, No. 1	"	Jones & Morgan	Jackson.
Morgan's, No. 2	Slope	"	"
Morgan's, No. 3	"	"	"
Kelley	Drift	Kelley Coal Co	Coalton.
Western	"	Western Coal Co	"
Sterling	"	Sterling "	"
Garfield	"	Garfield "	"
Southern Ohio, No. 1	"	Southern Ohio Coal & Iron Co	"
Southern Ohio, No. 2	"	" "	"
Cannel Bank	"	Adam Scott	"
Acorn	Shaft	Jones Coal Co	Jackson.
Emma	"	Emma "	Glen Roy.
Standard	"	Standard Coal Co	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Jackson County—Cont'd.			
Murphin's	Shaft...	Murphin & Co	Wellston.
Center Valley	" ...	Drew & Wasson	"
Comet	" ...	Cin. Con. Coal & Mining Co	"
Meadow Run	" ...	Meadow Run Coal Co	"
Fluhart's	" ...	T. Fluhart & Co	"
Eliza	" ...	Eliza Furnace Co	"
S. O., No. 3	" ...	Southern Ohio Coal & Iron Co	"
Milton	" ...	Milton Furnace & Coal Co	"
Wellston, No. 1	" ...	Wellston Coal & Iron Co	"
Wellston, No. 2	" ...	" "	"
Coal Run	Drift ...	Southern Ohio Coal & Iron Co	"
Jefferson County.			
Rush Run	Shaft...	Rush Run Coal Co	Rush Run.
Lagrange Shaft	" ...	Lagrange Coal Works	Phillipsburg.
Walnut Hill	Drift ...	Tallman & Harwood	Yorkville.
Gravel Shaft	Shaft...	Cleveland Furnace Co	Steubenville.
Stony Hollow	" ...	Steubenville Coal Mining Co	"
High Shaft	" ...	" "	"
Rolling Mill	" ...	Spaulding, Woodward & Co	"
Everick's	" ...	Ohio & Pennsylvania Coal Co	"
Boreland's	" ...	Swift Iron & Steel Works	"
Diamond	Drift ...	S. N. & W. G. McCullough	Linton.
H. Strip Vein	" ...	W. H. Wallace & Son	Hammondsville.
Groff	" ...	W. W. Nessly	Linton.
Fire Clay Bank	" ...	Calumet Terra Cotta Co	Elliottsville.
Bustard's	Shaft...	Steubenville Coal & Coke Co	Steubenville.
Mingo	" ...	Junction Iron Co	Mingo.
Alecanna	" ...	Sharp & Daniels	Steubenville.
Lawrence County.			
Sheridan Coal Works	Drift ...	Sheridan Mining Co	Sheridan Coal Wks
Newcastle	" ...	Means, Kyle & Co	Hanging Rock.
Belfont	" ...	Norton Bros. & Co	Ironton.
Lawrence	" ...	Lawrence Iron Works	"
Old Mill Mine	" ...	N. Y. & Ohio Iron & Steel Co	"
Union	" ...	Union Iron Co	Samsonville.
Medina County.			
Diamond	Slope...	Humphrey & Coleman	Wadsworth.
Wadsworth	" ...	Wadsworth Coal Co	Doylestown.
Excelsior	" ...	Excelsior Coal Mining Co	"
Meigs County.			
Charter Oak	Drift ...	Pomeroy Heirs	Pomeroy.
Slope	Slope...	Union Mines Co	Syracuse.
Riverside	" ...	Ohio Coal Co	Antiquity.
Williams'	Drift ...	Ebenezer Williams	Minersville.
Buckeye	" ...	Buckeye Salt Co	Pomeroy.
Coal Ridge	" ...	Coal Ridge Salt Co	"
Crescent City	" ...	Crescent City Iron Works	"
Big Bend	" ...	Big Bend Salt Co	"

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Meigs County—Continued.			
Diamond	Drift...	Pomeroy Coal Co	Pomeroy.
Dabney	" ...	"	"
Peacock	" ...	"	"
Minersville	" ...	"	"
Shaft	Shaft...	Syracuse Coal & Salt Works...	Syracuse.
Mahoning County.			
Osburn	Slope...	Evan Morris	Girard.
John Henry	Shaft...	W. T. Williams & Co	
Austin	" ...	Tod. Wells & Co	Mineral Ridge.
Cambria	" ...	W. T. Williams & Co	"
Leadville	" ...	Leadville Coal Co	Youngstown.
Foster	" ...	Foster Coal Co	"
Osburn	" ...	Andrew Brothers	"
Darrow's	Drift...	J. P. Darrow	Lowellsville.
Power's	Slope...	A. W. Powers	Youngstown.
Enterprise Shaft	Shaft...	Allen Coal Co	"
Kyle's	Slope...	Kyle Coal Co	"
New Slope	" ...	Osborn Coal Co	Mineral Ridge.
Walter's Bank	Shaft...	Walters & Co	Washingtonville.
Buckeye	" ...	Robert Hunter	Youngstown.
Pennel	Slope...	New Lisbon Coal Co	"
Harroff	Shaft...	Harroff Coal Co	"
Green's	Slope...	Green Coal Co	Greenford.
Witch Hazel	Shaft...	Witch Hazel Coal Co	Youngstown.
Muskingum County.			
Del Carbo	Drift...	Consolidated Coal & Min'g Co..	Roseville.
Muskingum Valley	" ...	George Veredrone	"
Horton's	" ...	Henry Horton	Zanesville.
Wheeler's	" ...	G. Wheeler	"
Ballou's	" ..	Orrin Ballou	"
Blandy's	" ...	H. Blandy	"
Stelover's	" ...	W. A. Stelover	"
Greiner's	" ...	H. Greiner	"
Harper's	" ...	E. Harper	"
Peacock	" ...	D. Mathews & Co	Gilbert Station.
Owens'	" ...	James Owens	Putnam.
Harper's	" ...	L. Harper	Zanesville.
Noble County.			
Macksburg	Drift...	Ohio Coal Co	Macksburg.
Perry County.			
Tucker's	Drift...	Doe & Job	New Straitsville.
Plummer Hill	" ...	Straitsville Coal Co	"
Old Mine	" ...	Straitsville Coal Mining Co	"
Troy Mine	" ...	Thomas Coal and Iron Co	"
Chicago	" ...	W. P. Rend & Co	"
Consolidation	" ...	Consolidated Coal Mining Co..	"
Central	" ...	Straitsville Central Mining Co..	"
Upson	" ...	Card & Upson	Shawnee.

NOTE.—The mines of Muskingum county are small, not always working ten men at once.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Perry County—Continued.			
XX Furnace	Drift	Sandusky & Shawnee C. & I. Co	Shawnee.
Manly's	"	Furnace Coal Co	"
Shawnee	"	Licking Iron Co	"
Shawnee Valley	"	Shawnee Valley Coal Co	"
New York	"	N. Y. & Straitsville C. & I. Co.	"
Tunnel Hill	"	Tunnel Hill Coal Co	New Lexington.
Jones'	"	S. & J. Jones & Co	McCluney.
Davis'	"	D. E. Davis	Bristol Station.
Brilliant	"	J. E. Payne	McCuneville.
No. 1	"	Ohio Central Coal Co	Corning.
No. 2	"	" "	"
No. 3	Shaft	" "	"
No. 9	"	" "	"
No. 11	"	" "	"
No. 12	Drift	" "	"
No. 13	Shaft	" "	"
No. 15	"	" "	"
No. 19	"	" "	"
Sunday Creek, No. 7	"	Sunday Creek Coal Co	Rendville.
Rend's No. 5	"	Rend Coal Co	"
Rend's No. 2	"	"	"
Dickson's	Drift	J. C. Hamilton	Shawnee.
Black Hill	"	Levi Rerrick	Maholm.
Farques'	"	J. D. Farques	"
Consolidated	"	Consolidated Coal Mining Co.	Cincinnati.
Black Diamond	"	E. D. Simpson	Maholm.
O. K.	"	W. D. Clark	"
Daugherty's	"	F. Daugherty	"
Lyonsdale	"	Lyonsdale Coal Co	Columbus.
Tague's, No. 1	"	M. & P. Tague & Co	McCluney.
Tauge's, No. 2	"	"	"
Tague's, No. 3	"	"	"
Portage County.			
Wilson's	Shaft	Wilson, Osburn & Co	Palmyra.
Scott's	"	Scott Coal Co	Sharon, Pa.
Black Diamond	"	P. L. Kimberly	Diamond, P. O.
Stark County.			
Osnaburgh Mine	Drift	Osnaburgh Coal Co	Osnaburgh.
Mountain	Shaft	Rhodes Coal Co	Cleveland.
Lawrence	"	Ridgeway Coal Co	Massillon.
Camp Creek	"	Camp Creek Coal Co	Elyria.
Pigeon Run	"	Massillon Pigeon Run Coal Co	Massillon.
Grove Shaft, No. 2	"	Rhodes Coal Co	Cleveland.
Willow, No. 5	Slope	"	"
Sippo	"	Sippo Coal Co	Massillon.
Massillon City	"	Massillon City Coal Co	"
Oak Hill	"	Oak Hill Coal Co	"
Willow, No. 3	"	Rhodes Coal Co	Cleveland.
Valley Mine, No. 1	Drift	Valley Coal Co	Canton.
Valley Mine, No. 2	"	"	"
Greentown	"	Smith, Borst & Co	Greentown.
Fox Run	"	Fox Run Coal Co	Canton.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Stark County—Continued.			
Zerby Drift	Drift...	J. P. Burton & Co	Massillon.
Windsor	Slope...	Windsor Coal Co	"
Garfield	Shaft...	Navarre "	Elyria.
Hadley's	Drift...	Brown & Hadley	North Industry.
Elm Run, No. 1	Shaft...	Massillon Elm Run Coal Co	Massillon.
Elm Run, No. 2	" ...	" " ...	"
Summit County.			
Thomas Drift, No. 1	Drift...	Phillip Thomas	Cuyahoga Falls.
Thomas Drift, No. 2	" ...	"	"
Summit Mine	Slope...	Summit Mine Coal Co	101 Sup. st., Clev.
New York	Drift...	Thomas Bros	Thomastown.
Nemissila	Slope...	Nemissila Coal Mining Co	Cleveland.
Summit	Shaft...	Summit Mining Co	"
Dennison	Slope..	Dennison Coal Co	Sherman.
Burnett	" ...	Brewster Coal Co	Akron.
Lake View	Shaft...	Lake View Coal Co	"
Tuscarawas County.			
Tunnel Mine	Drift...	Rhodes Coal Co	Cleveland.
Block Vein	Slope...	George J. Markley	Mineral Point.
Newberry	Drift...	C. E. Holden	"
Walton Ridge	" ...	Buckeye Coal Co	New Philadelphia
Hert's	" ...	Nicholas Hert	Tuscarawas.
Herning's	" ...	Andrew Herning	"
Minich's	" ...	Charles Minich	"
Jones'	" ...	Wm. R. Jones	New Philadelphia
Goshen Ridge	" ...	Helmick & McFarland	"
Coventry	" ...	Harry Miller & Son	"
Rennie's	" ...	W. R. Rennie	"
Goshen Drift	" ...	Goshen Ridge Coal Co	"
Groff's	" ...	Frederick Groff	"
Rock Hill	" ...	Rock Hill Coal Co	Elyria.
Pike Run, No. 1	" ...	Tuscarawas Coal Co	"
Trumbull County.			
Love	Slope...	Andrews, Hitchcock & Co	Youngstown.
Burnett	" ...	" "	"
No. 3	" ...	Mahoning Coal Co	Coalburg.
No. 9	" ...	"	"
No. 8	" ...	"	"
Brookfield	Drift...	Brookfield Coal Co	Sharon, Pa.
Cleveland Shaft	Shaft...	Ohio Coal Co	Cleveland.
Shenango	Slope...	Shenango Coal Co	Wheatland, Pa.
Halliday	" ...	Halliday "	Youngstown.
Kline	" ...	Briar Hill Iron Co	"
Church Hill	" ...	Church Hill Coal Co	"
New Blackberry	Shaft...	Vienna Coal Co	"
Church Hill	" ...	Church Hill Coal Co	"
High Shaft	" ...	Morris & Sampson	Church Hill.
Garfield	" ...	McCurdy & Morgan	Youngstown.

NOTE.—The mines of the Hocking Valley, which have been consolidated by the Columbus and Hocking Cool and Iron Co., are given in the account of the Hocking Valley region, which see.

LIST OF MINES—Continued.

Name of Mine.	Kind.	Name of Operator.	P. O. Address.
Trumbull County—Cont'd.			
Osborne's	Slope	Osborne Coal Co	Mineral Ridge.
Jacob's	Shaft	P. Jacobs & Co	Youngstown.
Williams'	"	D. Williams & Co	Hubbard.
Vinton County.			
Coalmont	Drift	Zaleski Coal Co	Zaleski.
Zaleski	"	"	"
Washington County.			
Coal Run	Drift		Coal Run.
Maxburg	"	Ohio Coal Co	Marietta.
Wayne County.			
New Chippewa	Drift	New Chippewa Coal Co	81 Bank st., Cleve.
Silver Creek	Shaft	Silver Creek Coal Co	Wadsworth.
Fox Lake	"	Fox Lake Coal Co	Cleveland.

TENTH ANNUAL REPORT

OF THE

STATE INSPECTOR OF MINES,

TO THE

GOVERNOR OF THE STATE OF OHIO,

FOR THE YEAR 1884

COLUMBUS, OHIO:
THE WESTBOTE CO., STATE PRINTERS.
1884.

OFFICE OF CHIEF INSPECTOR OF MINES,

COLUMBUS, O., *November* 15, 1884.

Hon. GEORGE HOADLY, *Governor of Ohio:*

SIR: I have the honor to present herewith the Tenth Annual Report of this Department.

Very respectfully,

THOS. B. BANCROFT,

Chief Inspector of Mines.

ANNUAL REPORT.

COLUMBUS, O., *November* 15, 1884.

To His Excellency, GEORGE HOADLY, *Governor of Ohio:*

In accordance with the statute relative to mines and mining in Ohio, I have the honor to submit herewith the Tenth Annual Report of this Department:

Being required by the recent amendment to the mining law, to collect statistics of the mineral production of the State, it was deemed advisable to have these statistics extend to the close of the year, instead of to November 15th, the close of the fiscal year. I was led to this conclusion from the fact that my predecessor had hitherto estimated the coal production of each year to December 31st, and it was also found that more accurate statisticts could be obtained from the smaller mines of the State to the end of the year than could be arrived at by taking the production to November 15th.

Very respectfully,

THOS. B. BANCROFT,

Chief Inspector of Mines.

Upon entering on the discharge of the duties of this office, by appointment, February 16th, my predecessor's engagements were found to be such as required his immediate absence; hence, much time that might otherwise have been profitably employed in inspecting mines in the State, by the Inspector, was devoted to becoming more fully acquainted with the details and duties of the office work, finding the names of the mines of the State, their owners, location, etc., by which to address monthly ventilation reports. The only guide to be found in this matter was a list of mines contained in the Eighth Annual Report of the office, which had not been revised for years, and was full of inaccuracies. Many other matters connected with the office were also left for discovery, as nothing was found in the shape of a record that was of ready, convenient, or connected reference.

Mr. Austin King, Jr., of Salineville, was appointed Assistant Inspector February 16th, and to his energy and the very able assistance

rendered by him is due the fact that, notwithstanding the difficulties in the way, there were fifty-five mines visited and examined between February 16th and April 11th, on which latter day the amendment to the mining law creating three District Inspectors passed the House and became a law.

During this time all the mines in Medina, Portage, and Summit, and a majority of those in Jefferson, Stark, and Columbiana counties, were visited by Mr. King. He also gave his attention to a number of mines in Wayne, Tuscarawas, Belmont, and Carroll counties, while the Inspector gave such time as he could spare from his office duties to those mines that demanded immediate attention in the counties of Athens, Hocking, Jackson, Perry, and Meigs. Suggestions were made and improvements ordered wherever it was deemed necessary; and it affords me pleasure to state that, with very few exceptions, a disposition has been found on the part of mine owners generally, to render a ready and cheerful compliance with the law, whenever any neglect of the same has been pointed out to them.

Operators are daily becoming alive to the fact that good ventilation, proper drainage, and general security to the mines and miners, is not inconsistent with true business economy, and whatever may be said as to the danger to the State, or to the laboring classes, caused by the aggregation of capital in large corporations, it is certain that those operators and coal companies employing the largest amounts of capital, lay out their mines more intelligently, have better ventilation, and pay a closer and more strict attention to the requirements of the mining law, in all its details, than others who, from lack of means, consider many of its provisions burdensome.

AMENDMENT TO THE MINING LAW.

The General Assembly, at its last session, passed an amendment to the Mining Law that is certainly worthy of the highest commendation, and is a great step in advance in the history of mine inspection in this State. The record of improvement in this department, up to the passage of this act, has been fully gone over, in a previous report, by my predecesor, and need not be referred to here.

With the rapid growth of mining, and the great increase in the number of mines in the State, and with the increased office work attendant thereon, it was evident that the limited inspecting force was entirely inadequate to the requirements of the service. One inspector and his assistant could not possibly visit and inspect the mines of the State once a year, even though devoting their entire time, not otherwise

employed, to the work. As a consequence, attention could be given only to such mines as, through incompetent management, or negligence on the part of the owners, were most noticeable in violating the law; and even in these cases, but little could be done for their benefit, owing to the length of time necessarily elapsing between the visits of the Inspector or his assistant, because of the immense amount of labor imposed upon them. There are to day, in this State, 332 mines coming under the requirements of the Mining Law, and 167 others not employing the requisite number of men; any one of the latter, however, under the law, must be inspected at the request of the miners employed therein. With this greatly increased field for inspection, the inspecting force still remained the same as it had been when the mines of the State were not half so numerous.

A bill was introduced in the House, at the last session of the General Assembly, which was subsequently amended by the Senate and passed in its amended form April 11th, dividing the State into three mining districts, and creating the office of Chief Inspector of Mines, with an assistant, designated as a District Inspector, in each district, This was the main feature of the bill, but there were other equally salutary and needed reforms introduced, notably, the conferring of the powers of sealers of weights and measures, as applied to mine scales, upon the District Inspectors. The full text of the bill having been published in the last report of this department, it is unnecessary to further allude to its details at present.

Under the provisions of this act, the undersigned was appointed Chief Inspector of Mines, and he, with the approval of the Executive, appointed the following District Inspectors, viz: For the first district, Wm. Dalrymple, of Nelsonville; for the second district, Wm. A. Davis, of Cambridge; for the third district, Austin King, jr., of Salineville. This force entered upon their duties May 1st, and the report of each of the District Inspectors will be found in its proper place in the present report. In consequence of this increased force, the working mines of the State have *all* been visited once, and those in need of more frequent inspection have been gone through three, four, and in some cases even five times.

It is gratifying to observe, and is a matter of pardonable pride to the department, that in a space of less than six months there has been created in the State 43 ventilating furnaces and ten fans, where no artificial means of ventilation previously existed. In addition to this, airways have been enlarged, drainage perfected, safety-catches and covers have been placed on cages, where none were found, second openings

have been made to mines where required by law, and the health, safety and protection of the miners noticeably improved.

In fact, without disparagement to any of my predecessors, who were hampered in their efforts by the inadequate force at their disposal, it is safe to say that, since this law took effect, there has been more *practical* improvement manifested than could possibly have been accomplished in thrice the length of time under the old regime. In some cases it has been found necessary to resort to legal measures to enforce compliance with the demands of the Inspector, but these instances are rare, and in most cases prompt acquiescence has been accorded to their suggestions or instructions.

CONTINGENT FUND OF DISTRICT INSPECTORS.

The contingent fund, appropriated for the use of the District Inspectors, was exhausted October 1st, and an increased appropriation has been asked for the ensuing year. This is rendered necessary, as stated elsewhere in this report, partly by the increased expenditure involved in the proper carrying out of the provision relative to the testing of mine scales, and also by the increased efficiency of the service contemplated by the amendment creating the District Inspectors.

Under the old law, the mines of the State, from lack of sufficient inspecting force, could not be visited more than once a year, while, with the present number of Inspectors, it is now possible to inspect each mine four times annually, if not oftener. This increase of travel necessitates a correspondingly increased expense. Again, to insure the fullest amount of benefit to all concerned, it is necessary that a District Inspector should not remain too long in one locality. It is too often the case that, when the District Inspector is known to be in the vicinity, those mines that ordinarily are deficient in ventilation, will fire up their furnaces and prepare to make a good showing, in anticipation of his visit, only to resume their former condition on his departure.

The contingent fund of the District Inspectors should be sufficient to enable them to move from one county or locality to another, frequently, and without notice in advance, so that the *true* and ordinary working condition of the mines may be discovered.

I also beg leave to respectfully suggest, that the contingent fund of the District Inspectors and that of the Chief Inspector, which are now separate and distinct, be merged together and made one fund for the whole department, subject, as both at present are, to the order of the Chief Inspector.

PRODUCTION OF COAL IN 1884.

This year, for the first time since the creation of the office of Inspector of Mines, the collection of statistics of the coal production of the State has been aided by statutory provision. My immediate predecessor, as a labor of love, and not because it was a duty devolving upon him by law, has, up to the present year, given the annual coal tonnage of the State in his reports. While great credit is due him for his efforts in this direction, and while he doubtless employed every means at his disposal to obtain full returns, it is believed that, owing to recent legislation on the subject, the present estimate is more nearly correct than any that have preceded it. In fact, every known mine in the State (large and small) has made returns to this office, and the figures given below are, to all intents and purposes, correct. It is to be regretted that some of the returns were not more complete in matters of detail, as, if all had answered fully the questions put them, the Inspector could have made interesting deductions therefrom, bearing upon the relative amount of coal that could be mined in a given time, per man, in each district, or county, and, perhaps, in each vein of the geological series.

The amounts given in all of these tables are calculated upon 2,000 pounds to the ton, and it will be observed that, notwithstanding the loss of output, all over the State, by floods, labor troubles, and other causes, and the fact that the average time made by the mines of the State during the year was only 199 working days, the total production is but 579,177 tons less than that of 1883. It is gratifying to observe, in this connection, that in comparing the total output of the State with the list of accidents for the year on file in this office, it is found there was but one accident *of any kind* to 115,910 tons of coal mined, and but one life lost to 294,233 tons of coal mined. It is believed that this will compare very favorably with the record of any other State furnishing similar statistics.

Annual Coal Production of Ohio from 1872 *to* 1884.

1872	5,315,294	tons.
1873	5,450,028	"
1874	3,267,585	"
1875	4,864,259	"
1876	3,500,000	"
1877	5,250,000	"
1878	5,500,000	"
1879	6,000,000	"
1880	7,000,000	"
1881	8,225,000	"

1882	9,450,000 tons.
1883	8,229,429 "
1884	7,650,062 "

COAL PRODUCTION BY COUNTIES FOR 1884.

County.	Tons of lump.	Tons of nut.	Total.
Perry	1,175,926	203,174	1,379,100
Jackson	690,887	140,833	831,720
Belmont	538,180	104,949	643,129
Athens	527,963	99,981	627,944
Stark	461,644	51,581	513,225
Columbiana	401,942	67,766	469,708
Guernsey	307,635	67,792	375,427
Hocking	315,702	56,992	372,694
Tuscarawas	272,076	45,065	317,141
Jefferson	294,976	21,801	316,777
Trumbull	243,264	14,419	257,683
Summit	236,350	16,798	253,148
Meigs	243,157	5,279	248,436
Mahoning	224,599	17,000	241,599
Lawrence	142,197	34,215	176,412
Wayne	109,443	11,128	120,571
Carroll	90,603	11,928	102,531
Muskingum	75,390	9,008	84,398
Medina	71,560	5,600	77,160
Vinton	65,743	3,997	69,740
Portage	60,808	4,839	65,647
Coshocton	46,425	10,137	56,562
Gallia	17,512	2,860	20,372
Holmes	9,917	2,135	12,052
Morgan	5,764	1,872	7,636
Washington	5,600	.....	5,600
Scioto	3,650	.....	3,650
Total	6,638,913	1,011,149	7,650,062

Below is given a table of production, time worked, number of mines and men employed therein, for the year 1884. It is believed the number of men given exceeds the actual number employed in this industry in the State to some extent. This arises from the fact that miners are migratory, and when one mine or district is idle they remove to adjacent mines and counties to obtain work, and thus, where the average number of men employed by each mine is given, as in this case, it will be found that many men have been enumerated more than once. To offset this, however, in many cases (particularly in the Hocking Valley) the usual number of men was largely increased among mines that worked during the strikes in their vicinities, and employed the striking miners, but that did not report to this office more than the number of men they ordinarily employ.

TABLE OF TONNAGE, TIME WORKED, NUMBER OF MEN, ETC., IN EACH COUNTY.

County.	Tonnage.	Number of mines.	Average of weeks worked.	Number of miners.	Other employes.	Accidents.	Fatalities.
Athens	627,944	36	22	1,545	321	2	4
Belmont	643,129	41	35	1,207	225	3	1
Columbiana	469,708	43	30	882	271	1	1
Coshocton	56,562	5	43	151	24	.....	1
Carroll	102,531	10	29	260	32	1	.....
Guernsey	375,427	17	32	692	97	3	.....
Gallia	20,372	5	38	52	8	.....	.....
Holmes	12,052	7	47	37	8	.....	.....
Hocking	372,694	22	19	715	164	.....	1
Jackson	831,720	50	41	1,840	245	2	1
Jefferson	316,777	25	35	513	134	2	.....
Lawrence	176,412	22	38	420	79	1	.....
Medina	77,160	5	37	158	18	2	.....
Muskingum	84,398	23	39	191	28	.....	.....
Morgan	7,636	.....	.....	.....	.....	.....	.....
Meigs	248,436	14	29	666	148	1	.....
Mahoning	241,599	23	38	848	138	6	1
Perry	1,379,100	45	28	2,729	521	.....	5
Portage	65,647	4	27	198	32	.....	1
Summit	253,148	10	31	727	123	1	2
Scioto	3,650	.....	.....	.....	.....	.....	.....
Stark	513,225	35	34	1,383	181	7	2
Tuscarawas	317,141	20	31	649	109	4	3
Trumbull	257,683	19	29	740	92	2	2
Vinton	69,740	15	39	203	56	1	1
Wayne	120,571	6	39	165	60	1	.....
Washington	5,600	1	25	12	4	.....	.....
Totals	7,650,062	503	830	16,983	3,118	40	26

PRODUCTION OF NATIVE ORE IN 1884.

Below will be found the iron ore tonnage of the State, by counti , for the year ending December 31, 1884. The facilities at hand for procuring statistics of the production of ore, limestone and fire clay are not equal to those attending the coal mining industry. The former commodities have not hitherto been indicated, by the statute, as coming under the notice of this department. With nothing at hand to show who were engaged in these industries, it is possible that some have not been reached, although every effort has been made to obtain full and

complete returns, and it is believed that the estimates herein given are nearly correct. From the fact that much of the iron ore mined in the State is dug by individuals scattered over the ore producing districts, and bringing an occasional load of ore to the furnaces in their vicinity, it is hardly possible to get an accurate estimate of the number of persons engaged in mining ore in the State. It is not known that any ore is mined in the State for export, and it is believed that the total production is consumed within its borders.

The amounts given below were furnished by the different furnaces, in each county, and it is believed that all who mined any ore during the year have reported. It is hoped in this case, as in that of the coal production, that the benefit to be derived from more detailed statistics will stimulate those interested to aid the inspector in his efforts, and that the next report may show the amount of black-band ore separate from the hematite, the number of men employed in mining, the time worked, and much other desirable information not at present obtainable.

AMOUNT OF IRON ORE MINED IN 1884.

County.	Tons.
Columbiana	8,800
Hocking	5,382
Jackson	48,958
Jefferson	22,219
Lawrence	88,901
Mahoning	37,240
Perry	7,450
Scioto	9,281
Tuscarawas	18,000
Trumbull	184
Vinton	29,921
Total	276,286

PRODUCTION OF LIMESTONE IN 1884.

The amount of limestone produced by the different counties of the State as given below, has reference only to that used by blast furnaces, and does not comprise the quantity mined for building purposes or for the manufacture of lime. It is expected that in its next report the department will be able to give the amount used for various purposes and much other interesting data.

AMOUNT OF LIMESTONE MINED IN 1884.

County.	Tons.
Belmont	1,410
Columbiana	3,623
Franklin	41,113
Jackson	15,500
Jefferson	15,108
Lawrence	89,003
Muskingum	5,960
Mahoning	49,273
Perry	4,500
Scioto	6,495
Stark	1,320
Total	183,305

PRODUCTION OF FIRE CLAY IN 1884.

The estimates of production of fire clay, as given below, are found to agree closely with those furnished the Secretary of State in returns sent him, and are supposed to be nearly correct. As in the case of iron ore, much fire clay is dug by individuals, in a desultory way, and sold to the consumers in their vicinity. Application has been made to all known consumers in the State, and the result given below is derived from their reports. From these reports it is judged that about 200 men are employed in mining fire clay in the State.

AMOUNT OF FIRE CLAY MINED IN 1884.

County.	Tons.
Columbiana	41,051
Hocking	10,011
Jackson	4,720
Jefferson	45,549
Lawrence	6,930
Mahoning	573
Perry	13,300
Portage	1,000
Scioto	17,310
Stark	2,640
Summit	16,000
Tuscarawas	8,894
Wayne	230
Total	168,208

ACCIDENTS IN THE MINES.

Below is given a list of accidents, fatal or otherwise, from February 16th to November 15th, that have come to the notice of this department.

No record is to be found in this office of accidents occurring from the close of the last fiscal year (November 15, 1883), to the date of my assuming the office, February 16, 1884, though there can be little doubt but some must have occurred.

The list here given is as complete as possible to be under the difficulties experienced in gathering details, as noticed elsewhere. Many accidents, the consequenses of which were but trivial, have not been noticed or recorded.

The total number of accidents recorded is sixty-six, of which twenty-six were fatal. It will be observed that nearly one-half of the whole number are from falls of slate or roof, and one-fourth of the whole number are from falls of coal. One half of the *fatal* accidents are from these two causes alone. It is presumed that many of these could have been avoided by proper care, but in many mines the roof is treacherous and liable to fall at any time without warning. There is no doubt, however, that miners, from being habitually accustomed to such danger, become, in many instances, negligent in adopting proper measures of safety. Two deaths, one in Perry and one in Jackson counties, were caused by shots blowing through pillars and killing men in the adjoining room, The practice of allowing pillars to become so thin as to endanger life in the next room, cannot be too severely reprehended; and it would appear that such pillars certainly cannot be sufficient to support the superincumbent strata with safety to the mine and miners.

FATAL ACCIDENTS.

March 6th. Warren Barrins, at Goshen mine, in Tuscarawas county, was run over by cars.

March 7th. John Kelly, at Longstreth, Hocking county, killed by a fall of coal.

March 27th. Calvin Trimmer, at Maple Hill mine, Athens county, killed by fall of roof.

April 8d. Matthew Evans, at No. 9, in Trumbull county, killed by premature blast.

April 19th. Wm. Curran, at Hussey mine, in Columbiana county, killed by fall of roof.

May 6th. Wm. B. Davis, at Burnett mine, in Summit county, was standing against the pillar at bottom of slope when the hoisting gearing broke and the car killed him.

May 19th. Christ. Shingler, at Zaleski mine, in Vinton county, slate fell on him, from the effects of which he died July 7th.

June 6th. James Fain, at Maple Hill mine, in Athens county, killed by fall of coal.

June 18th. John J. Jones, at Leadville shaft, in Mahoning county, burned by an explosion of fire-damp, and died a few days later.

June 16th. Chas. McPherson, at Brock Hill mine, in Tuscarawas county, fell under a car and broke his leg, and died from amputation.

July 1st. Joseph Sibson, at Wilson mine, in Portage county, killed by falling down air-shaft.

July 11th. George Snippey, at Ohio Central mine, No. 9, in Perry county, killed by a shot through the pillar from adjoining room.

July 15th. Rueben Palmer, at Indiana mine, in Jackson county, killed by a shot through the pillar from adjoining room.

August 1st. Wm. Hall, at Home mine, in Coshocton county, killed by fall of coal.

August 5th. Sol. White, at Ohio Central, No. 21, in Perry county, killed by fall of slate.

August 18th. John Juhas, at Maynard mine, in Belmont county, killed by fall of soapstone.

September 17th. Joseph Ells, in Tuscarawas county, killed by fall of ore in iron ore mine.

September 24th. Wm. Anderson, at Rend's No. 9, in Perry county, killed by fall of slate.

September 24th. David C. Jones, at Mahoning Coal Co.'s No. 9, in Trumbull county, killed by runaway cars on the slope.

September 30th. Thos. Thomas, at Sunday Creek mine, No. 7, in Perry county, killed by jumping from the cage before it landed and falling down the shaft.

October 7th. Andrew Gulasch and Dejuria Kamintchky, at Half-moon mine, in Athens county, killed by explosion of keg of powder while making a cartridge.

October 20th. James Patterson, at North Lawrence mine, in Stark county, killed by fall of coal.

November 7th. Thos. Edwards, at Richard's mine, in Stark county, killed by fall of rock.

November 8th. John Healy, at Lake View mine, in Summit county, went back to see why a shot did not go off, and was found next day in the mine, insensible, and died that evening.

November 10th. George Kennedy, at Sunday Creek mine, No. 7, in Perry county, killed by fall of slate.

NON-FATAL ACCIDENTS.

March 31st. Hiram Six, at Jacksonville mine, in Athens county, burned by fire-damp.

April 2d. A. L. Jefferson, at Walnut Hill mine, in Jefferson county, injured by fall of coal.

April 3d. John Evans, at No. 9, in Trumbull county, lost an eye by premature blast.

April 10th. Edward Brendfield, at same mine, was injured in knee by fall of coal.

April 25th. Nicholas Shabble, at Wheeling Creek mine, in Belmont county, leg broken by fall of rock.

April 28th. George Brown, at Shaft No. 1, in Medina county, foot crushed by fall of coal.

April 28th. Thos. McDermott, at Dennison mine, in Tuscarawas county, spine injured by fall of roof.

April 28th. Jerry Cox, at same time and place, had his arm and leg injured from same cause.

May 27th. John Six, at L. D. mines, in Athens county, flesh wounds on thigh by being caught between cars.

June 4th. Anthy Dolphin, at Garfield mine, in Stark county, injured in groin by fall of slate.

June 11th. Chas. Winkart, had his leg broken by a fall of coal, in the same mine.

June 12th. P. H. Gillstoff, at Dabney mine, in Meigs county, had his arm injured by fall of slate.

June 13th. W. A. Jones, Thos. Davis, and David Nichols, were each burned by fire-damp, at Leadville Shaft, in Mahoning county.

June 16th. Wm. Lambert, at Eliza mine, in Jackson county, internally injured by fall of draw slate.

June 19th. Christ. Ert, at Foster mine, in Mahoning county, leg and two ribs broken by fall of slate.

June 25th. Robt. Benes, at Washingtonville mine, in Mahoning county, foot crushed by fall of coal.

June 27th. Hugh Smith, at Rose Hill mine, in Stark county, back injured by fall of slate.

June 28th. Ed. Steinbaugh, at Goshen Run mine, in Tuscarawas county, back and arm injured by fall of slate.

July 3d. Wash. Smith, at Old Shaft, in Columbiana county, shoulder crushed by fall of slate.

July 6th. Christ. Kline, at Willow Bank No. 6, in Stark county, back injured by fall of slate.

July 8th. Pat'k Gordan, at Guernsey mine, in Guernsey county, leg broken by slip in coal.

July 11th. Pat'k Doody, at Eliza mine, in Jackson county, injured by fall of slate.

July 25th. John Hanley, at Wheeling Creek mine, in Belmont county, injured by fall of rock.

July 28th. Wesley Neads, at Mathew's mine, in Guernsey county, shoulder and leg broken by falling under car.

July 28th. John Jordan, at Mill mine, in Tuscarawas county, legs injured by fall of coal.

July 28th. Peter Kellicer, at Elm Run mine, in Stark county, head injured by fall of coal.

August 8th. Michael Deviney, at Foster mine, in Mahoning county, leg broken by fall of slate.

August 20th. Thos. Wales, at Standard mine, in Belmont county, injured by fall of slate.

September 3d. Saml. Davis, at Bustard mine, in Jefferson county, eyes injured by a premature blast.

September 12th. John Barnett, at Akron mine, in Guernsey county, back and hips injured by fall of coal.

September 24th. Wm. Pinglaize, at Allen mine, in Carroll county, arm broken by fall of coal.

October 3d. Matthew Slinger, at Elm Run mine, in Stark county, hip out of place by fall of slate.

October 9th. Jasper Pennell, at Zaleski mine, in Vinton county, leg broken by fall of coal.

October 18th. Christ. Stebbins, at Clinton mine, in Wayne county, foot crushed by fall of slate.

October 20th. Wm. Kreitger, at Garfield mine, in Stark county, run over by cars and leg broken.

November 7th. Henry Brigham, at Lake View mine, in Summit county, collar bone broken by fall of coal.

November 13th. Thos. Thomas, at Excelsior mine, in Medina county, injured by fall of slate.

November 15th. James McNarlan, at Kelly mine, in Lawrence county, back broben by fall of slate.

REVIEW OF THE MINING LAW.

It is found that some of the important provisions of the Mining Law are rendered inoperative from lack of provision being made for their enforcement. Under section 292, the Chief Inspector is required to keep a record of the "number of accidents, injuries received, or deaths, in or about the mines (and for this purpose, every person having charge of any mine, whenever loss of life occurs by accident connected with the working of such mine, or by explosion, shall give notice thereof, forthwith by mail or otherwise, to the Inspector of Mines, and to the coroner of the county in which such mine is situated, who shall hold an inquest upon the body of the person or persons whose death has been caused, and inquire carefully into the cause thereof, and shall return a copy of the finding and all the testimony to the Inspector)," etc.

It is important that if statistics of this kind are to be gathered they should be, as nearly as possible, correct. It would be of interest to compare the proportion of accidents, fatal or otherwise, to the tonnage of coal mined in this State, with that of other states giving similar statistics. As the law now stands it is found that many accidents occur of which no account ever reaches this office. The coroners of the counties, in many instances, neglect, entirely, to send copies of their verdicts in cases of death, and, in numerous cases, persons having charge of mines wherein accidents have occurred, have failed to notify the Inspector of the facts in the case. In fact, much of the information, in this respect, gathered for this report, has baen derived from the press or from accidental meetings with persons who were cognizant of the facts, and narrated them to the Inspector, who at once wrote to the proper persons to send statements of the cases to him. In order to more fully complete this list, the Inspector, during the present year, caused to be published, in the mining papers of the State, an invitation to the miners, generally, to send to this office the names of any persons injured at any time in the mine in which they were employed, with details of the cause and nature of the accident. But few responses were received to this request, and I desire again to urge upon both miners and operators, that they aid the department, so far as in their power lies, in collecting these statistics, which are of interest to all concerned. It would be well for the General Assembly to provide means whereby compliance with this provision of the law shall be made compulsory.

Another provision of the law that has hitherto been "more honored in the breach than in the observance," is section 296 of the Revised Statutes, which provides that mine owners "shall make, or cause to be made, an accurate map or plan of the working of their mines, on a scale not less than two hundred feet to the inch, showing the area mined or excavated, and the location and connection with such excavation of the mine, of the lines of all the adjoining lands, and the name or names of each owner or owners, so far as known, marked on each tract," etc.

The employment of mining engineers is becoming more general, and while many of the operators of the State possess maps and plans of their underground workings, it is very desirable that a more general observance of this section should be brought about. The objection to it, on the score of expense, does not avail against the increased advantages derived from having an accurate survey of the mine always at hand and ready in case of emergency. In the case of a company of several partners, or stockholders, any one of them can see, at a glance, the

exact condition of his property; the area already worked over and the amount of coal still untouched. It is also a safeguard against loss or damage caused by incompetency on the part of the bank boss or superintendent. Instances have come under the notice of the Inspector where a map of the mine would have saved thousands of dollars to the owner; and in one case a large body of coal was lost, and had to be entirely abandoned, solely from this cause.

Again, in case of an explosion, whereby brattices are blown out, doors thrown down, air-courses demolished, and the whole interior working of the mine changed or subverted, without a correct plan of the mine, the usefulness of an Inspector, howsoever competent, would be very materially lessened, and it is questionable whether a competent miner or bank boss, familiar with the course of the galleries and passages, would not be of far greater service in saving life and property than the most experienced mine Inspector, under the circumstances.

The same section provides that, "when any mine is exhausted or abandoned, and before the pillars are drawn in any portion of the mine, the owner or agent thereof shall cause to be made, a correct map of such mine, showing the area and working of the same, to the day of abandoning, or drawing pillars for the purpose of abandoning, and file such map, within ninety days thereafter, at the office of the county recorder in the county where such mine is located," etc.

This provision is intended to guard against the danger arising from new mines breaking through into old workings that may have been abandoned for years, and are standing full of noxious gases, from the escape of which great danger may ensue to the lives of all engaged in the new work. This is a highly important matter to both mine owners and miners, but it is doubtful if the labor of the county recorders has been made at all burdensome by the maps of abandoned mines deposited with them to file.

Were mine owners to keep maps of their working mines, in accordance with the provisions of the first part of this section, these maps could be filed with the county recorders, on abandoning the mine, without additional expense, and would be all the law requires.

In cases where no maps or plans of the mine are kept, the Inspector is authorized to direct such maps to be made; and if not made within sixty days from such notice, the owner or agent of such mine is liable to a fine of five dollars for each and every day until such map be made. It is hoped that mine owners, generally, may see the necessity for these maps, and that the department may not be compelled to resort to legal measures in this matter.

Section 293 invests each District Inspector with "all the powers and authority of county auditors, as sealers of weights and measures in the different counties of this State; * * * * * but said Inspectors shall exercise said authority in connection with weights and measures, only at mines in their respective districts."

This provision met with the universal approbation of the miners of the State, and supplied a long felt want in this direction. The question of the correctness of the mine scales of the State has long been a source of trouble and irritation between employers and employed, and it was expected that this provision would greatly tend to an adjustment of the difficulties arising from this source. Requests have come to the District Inspectors, from various mines in the State, to have the mine scales inspected and corrected, if found to be out of order.

While the department has been desirous to do all possible to be done, under this section, it has been, so far, unable to carry out this wise provision of the law, from two causes.

First. The appropriation made for the contingent fund of the District Inspectors was found to be inadequate to their needs. To inspect mine scales properly requires the use of some thousand pounds of weights, which must be transported, in many cases, several miles, where the mines are not continguous to the railroad stations. This would require the hiring of conveyances, at considerable expense, which the contingent fund at their disposal would not warrant. An increase in their contingent fund has been asked for the ensuing year, partially on this account.

Again, in order to properly equip the District Inspectors to inspect mine scales, it is provided that, "they shall be entitled to receive, on payment therefor, from the secretary of State, the same copies as is provided by section 143 of the Revised Statutes to be furnished to county auditors," etc.

These copies come in sets, and the secretary of State is not authorized to break a set or sell a part of one. A set consists of liquid measures, dry measures, and measures of length, as well as of weight, and costs $115. The District Inspectors have no use for any of these measurse, other than large weights. The only large weight in a set is *one* of fifty pounds, and is not sufficient for the purpose of testing mine scales, and if it were sufficient, the cost of a set of copies to each District Inspector would be greater than he could ever expect to have reimbursed him by his fees as sealer of weights and measures.

A proper outfit for testing large scales consists of from ten to twenty United States standard weights, of fifty pounds each, that are sealed by

United States weigher. Ten of these can be purchased for $22.50 a set, and I suggest that a special act of the General Assemby, authorizing the purchase of a set of proper weights for each District Inspector, to be the property of the State, would render operative one of the best and most desirable provisions of the Mining Law, now a dead letter, for the reasons above assigned.

Two sources of danger to men employed in mines, worked by shaft or slope, have been noticed, that are also well worthy the attention of the General Assembly.

The first is the placing of boilers and hoisting machinery in too close proximity to the shaft or slope. Too much stress cannot be placed upon the danger to those working below, arising from the risk of fire among the buildings at the mouth of the pit. This is particularly the case with shafts. The necessary timber structure over the shaft becoming in time dry, and soaked with oil in many places, is exceedingly inflammable, and in hot dry weather a spark might cause a conflagration that would prove fatal to all in the mine below. Many shafts in the State employing large numbers of miners are not yet sufficiently developed to come under the statutory provision for a second opening. In such a case, with the only means of escape shut off by fire, with the shaft choked by falling timber, and with the smoke and gases from the fire above going with the air current down the shaft and through all the workings, the chances for life among the imprisoned miners would be but few indeed. It would seem that no argument is necessary to prove this proposition. The appalling loss of life from this cause by the Avondale disaster in Pennsylvania, a few years ago, and a very narrow escape from a similar accident, in a shaft with but one opening, in this State, coming under the notice of the Chief Inspector this year, lead me to suggest that the distance of all boilers and machinery from the mouth of the pit, be in future regulated by statute.

The second source of danger referred to is in the cases of slopes and engine planes, which are also used as traveling ways by men employed in the mine. It has been found that in many instances the distance from the track to the side of the slope, or plane, is barely sufficient to permit the passage of a person between the wall and the car in motion on the track. From the speed at which cars are run in some places but little time is afforded to seek safety or shelter from an approaching car, and an accident, fatal or otherwise, could scarcely be avoided in the event of the breaking of a rope or a part of the machinery. Much, if not all, risk from this cause could be avoided were refuge places provided

at proper intervals in the sides of such slopes, or planes, where parties exposed to such danger could stand safely until it had passed.

Section 301 provides for the hanging of doors, used in directing the air current, so that they will shut of their own accord. Many instances have been found where, through ignorance on the part of the boss or manager, the doors are not so hung; and in one case a door was noticed that opened *with* the air current. Any practical miner knows that a door that does not open *against* the current is not a very reliable agent as a means of directing ventilation. In many mines, particularly in those working on the single entry plan, many of the doors most important in directing the course of the air are those through which men and teams are constantly passing. Men in passing through these doors are frequently not careful to see that they are properly closed after them, and drivers, too often, in going into a room or entry, for a car, prop the door open and allow it to remain so until their return. Should a car leave the track, or any other occurrence happen to detain him, the door stands open for a period shorter or longer, as the case may be, and during all this time the miners and others inside of the door, and particularly those farthest from the intake, where the air is foulest, are deprived of the air current so necessary to their welfare, and which should be as nearly constant as possible, to carry away the natural gases as fast as they generate. The main object of the mining law is to secure proper ventilation, and this object cannot be attained unless the strictest care is exercised in keeping all important doors closed. In mines generating fire-damp, carelessness of this sort would be simply criminal, and should so be dealt with. In all cases a trapper (or door boy) should be placed at every door used for directing the air current, and through which persons and teams are frequently passing, whose duty it should be to open the door on their approach, and to close it promptly after their passage, and to see that it is kept closed in the interim.

Allusion has been before made to the ready and cheerful compliance made in most cases to the requirements of the law and to the suggestions and directions of the Inspectors. I regret to say that a few instances have been met with where a resort to legal measures has been necessary to enforce the provisions of the statute. In some cases the cost to the State, of such enforcement, has been greater than the fine imposed upon the offender, and this fact, while detrimental to the efficiency of the department, is at the same time a source of encouragement to such as will not comply with the statute, except under compulsion. I beg leave to suggest that the penalty provided by section 6871

be made not less than $50, instead of "not more than $50," as it now reads.

In this connection (while it does not properly belong to this department), I desire to remark, that in visiting mines where steam boilers are employed, the attention of myself, as well as of the District Inspectors, has been drawn to the many cases where old, worn out, and weak boilers are in use. Great danger to life and property must necessarily exist where this neglect is permitted, and it is truly wonderful that accidents from this source are not more frequent about the mines, as well as elsewhere. Some steps should, in my judgment, be taken to insure State supervision in this matter. At present, the only safeguard is that derived from the inspection of boilers made, from time to time, by the agents of insurance companies doing business in the State.

VENTILATION.

All mines coming under the Statute are required to have some artificial means of ventilation. It is singular to observe the many different ideas of what constitutes artificial ventilation. In some instances, a small basket filled with burning coal and hanging at the bottom of the air shaft is deemed sufficient; while in many cases no attempt has yet been made to increase the air current beyond that afforded by natural means. It is expected that great improvement will be manifested in the latter cases during the ensuing year.

The gases most commonly met with in coal mines are: Carbonic acid gas, known among miners as black damp; carbonic oxide, or white damp; carbureted hydrogen, or fire-damp, and sulphureted hydrogen. Of these the most frequent in the mines of Ohio is carbonic acid, or black damp. In Jefferson, Jackson, and some few other counties, fire-damp exists, but not in sufficient quantities to necessitate the general use of safety lamps. Mines where it is found are, of necessity, among the best ventilated mines in the State. Being of less specific gravity than atmospheric air, it floats near the top of the workings, next the roof. Having neither taste nor smell, it is difficult to detect it when it appears in mines that have previously been considered free from it. The experienced miner, however, can, by shading his lamp with his hand, clearly distinguish it, when in sufficient quantity, floating upon the air as oil upon water. It exudes from the wall of coal in blowers, and comes up in bubbles through the water on the floor of rooms or entries. It has been frequently known to burst forth in large quantities where a concealed body of it has been suddenly met and liberated in the workings, and has fouled the air-courses, for great distances, in

a short space of time. I have stood on the gangway, in the pitching veins of the Anthracite region, where the air was as pure as upon the surface, when a fall of coal taking place in a breast has liberated the gas and forced it down upon the gangway, and in an instant the gauze of the safety lamp has filled with the blue flame, indicating the presence, all round, of the deadly damp. Persons in the act of inhalation at the time an explosion takes place, and drawing the flame into their lungs, never recover, even though the explosion be ever so slight. After an explosion, and the slaughter and havoc occasioned thereby, comes the still more dangerous after damp. Nothing can live in it, and those whom the explosion has spared, make haste to get to a place of safety. With stoppings, doors, and brattices destroyed, with the course of the air current changed, or the current itself annihilated, obliged to grope about in the dark, the poor miner is as liable to rush headlong into fresh dangers as to escape from those which surround him.

No person who has not witnessed the devastation caused by explosions of fire-damp can form any idea of the immense and terrible power for destruction that lies lurking in the hidden recesses and dark corners of the underground workings where it is known to exist. Too great care cannot be exercised in mines where it is found, as witness the terrible calamities by explosion during the present year in Virginia and Pennsylvania. In one instance in Pennsylvania, it appears that the terrible loss of life was due to a want of care in keeping closed a door, whereby the air current was deranged and the death-bearing atmosphere came in contact with a lamp, with results most appalling. The cause of the Pocahontas disaster seems to be as yet unaccounted for. Many theories have been advanced in regard to it, none of which are entirely satisfactory. Where fire-damp exists the carelessness of one man endangers the lives of all in the mine; and it is astonishing how reckless men become from constant contact with this insidious gas. An explosion occurred in a mine with which the writer was connected, that cost the lives of thirteen men. No cause could be assigned for the accident at the time. A boy in charge of a door was among the dead, and about a year afterward, in cleaning up the gutter near where his body was found, his safety lamp was found *opened*. Here then was an explanation of the calamity. He had opened his lamp, probably to light his pipe, and the lives of twelve men, with his own, paid the penalty of his temerity. There are miners in this State that will remember the occasion here referred to.

Competent bosses should be employed, and the strictest care and closest oversight should be exercised in all mines where this dangerous

gas is known to exist; and so far as known this is the case in all mines in Ohio, where fire-damp is found, and it is hoped that our State may continue in the future, as she has done in the past, free from any great calamity from this cause.

As before remarked, the gas most frequently met with in the mines in Ohio is carbonic acid, or black-damp. This gas is readily known when met, as the lamp burns feebly, and where it exists in sufficient quantities, is extinguished. It is produced by the breathing of men and animals in the mines, and by the combustion of lamps, and powder. It generates most freely in old and abandoned workings, and in the goves in places that are still in active operation. All old workings should, if possible, be bratticed off from the new work, so that this gas may be prevented from escaping and mixing with the purer air circulating through the working parts of the mine. In working a new mine in proximity to one that has been worked out, great care should be exercised also to avoid breaking through into the old works and liberating the gases that may have accumulated therein. In the ordinary course of ventilation the fresh air from the outside becomes sufficiently contaminated before going into the outlet, without being further poisoned from causes that in most cases can be avoided at little expense. This gas is heavier than air and lies on the floor of the mines. From its weight and inertia it is difficult to remove when it is allowed to accumulate in any great quantity.

Carbonic oxide, or white damp, is also found in coal mines, although, so far, but two instances of its presence in this State have come to my notice. It is rather lighter than air, and is known by its peculiar odor. Lamps sometimes burn well where it exists, and the miner is frequently overcome by dizziness or fainting before he is aware of its presence.

Sulphureted hydrogen is somewhat heavier than air, and is thrown off by decomposition in old workings, especially in veins where much sulphur exists in the coal. It is readily distinguished by its odor, resembling rotten eggs.

NATURAL VENTILATION.

Having thus briefly considered the nature of the gases to contend with in coal mining, let us now notice the means we possess for removing them.

There are two general methods of ventilation, viz.: Natural and artificial. The statute in Ohio does not recognize natural ventilation in mines coming within its scope, yet many of them still adhere to this "trust to luck" system.

The theory of ventilation by natural forces is, that the air in the mine becoming rarified and heated to a greater degree than the air outside, will rise through the air-shaft, or outlet, and its place be supplied by fresh air at the inlet. This theory is entirely correct in cold weather. On hot, close and sultry days, however, the course of the air is reversed and the outlet draws down; and during days of variable external temperature the air in such mines goes backward and forward, or, as the miners say, "baffles" so that but little ventilation ensues. Under ordinary circumstances, and where no gases exist, this system generally affords sufficient ventilation in winter. In no case does it do so in summer. In one mine I visited, even on a cold day in winter, one could tell when the wind rose or fell outside over the air-shaft, by the increased current in the mine below. Where black damp is found in any quantity it is safe to say that it cannot be removed by natural ventilation.

ARTIFICIAL VENTILATION.

This may be divided into furnace and mechanical ventilation. Of these the furnace is most generally in use in Ohio, and the results obtained are in most cases satisfactory. In many instances, however, the furnace is entirely inadequate in size for the duty demanded of it. A furnace requires constant attention, and the neglect of the fireman in keeping up the fires is soon apparent in the decreased volume of air circulating in the mine, and the air current will fluctuate more or less from this cause. Better results are obtained from furnaces in deep pits than in shallow ones, owing to the increased height of the volume of rarified air ascending from the pit.

In erecting furnaces care is not always taken to make them large enough to accommodate the increasing wants of the mine consequent upon its future development, and very frequently the usefulness of a furnace is impaired by the upcast shaft being smaller in sectional area than the intake to the furnace. It cannot be expected that air, after being increased to double its volume by passing over the furnace fire, can be conducted with the same facility through an opening smaller than it occupied when cold and condensed. Air-shafts should, in all cases, be equal in area to the return air course of the mine. Instances have been met with in drift openings, where the furnace was provided with a chimney on the outside, where the area of the return was from thirty-six to forty feet, and the area of the stack through which the heated air passed did not exceed twelve feet. Airways are also found that vary in size at different points, thus increasing the friction and

retarding the current. To be safe the practical working capacity of an air course should be calculated at the point of its smallest area.

When the pump shaft is used as an outlet or air-shaft, the large timber braces for the column pipe all interfere with the current and lessen the capacity of the shaft. These braces increase the friction on the air to a much greater extent than many suppose. This matter of friction is often lost sight of by many mine bosses and does not sufficiently enter into their calculations of the resistance to be overcome to insure proper ventilation. In fact, eight or nine-tenths of the power employed in ventilating mines is consumed in overcoming frictional resistance, while the remaining one or two-tenths do the actual work of ventilation. Hence, it is proper to take advantage of every circumstance to reduce to its minimum this resistance. Each air way should be of the same area throughout, and abrupt turns in the current avoided as far as possible. The sides of air courses should be as smooth as the nature of the vein will permit, and no obstructions, such as props or braces, be permitted in them.

All these, and many other difficulties, natural and artificial, stand in the way of the proper ventilation of mines. The question arises, how are they to be overcome? While the furnace has been generally adopted in this State, there are two strong reasons against its use. The first is the danger, in mines generating fire-damp, in passing the current over the flame of the furnace, and thus exploding the gas with which it may be charged. Instances are by no means rare where explosions have occurred from this cause. This danger can be avoided by dumb drifts, or openings by which the air of the mines passes into the air shaft beyond the fire. It is questionable, however, whether this rush of cool air into the hot air of the shaft does not, by lowering its temperature, decrease the power of the furnace.

The second objection to the furnace is this: By section 297 of the Revised Statutes, every shaft, wherein over fifteen thousand square yards have been excavated, is required to have two separate and distinct outlets by which means of ingress and egress are always available to the persons employed in the mine. In almost every case in this State where there are two shafts to a mine, one of them is used as an air-shaft. The question arises, which will probably at some time have to be settled by the courts, is a second shaft, with a furnace at the bottom of it, a second outlet as contemplated by the statute? It certainly is a second outlet; but in the event of the closing of the hoisting shaft by any accident, would it be a means of escape to the imprisoned miners below? A wooden stairway could hardly be kept in the air-shaft, owing to the

danger of its being ignited and destroyed. An iron ladder would become heated to such a degree as to render it unavailable as a means of escape, even if it were possible for the men to ascend the shaft through the gases and heat from the furnace without danger from suffocation. Were the furnace fire to be extinguished, much time must be lost in doing so, and waiting for the shaft to cool and the gases to pass off. Were the buildings on top of the hoisting shaft to take fire, the smoke would draw down and go directly to the air-shaft. In this case the stythe, or in case of an explosion, the after-damp would render moments precious, and no time to be lost in rescuing the men, which, in most cases, could only be done by a rope from the top.

With these objections to the furnace as a ventilator, let us consider what are our resources in the way of

MECHANICAL VENTILATION.

There are various contrivances for ventilating mines by mechanical means, such as air-pumps, the steam jet, the centrifugal fan, and several others not necessary to mention. In many shafts in this State, the necessary current is produced by using the pump shaft as an air-shaft, and depending on the heat derived from the steam pump at the bottom to raise the temperature of the air and bring down the ascentional movement required. While this is found to be all that is desired in mines of no great magnitude, yet it would prove wholly insufficient in many of the large mines of the State.

The centrifugal fan has proved to be the best and most efficient mechanical ventilator yet introduced. There are many varieties of fans, such as the Guibal, Fabry, the Lambert, and a species of fan known as the Lemielle Ventilator. Experiments have also been made with the screw, turbine wheel, and the propeller, but prominent among them all stands the Guibal fan. Its superiority has been demonstrated in England and on the continent, and in the Anthracite region of Pennsylvania. The pitching veins of the Anthracite coal fields are probably the most difficult to ventilate in the world. Most of them are full of fire-damp, and worked with safety lamps exclusively; and as they pitch at angles varying from 30 to 65 degress, or even more, the fire-damp floats at the face of the rooms or breasts, and the miner works for the most part surrounded by the deadly element. Headings are driven between the rooms from fifteen to twenty yards apart, in order to bring the air current close to the miner, and when the room is in advance of the heading, hand fans, worked by boys, are used to dilute the gas at the face of the rooms and render its specific gravity great enough to

admit of its being brought down to within reach of the current through the heading. Large amounts of capital are invested in these collieries, and the best talent is sought, and the most experienced men are employed as superintendents and bosses. Throughout all this region the fan has superseded the furnace, and the new mining law, now before the Pennsylvania Legislature, expressly provides that, after its passage, it shall be illegal to use a furnace for ventilation in mines where explosive gases are generated. The Guibal principle is the basis upon which most of these fans are constructed, but each individual fan maker has his own idea of the minor details.

It is unnecessary to describe the Guibal fan, as a full description was given of it in the last report of this department.

Fans are of two general kinds, viz., the exhaust and the forcing fan. The exhaust fan draws the air from the mine, while the forcing fan forces it down the shaft and into the workings. Authorities differ as to the relative merits of each. It would seem, however, that the exhaust fan would have the benefit of the tendency of the heated air of the mine to ascend to assist it in its work, which the forcing fan would not obtain.

It is claimed by some that in deep pits the furnace gives better results than the fan. This is doubtful, however, as witness the general adoption of the fan in Europe, where the deepest coal pits in the world are to be found. Some of these fans are of immense size, one in England being forty feet in diameter, and moving two hundred thousand feet of air per minute. However this may be, there are no pits in Ohio deep enough to raise the question of the superiority of the fan over the furnace. A properly constructed fan of twelve feet in diameter, I venture to assert, would give more air than any mine in the State at present enjoys.

The capacity of a fan can be readily increased to conform to the increased needs of the development of the mine, by simply increasing the speed at which it runs. In this it has the advantage of the furnace, which can only be increased in power by tearing out and enlarging. The fan is not dependent upon the fireman, as is the furnace, for its regular working. Once attach a governor to the fan engine and it works along at a regular speed requiring no attention but to lubricate. Where a fan can be placed contiguous to the hoisting shaft, the steam to run it can be obtained from the boiler of the hoisting engine, and where this fortuitous circumstance exists, the economy of the fan is self-evident, as it can be run without extra expense for an attendant, and will save the coal which a furnace would consume. In other words, the ventilat-

ing of such a mine would cost only the oil required for lubrication and the necessary wear and tear.

With a fan at the top of the air-shaft, no danger would exist from the passage of fire-damp over the furnace fire, and with a wooden ladder, or stairway, in the shaft, the requirements of section 297, heretofore referred to, would be fully met, and the safety of the miners, so far as a means of escape is concerned, would be fully assured.

Fans are gradually being introduced throughout the State, but being a new idea to many, they are not being adopted as rapidly as is desirable. The operators whose mines are worked by shaft, need a fan that can be used either as an exhaust or as a forcing fan. This is because the strong current produced by an exhaust fan, in going down the hoisting shaft, freezes the guides and occasions trouble in the hoist. When the air is forced down the air-shaft the warm air passes up the hoisting shaft, and to a certain extent prevents freezing.

There are several varieties of fans in use in Ohio at present, but all are so built as to be reversible in their action if desired. The great objection, and the only one, is its first cost, which has generally been in excess of the furnace. No one can question its greater efficiency. A complete Guibal fan, made in our own State, has recently been brought to my notice, and the makers claim that, where the hoisting boilers can be used for steam, the fan, with an engine to run it, can be erected at less cost than an ordinary furnace. If such a fan can be erected for less, or even a little more cost than a furnace, as a matter of economy to operators and safety to miners, it should recommend itself to all.

CONDITION OF TRADE—LABOR TROUBLES, ETC.

The coal trade in this State during the past year has been in a very unsatisfactory condition. With the prostration in other branches of industry, the production of coal was, in the early part of the year, in excess of the demand, and prices were so low that the outlook was gloomy indeed. The miners were not generally working half time, and there was no assurance that even this rate of production could be maintained for any length of time. The question of a reduction in the price of mining began to be agitated by the operators, and as a natural consequence, labor troubles followed. The strike at Dell Roy, in Carroll county, was then in progress, and it was followed by the strike at Coalton and Wellston, in Jackson county, and the lock-out in the Hocking Valley. A number of smaller strikes and local difficulties have characterized the

business of the year throughout the State, but the labor troubles of the Hocking Valley have crowded them all into the background. The stoppage of the mines at Pomeroy, and the loss of output in the Hocking Valley, caused by the lock-out, depleted the market to some extent, and probably enabled the other districts of the State to work more fully than they otherwise would have done, but even under this decrease of production, coal mining, all over the State, with the exception, perhaps, of the Jackson county mines, has been very irregular, and uncertain throughout the year.

STRIKES.

Whilst local troubles of a minor character have been no more frequent than usual during the past year, there have been three strikes that are deemed of sufficient importance to deserve notice in this report. These are the strikes at Dell Roy and Coalton, and the lock-out in the Hocking Valley.

The strike at Dell Roy, in Carroll county, which lasted about six months, was inaugurated February 15th. It was caused by a proposed reduction of thirteen cents per ton in mining, offered by the operators. Against this the men struck, and a determined resistance was made by them. About August 15th, however, the men went to work at the operators' terms. This was followed by a reduction in price of mining, at some of the neighboring mines, to conform to the reduced rate at which the men went to work. One result, that was the outgrowth of this strike, was the formation of two coal companies, somewhat corporative in their nature, by miners of the district, These men, during their enforced idleness, united their labor, leased some coal property, and opened up and commenced working two mines. One of them, known as the Connotton Coal Co., is composed of nine miners, who have opened a drift on vein number five, which is found to be of good quality. The other, composed of twelve miners, and called the Russell Hill Coal Co., have sunk a shaft upon the Pike Run vein, at Dell Roy, which is found to be four feet and two inches thick and of excellent quality. Both these companies appear to be doing well, and to have fair prospects of success before them.

In the Coalton district, of Jackson county, the miners had been working for a year under contract, at a price for mining that was to be five cents per ton over and above that paid for mining in the Hocking Valley. This contract expired on the first of May, just at the time when a reduction in the price of mining was being asked in the Hocking Valley. The miners of Coalton were asked to sign the same contract again,

for another year, but, with the doubtful and uncertain state of affairs in the Hocking Valley, they could form no idea what the outcome might be, or what their own price for mining might become. Under these circumstances they refused to sign any contract for a year, but subsequently offered to do so for four months. To this the operators objected, and stated as their reason, that such a contract, for four months only, would expire during their fall trade and at a time when it would be very inconvenient for them to have to open up the question of wages, with all the perplexities attendant thereon. As a consequence, about the middle of May, all the miners of the Coalton district, with the exception of one mine, came out on strike. No disturbance attended the dispute, and the men quietly maintained their position during the whole time of the strike, which lasted about a month. On June 3d a mass meeting of the miners of the Coalton and Wellston districts was held, and after the transaction of some other business, a general strike of all the commercial mines in the Wellston district was ordered, commencing June 5th. These men had, so far, been working while their brethren of the Coalton district were idle. This order did not include those miners who were working in the furnace banks and supplying coal to the blast furnaces of the district. The men were now all on strike, and matters began to assume a serious aspect, so far as the general business of the district was concerned. However, the same orderly conduct was observed as had previously characterized the difficulty, and after many conferences between the men and the operators, the following proposition was submitted by the men to the operators, and by them accepted June 12th, and all resumed work, and have been working with great regularity ever since:

Basis of settlement of the differences between the miners and operators of the Coalton district Jackson county, Ohio, and adoption of rules governing the future workings of the mines and for resumption of work at once in all the mines in said district.

RULE 1. The price paid for mining shall be five cents per ton above Hocking Valley prices.

RULE 2. The miners of this district shall be free to act on all questions of a general character in such manner as may be decided upon, from time to time, by the State Miners' Association in their State Conventions; provided, that the difference in price named in the first rule shall be deemed a local question.

RULE 3. All differences of a local nature that may arise between operators and miners of any mine in this district shall be settled by the mine committee and mine boss. Should they fail to agree, the difference must be referred to a board of arbitration composed of five miners and five operators and one disinterested party, the latter to be selected by the two first named parties, the decision of the board to be final, pending arbitration work shall continue.

RULE 4. There shall be no meetings held in the mines during working hours.

RULE 5. No operator shall have control over the purchasing power of any of the miners.

RULE 6. The price paid for entry driving shall be $1.75 per yard when mining is 75 cents per ton, and when 85 cents, $2.00 per yard, and shall vibrate up and down in the same proportion, except in case there is rock or rock mixture in the bottom removed, in which event it shall be paid for at one-third more over and above the price of the top slate.

RULE 7. No mine shall be prejudiced and no miner victimized by reason of the present trouble in the Coalton district.

Signed on behalf of the miners of Coalton district:

JOHN WALL,
JOHN WYKLE,
JOSEPH SMITH,
CHAS. RITTENHOUSE,
JOHN BLANKENSHIP,

Committee.

Signed on behalf of the operators of Coalton district:

J. J. C. EVANS,
H. L. CHAPMAN,
EBEN JONES,
J. MORROW,
E. W. REDDING,

Committee.

In the mean time the difficulties continued in the Hocking Valley. Trade was very much depressed and no prospect of its improving. The miners were receiving 70 cents per ton, the usual summer price, but the mines were idle, except when an order was received for coal at at any one of them, and then it would work only long enough to fill the order. From this cause the miners were unable to work steadily, and from four to ten days' work each month became about the most they could get.

Matters remained in this condition until April 22d, on which day an address was prepared by the Columbus & Hocking Coal and Iron Co. (known as the Syndicate) and the Ohio Coal Exchange, which was submitted to their miners, and also posted up through the district. This address alluded to the depressed state of the trade, and stated that in other mining districts, coming in competition with the Hocking Valley, the price of mining had been reduced so materially that the Hocking Valley operators were no longer able to meet them in prices and closed as follows:

"If we are to hold our trade, keep our mines in operation, and give our employees work during the coming season, we must have our mining

for 60 cents per ton until September 1st. We ask you to call a meeting and give us your answer by Monday the 28th. Contracts are being closed every day and Hocking is not securing them."

No action was taken upon this address by the miners, further than to discuss its merits among themselves, until April 30th, when, at a meeting of miners held in Columbus, an address was issued to the general public, giving their arguments and reasons against a reduction in the price of mining, and asking the Syndicate and Coal Exchange to withdraw their notice of reduction. This address was signed by the Executive Board and the President, Vice-President and Secretary of the Ohio Miners' Amalgamated Association.

Next day, May 1st, a general convention of the miners of the district was held at Straitsville, and after transacting some other business, the question of the address issued by the operators, April 22d, was taken up, and upon motion, it was resolved to indefinitely postpone any consideration of the question of agreeing to any reduction.

A suggestion was made at the meeting by President McBride, that a committee be appointed to meet a committee of the Syndicate and see if some measures could not be devised by which the furnaces and furnace mines of the Valley could be set to work. Such committee was appointed, and upon May 8th the two committees met. Articles of agreement, drawn up by the Miners' Association, upon which it was thought these mines could be started, were presented to the Syndicate, and after a long and good-natured discussion, the following agreement was entered into:

MUTUAL AGREEMENT BETWEEN THE OPERATORS AND THE MINERS OF DISTRICT NO. 1 OF THE O. M. A. A., ENTERED INTO THIS NINTH DAY OF MAY, 1884, AT NEW STRAITSVILLE, PERRY COUNTY, OHIO.

ARTICLE 1. All miners employed in furnace mines shall receive the same rate per ton, for mining, and the same price per yard, for entry driving, as the miners working in commercial mines. All other rules regulating prices for different kinds of work, as well as the system of working mines throughout this district, shall be rigidly observed, and should a violation of said prices, or system, take place, either by the operator or miner, said violation shall be investigated by a joint committee, consisting of three representatives of both parties, and if possible, an amicable settlement arrived at. Failing in this, however, the miners may, if they so desire, stop all furnace mines by giving one week's notice. Said joint meeting shall be held within one week from the time of said difference.

ARTICLE 2. In all cases, when commercial mines suspend work for the purpose of adjusting the price of mining, the price paid for mining shall be maintained in al

furnace mines until an adjustment is arrived at by the commercial mines. After a settlement is made, however, prices shall be uniform throughout the district.

ARTICLE 3. During a suspension of work in commercial mines, the furnace mines shall continue working, provided that all coal mined, excepting nut and pea coal, shall be used for no other purpose than that of supplying the furnaces with which the mines are connected.

ARTICLE 4. Should a strike be inaugurated in this district, the miners working in commercial mines shall, after the expiration of two weeks, be entitled to an equal share of the work performed in furnace mines.

ARTICLE 5. In selecting miners to work in furnace mines, we would recommend that no miners should be employed outside of those already under the employment of the company. The miners to be taken from those mines that are nearest to where the furnaces are located. And further, that a sufficient number of miners should be employed in said furnace mines, that will at all times enable them to make as near as practical the average wages of other mines operated by the company.

ARTICLE 6. All district rules conflicting with any of these rules are hereby repealed.

ARTICLE 7. These rules shall take effect and be in force after receiving a majority of all votes cast by the miners of District No. 1, of above rules, O. M. A. A.

All returns, for or against, to be made to the Secretary of Conference Committee.

ALEXANDER JOHNSON,
Buchtel, Athens Co., Ohio.

In behalf of the miners:

CHRISTOPHER EVANS, *Chairman*,
ALEXANDER JOHNSON, *Secretary*,
PATRICK HOLERAN,
JOHN HARDESTY,
WM. E. EVANS,
THE COLUMBUS & HOCKING COAL & IRON CO.,
By J. R. BUCHTEL, *Vice-President*.

But one furnace was working at the time, and no effort was made to start others, and eventually the men working in the furnace mines were brought out by the other miners.

From the date of this meeting, May 9th, matters progressed in a desultory way, men and operators viewing each other with distrust, and considerable irritation being engendered on both sides. It was evident that a crisis was at hand, and both parties to the dispute were daily becoming firmer in their views, and the breach between them was constantly widening.

On June 20th notices were posted at the mines of the Columbus & Hocking Coal and Iron Co., and at those of the Ohio Coal Exchange, stating that on and after Monday, June 23d, the price paid for mining

in those mines would be 60 cents per ton; and at noon of the same day all of their miners quit work. This was the first formal notice of a reduction that had been issued, and in accordance with the resolution of the Miners' Association, it met with a prompt resistance. For some two weeks after this affairs in the Valley remained in *statu quo*, with the mines and miners idle and no action of importance being taken by either side.

On July 5th, the following notice was issued by the C. & H. C. & I. Co. and the Ohio Coal Exchange:

NOTICE.

"Our appeal of April 22d for assistance in holding trade for the Hocking Valley having been rejected, and the offer of June 20th to pay 60 cents for mining being refused, we hereby withdraw our offer of 60 cents."

No offer was substituted for the one withdrawn, and on July 12th the miners of the Valley were paid off and ordered to take their tools from out the mines.

Here ended all official communication between the men and operators, and the long lockout commenced. At this date quite three thousand miners were out of employment in the Valley.

The only official action looking to a solution of the difficulty, taken after this time, was a resolution passed by a convention of miners held in Columbus, September 10th, declining, in consideration of the dull state of the trade, to ask the usual advance of ten cents per ton on mining, which had hitherto always been given September 1st. In some parts of the State this advance had already been accorded, but the miners benefited by it consented to its withdrawal, for the general good.

On July 14th two hundred and fifty Italians were brought into the Valley, from outside, under contract to work in the machine mines at $1.40 per day. These men were accompanied by a strong force of guards from the Pinkerton Detective Agency of Chicago, and were at once set to work.

Since this time men have been continually brought into the Valley from abroad and set to work in the mines under contract (a copy of which is given below, and at this writing some 1500 men, blacks and whites, occupy the places once filled by the resident miners, and about fifteen of the mines of the Valley are working with this labor.

MINERS' ANNUAL CONTRACT.

This agreement, made this 6th day of September, A. D. 1884, between the Columbus & Hocking Coal and Iron Co. of the first part and ——— of the second part:

Witnesseth: That the said party of the second part has agreed, and by these presents does agree, to enter into the employment of said party of the first part as a miner of coal, to commence on the 6th of September, 1884, and to continue therein until the 6th day of September, 1885, and to abide by, adhere to, and observe the rules and regulations promulgated from time to time by the said C. & H. C. & I. Co. for the purpose of regulating mining and other employment in and about coal mines of said C. & H. C. & I. Co., and not to be absent without leave except in case of sickness or other unavoidable contingency which would prevent him from work; also to keep his room in good working order.

The said party of the first part agrees to pay the said party of the second part for each and every ton of 2000 pounds of coal mined by him and delivered on bank cars at the face of the room where the same is mined, after it is screened over the one and one-quarter inch screen of the company, the sum of fifty cents. All payments to be made on the regular pay-day and in accordance with the rules and regulations aforesaid; and the pay-day will be on the 15th of each month for all wages or moneys the party of the second part may have earned during the last month previous to such pay-day.

And the party of the second part further agrees that he will not stop work, nor join any strike or combination for the purpose of obtaining or causing the said C.&H. C.&I. Co. to pay their miners an advance of wages or beyond what is specified, nor will he in any way aid, abet or countenance any such strike, combination or scheme for any purpose whatever during the time specified in the first clause of said contract. And if the second party shall violate any of the provisions of this contract in this regard at any time, he shall thereby forfeit all claims for coal previously mined and not paid for, and the first party be released from liability therefor.

In witness whereof the said parties have hereunto set their hands and seals the day and year first above written.

(Signatures of the company and superintendent, a witness, and the miner.)

RULES AND REGULATIONS

Adopted for the purpose of regulating mining and other employment in and about their coal mines.

1. Every employe of the company will be expected to perform a full day's work in his respective lines of employment, unless the forman of his department orders less time to be worked.

2. Any suspension of work during working hours by any portion or of all of the company's employes for the purpose of holding or attending any meeting for any purpose whatsoever, whether above or below ground, affecting operation of the company's mines, is positively forbidden.

3. The company will not deal with any committee purporting to represent any

league, organization or combination of workmen, but will deal directly with each of its employes.

5. Any employe who may have been discharged by the company, or who may leave with the consent of the company, shall receive all arrearages of pay due him at once.

6. No person will be allowed to interfere in any manner with the employer's just right of employing, retaining and discharging from employment, as provided herein, any person or persons whom the superintendent or bank boss, having charge of the mines for the time being, may consider proper, nor interfere in any way by threats or menace, or otherwise with the right of any employe to work or engage to work in any way and upon any terms and with whom he may think proper and best for his interest or the benefit of his family.

7. No employe will be permitted to fill his place by another man without the consent of the bank boss or superintendent.

8. Every employe will be paid once a month at the regular pay-day all wages or moneys he may have earned during the last month previous to such pay-day, after deducting any indebtness which such employe may owe to the company, or which the company, with the consent of such employe, may have assumed to pay to any other person.

9. It shall be the duty of every employe working in or about the mines to keep his working place in good order and repair. Any such employe who shall willfully, negligently or carelessly suffer his working place to get out of order or repair, and who shall not, upon request, immediately put the same in repair, the company may put such working place in repair at expense of the miner in the fault, and may retain the amount of such expense from the next or any future payment to which said employe would be otherwise entitled until fully reimbursed from such expense.

10. No employe, who has left the employment of the company, whether voluntarily or by discharge, will be entitled to receive any arrearages of pay due him for labor performed, whether on the regular pay-day or during the interval preceding pay-day, until he shall have put his working place in perfect working order, as required by this contract with the company. All employes leaving said employment will be requested to procure the certificate of the bank boss that they have complied with the requirements of this rule as aforesaid before making application at the company's office for final payment.

11. Any tenant of the company upon leaving its service, whether voluntary or by discharge, will not be entitled to receive any part of wages due him for labor performed until he shall have vacated the premises occupied by him and presented the keys of the same at the office.

From July 14th, when the first lot of men were brought into the Valley to replace the old hands, all the mines which were started in this manner have been guarded, day and night, by a large force composed of what are known as "Pinkerton guards," and others, employed for that purpose, from among the residents of the vicinity. The C., H. V. & T. Railroad also placed guards upon their bridges on the Monday

Creek branch of their road, and kept a patrol train running over that part of their road every night.

Hundreds of the old miners of the Valley left the district and went elsewhere, in Ohio and other states, to seek employment. A great number of those who remained found work at neighboring mines that continued working at the old prices. Most noticeable among these were the mines of the Ohio Central Coal Co., and those of Messrs W. P. Rend & Co. These mines, located at Jacksonville, in Athens county, and at Corning, Shawnee, and Straitsville, in Perry county, were filled to repletion with men. Four, or more, were placed in every room; and this work was so arranged by the Miners' Association, that all the idle miners had their just share of it by turns, and one and all contributed liberally of their earnings to the support of those who were not so employed.

On September 10th, the Ohio Central Coal Co. closed all their mines, which threw out of employment, not only the recently employed men, but their own old hands as well. Subsequently, the Rend mine, at Straitsville, was thrown idle by the refusal of the C., H. V. & T. Railroad to furnish cars for their coal. This, however, was but temporary, and in a few days this matter was adjusted and the mine resumed work. Contributions of food and money from other mining districts, from trades' unions, and the general public, came in largely for the support of the miners in this struggle, and commissaries were established all through the Valley, where weekly rations were served out to those entitled to receive them. Seldom, if ever, in the history of strikes, has such thorough organization been met with on both sides; and certainly there has never been such firm determination shown by both parties to hold out to the bitter end.

Perhaps no conflict between capital and labor has ever caused such wide-spread interest as has this of the Hocking Valley. The press, all over the land, has teemed with accounts of it, and much that is exaggerated and false has crept into their statements.

Disturbances have occurred, during the disagreement, that have been charged upon the miners, and by them credited to the guards. Without entering upon the merits of the case, it will be sufficient to make a plain statement of the facts.

On the night of August 30th, a hopper, near Straitsville, was burned, and the same night an attack was made upon the camp at Snake Hollow, in Hocking county, and a guard, named Hare, was killed.

On August 31st, a call was made upon the Governor, by the sheriff of Hocking county, for the aid of the militia to assist in maintaining the peace. That night, the Governor went himself to the Valley, and, after viewing the ground over, returned September 1st, and on September 2d, four companies of militia were sent down, under command of Assistant Adjutant General Dill. These companies were stationed at Sand Run, Longstreth, Murray City, and Snake Hollow. One of the companies, being considered in excess of the requirements of the occasion, was withdrawn September 8th. The remainder were on duty until the latter part of the month, when, there appearing no further occasion for them, they were gradually withdrawn. Those at Sand Run and Murray City were relieved September 27th. On September 29th, these were followed by those stationed at Snake Hollow, and, on October 3d, the few remaining on duty at Longstreth were discharged.

On October 11th, the coal in five mines about Straitsville and Sand Run, and in one mine at Carbon Hill, and in one at Shawnee, was found to be burning. They were all sealed up and allowed to remain shut until the fire was extinguished, which, in the worst case, was about two months.

On the night of November 5th, an attack was made upon the guards at Murray City, which was repulsed, and, on the same night, three bridges on the Monday Creek branch of the C., H. V. & T. Railroad were burned.

On ————————, the hoppers at W. A. Shoemaker & Co.'s mines near Nelsonville, were destroyed by fire.

The effect of this conflict between employers and employed has been disastrous to both parties, and far-reaching in its effects, It cannot be denied that the loss to the operators has been very heavy, and the deplorable condition of the miners needs no argument to prove. But for the assistance derived from their brethren in this State as well as from other sources, they would have been unable to have continued the struggle as long as it has lasted.

The vexed question of capital and labor is growing daily in importance, and is one that has occupied the attention of political economists for years, and will continue to do so for years to come. Many theories have been advanced towards its solution, while but few have proved of any practical value. A Board of Arbitration has been the favorite idea of many, but from local causes, this has seldom been found to give entire satisfaction.

A system has been in use in the coal regions of Eastern Pennsylvania for the last fifteen years, or more, that so far as the question of

wages is concerned, has proven eminently satisfactory, and I see no reason why it might not be adopted in the mining regions of this State. It is as follows: When first adopted, a joint committee of operators and men met and agreed upon a basis price, to be paid for mining coal and for days' wages, whenever coal sold at $2.50 per ton at the shipping point. A point was also agreed upon, below which the price paid for mining and for days' wages should never go, in any event.

With this as a basis, at the close of each month the two committees meet to arrange the price of wages for that month. This is done in the following manner: The name of every operator in the district is placed in a hat, and five names are drawn therefrom. The joint committee then wait upon the five operators, so drawn, and from their books the average price received by each for his coal, during the month, is taken. The average of these prices, received by the five, is then struck, and upon this average the wages to be paid for that month are fixed. The following, clipped from a recent paper, will perhaps show the method adopted more clearly:

"The following collieries, drawn to furnish prices of coal, sold in November, 1884, to determine the rate of wages to be paid for that month, in the Schuylkill district, make the following returns:

Girard colliery, (P. & R. C. and I. Co.)	.....	$2.42
Wadesville colliery, do	.....	2.45
Girard Mammoth colliery, do	.....	2.41
Gilberton colliery, do	.....	2.44
M. H. Gap colliery, do	.....	2.40

The average of these rates being $2.42⅖, the rate of wages to be paid for the month of November, 1884, is three (3) per cent. below the $2.50 basis."

I see no reason why some system of this nature cannot be introduced in the mining regions of Ohio. The first and only difficulty to be overcome, is in arriving at a just, equitable and satisfactory basis to start from. This once accomplished, the rest is plain sailing. This plan could be adopted by each mining section alone, for itself, or as wages in most of the districts in the State are governed more or less by those paid in the Hocking Valley, it could be adopted in the Hocking Valley alone, and wages in other parts of the State could be regulated by prices in the Valley. This plan is *known* to have worked well in practice, and is offered here as a suggestion only, but if from it should spring any method by which such difficulties as we have witnessed during the present year can in future be avoided, I shall consider the time well spent in aiding to bring it about.

FLOODING OF THE MINES AT POMEROY.

In February last the Ohio river, owing to heavy rains and the large body of snow at its head-waters, rose to a height beyond any previous record, causing immense loss to property and life, everywhere in its course. Many coal mines on its banks were flooded and thrown idle. This was particularly the case in Meigs county, at Syracuse, Minersville, Pomeroy and Middleport. These mines gave employment to upwards of five hundred men, who were thus thrown out of work for months, and compelled to seek places elsewhere, in the face of extreme stagnation everywhere in the trade. In addition to this misfortune, many of them had lost their all in the flood and were entirely destitute. Aid from a generous public, all over the land, flowed into the sufferers promptly and freely, but nevertheless, their sources of livelihood were cut off and the outlook was gloomy, indeed.

The river commenced rising early in the month, and continued rising rapidly until the highest water-mark of 1883 was passed. Many supposed that it would now certainly, soon cease, but it still rose gradually, higher and higher, until the mark of 1832 (the highest ever before known) was covered, and still rising. Eventually its height was over six feet above the mark of 1832. Some hundred and fifty houses were washed away from Pomeroy and vicinity, and upwards of five thousand people were driven out to the hills for safety. There, without food or shelter, they passed several days exposed to the inclement weather of the season. Telegraph communication was cut off, and the people, crowded together at the foot of the cliff, which rose perpendicularly above them, were unaware of any outside efforts being made for their relief. The first intimation they had that their needs were receiving consideration was when the relief boat from Gallipolis came round the bend with supplies of food and clothing.

The laboring classes, thereabouts, depend almost entirely upon the salt furnaces and coal mines for employment. The salt works were thrown idle for a long time from the effects of the flood; but the coal mines were, with a few exceptions, inundated to an extent that caused months of enforced idleness to those employed about them. These mines are all of very extended area, and have been worked for years, giving room for the reception of an enormous quantity of water, when filled to the extent that occurred on this occasion.

On February 9th, the river reached the top of the upcast at Syracuse shaft and commenced pouring into the pit. It continued flowing in for six days, or until the river had fallen so that its surface was again

below the mouth of the upcast. The slope at Syracuse was also inundated, and by the flooding of these two places nearly two hundred miners were thrown out of employment.

On May 7th the work of pumping these mines commenced. A pulseometer was put to work at the upcast shaft. This pump had an estimated capacity of 500 gallons per minute, and it worked constantly from May 7th until October 28. About the last of May, a centrifugal pump was placed in the hoisting shaft. Its capacity was reckoned at 1500 gallons per minute, and it continued pumping until September 8th. At the slope, a Dean pump, of a capacity of 500 gallons per minute, commenced to work on July 15th, and ceased August 8th. Some idea may be formed of the immense volume of water in these two mines, when it is considered that the three pumps used in clearing them had a combined capacity of 2500 gallons per minute, and the average time they worked, from commencing operations to the close, was ninety-nine days.

These mines were more or less injured by the action of the water and the washing in of debris, but not so much as might have been expected. The greatest damage was in the slope, and came from the caving in of the rock and roof in the rooms. Out of twenty-eight working places, on one entry, eighteen were irreparably ruined from this cause. Work ceased in both mines February 9th, and on October 15th about fifty men commenced work in the slope, by putting two men to a room.

At Minersville, the water entered the Williams mine February 10th. This mine is one of the most extensive in the vicinity, and gives employment to about two hundred men. The flow into the mine was constant, until the river receeded, and, as soon as admissible, efforts were at once begun to remove the water and get to work. The pump used here was an improved Blake pump, with steam cylinder 20x24 inches, and a water cylinder, 14x24. The capacity of this pump was 1600 gallons per minute, and it worked continuously until September 1st. This mine ran to a dip, and, in consequence, was able to resume work, in one part, June 1st. In the balace of the mine, however, nothing could be done before September 1st. Much damage was done to the interior of the mine by the water, and considerable expense was incurred in cleaning up and repairing after the water was taken out.

At Pomeroy, in the mines of the Pomeroy Coal Co., the damage was not as great as it was at Minersville and Syracuse. These mines were flooded to a considerable extent, but, owing to their favorable situation, a great part of the water drained off when the river fell. Four work-

ing entries were partly filled, but were pumped out in about two weeks, through a two and one-half inch pipe. They employed nearly one hundred men, who were thrown idle about one month. The fact that they were able to resume work in so short a time was owing to the flooded portion of the mine being mostly old workings, and to the dip. Nevertheless, to empty the submerged portion required about nine months' work of a pump whose capacity was reckoned at 500 gallons per minute.

WATER IN THE JUSTUS MINE.

While upon the subject of flooded mines, the following account of a sudden influx of water to the Justus shaft may not be found uninteresting. This shaft is located at Justus, in Stark county, and is operated by the Howells Coal Co. At this writing (December 15th), Mr. Howells informs me that the volume of water coming into the shaft is still as great as ever, and that their four pumps are still kept constantly at work:

"Nearly everybody in this section has heard more or less of the trouble which has been hanging over the mine mentioned above, caused by the unexpected and complete flooding of it about three months ago. The inundation was caused by the caving in of one of the rooms and the water pouring in from that opening in an uncontrollable volume. The element entered in such quantity that, although three Blake pumps of 8-inch water cylinders each were in working order at the time, in five days the entire mine was flooded and the shaft—120 feet deep—was filled to a depth of 70 feet. Then the struggle began in dead earnest for supremacy between the company and the intruding unwelcome visitor. It was the general opinion of experienced mine operators that any attempt to subdue the element would prove futile, and the advice of nearly all outsiders was that the mine should be abandoned to what seemed to be its irrevocable fate.

"In answer to a question as to the source from which such an influx could emanate, Mr. Howells said the only theory was that it came from what is known as 'sheet water,' which is supposed to lie in sand and gravel washes from fifty to sixty feet below the surface, the 'sheet' tapped in this case undoubtedly covering a pretty large bed.

"The prospect for overcoming such a body of water was anything but flattering, but Mr. Evans, President of the company, and Matt. English, the mining boss, are not the stamp of men to be overawed by even a visitation of such magnitude, and in place of sitting down, folding their hands in sorrow at the misforture and calmly watching the annihilation

of the valuable property, they accepted the challenge and 'time' was called for the contest to begin. In opposition to the enemy the company had, when the fight was properly started, five boilers manufacturing steam and five pumps at work. The capacity of these pumps was furnished us, as follows: One duplex Worthington pump having steam cylinder 18½ inches in diameter with water cylinder 14 inches in diameter, discharging a volume of water which filled an 8-inch pipe, the speed of the piston rod being about 110 feet per minute (this pump alone has the power of a large sized locomotive); one pump of the same make having a 16-inch steam cylinder, 10½ inch water cylinder and forcing out a 6-inch pipe full of water at a velocity of 120 feet of piston rod per minute, and three Blake pumps of 14 inch steam and 8-inch water-cylinder, each filling 4-inch water pipes. To convey as definite an idea as possible of the foe they had to combat, it is stated that when all these pumps were in operation, they discharged about 2,500 gallons of water per minute without cessation day and night. Mr. Howells informed us that there is no instance in history of mining in Ohio, or probably the United States, where so great a body of water was pumped out of a mine, the only case even approximating it being that of the Leadville shaft in the Mahoning Valley.

"Thus the seemingly fruitless struggle on the part of the company continued with almost disheartening progress, the water coming in almost as rapidly as it was pumped out. Had the mine been an ordinary one the probability is that no effort would have been made to pump it out; but being a fine basin, the coal of a quality unsurpassed in the market, and the mine virtually a new one, the owners decided that it should not be abandoned without a vigorous attempt at reclamation. The expense incurred in conquering the enemy was about $10,000, the part which grieved the company the most to pay being a bill of $400 for coal used last month to keep the engine and pumps working.

"At the end of three months' unceasing, patient and faithful work, victory perched upon the banner of the company, the foe being then completely under control. Before the inundation about 125 men were employed in the mine, and although the force is not yet as large as before the trouble, all that can work have had steady employment since a week ago last Thursday, and the number is being increased almost daily. The water being discharged at the present time is estimated at from 1,200 to 1,500 gallons per minute, the pumps working incessantly. As to the water being still further reduced in volume is a problem which only time can solve; it may be increased, continue as at present, until the mine is worked out, or its inflow may suddenly cease. But what-

ever turn it may take, there is no probability of its attaining ascendency again."

CONTINGENT EXPENSES.

Below will be found an account of the expenses of this department for the last fiscal year, exclusive of the traveling expenses of the district inspectors, which will be found in their own reports. Instruments were purchased for the equipment of the district inspectors. The question was raised as to the fund from which this amount should be drawn, and, after consultation with the Attorney-General, it was decided that this expense was provided for by section 295 of the Revised Statutes, and the amount ($123) was paid from the contingent fund of the chief inspector. The office was found to be deficient in works on mining, geology, etc., and the sum of thirty-eight dollars and eighty cents has been expended, from the same fund, in the purchase of late works on these subjects.

CONTINGENT EXPENSES FOR YEAR ENDING NOVEMBER 15, 1884.

On what account expended.	Amount.
Office expenses from November 15, 1883, to February 16, 1884, as per report of Inspector Roy	$40 00
Traveling expenses of Assistant Inspector, John P. Williams, from November 15, 1883, to February 16, 1884, as per report of Inspector Roy	115 40
Total	$155 40

OFFICE EXPENSES FROM FEBRUARY 16 TO MAY 1, 1884.

Date.	On what account expended.	Amount.
February.	Amount paid for postage stamps	$10 00
	" desk key	80
March.	" postage stamps	8 00
	" expressage	2 80
	" subscription to Labor Tribune	2 50
	" Pennsylvania Geological Survey	2 80
	" janitor	5 00
April.	" janitor	5 00
	" postage stamps	12 00
	" telegraphing	87
	" repairs to anemometor	1 00
	Total	$49 77

TRAVELING EXPENSES T. B. BANCROFT, INSPECTOR OF MINES, FROM FEBRUARY 16 TO MAY 1, 1884.

Date.	On what account expended.	Amount.
February.	Visiting mines in Hocking county	$31 60
March.	" Athens and Meigs counties	44 35
April.	" Lawrence, Jackson, Perry and Guernsey counties	47 85
	Total	$123 80

TRAVELING EXPENSES AUSTIN KING, JR., ASSISTANT MINE INSPECTOR, FROM FEBRUARY 16 TO MAY 1, 1884.

Date.	On what account expended.	Amount.
February.	Visiting mines in Tuscarawas and Stark counties	$32 80
March.	" Columbiana, Jefferson and Wayne counties.	35 00
April.	" Portage, Carroll, etc..	16 30
	Total	$84 10

TRAVELING EXPENSES T. B. BANCROFT, CHIEF INSPECTOR, FROM MAY 1 TO NOVEMBER 15, 1884.

Date.	On what account expended.	Amount.
May.	Visiting mines in Meigs, Perry and Summit counties	$51 50
June.	" Jackson and Jefferson counties	42 05
July.	" Guernsey, Carroll, Stark and Tuscarawas counties	40 90
August.	Visiting mines in Mahoning, Trumbull and Columbiana counties	43 10
Septem'r.	Visiting mines in Hocking, Athens and Jefferson counties	54 68
October.	" Meigs, Gallia, Perry, Hocking, and Athens counties	60 95
Novemb'r.	Visiting mines in Hocking and Perry counties	32 25
	Total	$325 43

OFFICE EXPENSES FROM MAY 1 TO NOVEMBER 15, 1884.

Date.	On what account expended.	Amount.
May.	Postage stamps	$22 00
	Janitor	5 00
	Telegraphing	80
	Repairs to anemometer	50
	Post-office key	50
	Subscription to Iron Age	4 50
June.	Postage stamps	37 00
	Instruments for district inspectors	123 00
	Janitor	5 00
	Expressage	35
	Telegraphing	43
	Ohio Geological Survey	10 00
	Columbus Directory	3 00
	Subscription to Mining Herald	2 00
July.	Postage stamps	18 00
	Janitor	5 00
	Works on mining	11 00
	Expressage	35
August.	Postage stamps	15 00
	Janitor	5 00
	Telegraphing	75
Septem'r.	Postage stamps and postal cards	25 05
	Janitor	5 00
	Safety lamp brushes	1 61
	Telegraphing	25
	Repairs to anemometer	50
	Subscription to Trade and Labor Journal	1 00
October.	Postage stamps	10 00
	Janitor	5 00
	Telegraphing	50
Novemb'r.	Postage stamps	13 00
	Janitor	5 00
	Telegraphing	1 00
	Total	$337 09

In closing this report, I desire to express my entire satisfaction with my assistants, the district inspectors. A more able or efficient force could not be desired, and I have found them intelligent and thoroughly competent for all the duties of their positions. Their relation with miners and operators, in the line of their duties, have been pleasant and cordial, and while they have firmly insisted upon a compliance with the requirements of law, they have done so in a manner to cause but little, if any, friction or irritation. It is the desire of the entire department to enforce and carry out all the provisions of the statutes, and, with that end in view, I invite the co-operation of the miners of the State in aiding to bring about the improvement designed by it. There are many

causes of complaint that are known to the workers in a mine, which an inspector might overlook or fail to notice. I shall at all times be pleased to hear from any miner in the State notifying me of any infraction of, or any grievance coming under, the statute, and their communications will receive prompt attention and be considered strictly confidential.

REPORT OF WM. DALRYMPLE, DISTRICT INSPECTOR OF THE FIRST DISTRICT.

Since assuming the duties of this office, May 1st, I have endeavored to visit and inspect all of the mines as often as it was possible for me to do so, and to examine into the condition of them in regard to air, drainage and general security. I have visited all of the mines in the district once, except such as were idle, nearly half of them twice, and a number of them three times, as their cases required. There has been considerable improvement made in the condition of the mines in this district in regard to air. On my first visit, I found a number of the mines in very bad order for want of air, but during my second visit, I found them greatly improved. A number of places are very slow in coming up to the requirements of the law, but they are gradually improving.

There have been four new mines opened in this district during the year. Two of these are in Athens county, one in Hocking county, and another in Jackson county.

Two companies have complied with the law in regard to placing safety catches on their cages, and a number of others have promised to do so just as soon as the catches can be procured. In a number of mines I have found the air courses to be entirely too small to admit of the passage of the amount of air required for proper ventilation. Air courses should never be less than thirty feet in sectional area, and, where entries are driven double, all the breakthroughs, except the last made, should be bratticed and made air-tight. Especially in rooms is neglect of this sort apparent. Breakthroughs are made one after another and never bratticed, thus allowing the air to escape without reaching the face of the working places. Many of the complaints of the miners arise from this cause. The doors on the mouths of rooms also become dilapidated and, if proper care is not taken, this will cause the air to leak before reaching the face of the entry. Another bad practice that prevails in a number of mines is that of allowing the doors on the entries to remain open. This should never be done, as it allows air to be wasted that should be distributed throughout the mine. I have notified parties of neglect in all cases where these shortcomings have been found, and have also had occasion, at different mines, to prohibit more than ten men riding on a cage at one time.

There were two shafts in this district found working more men than allowed by law, while having but one opening. One of these, Antiquity shaft, in Meigs county, was notified to reduce their force to ten men, and they have complied. The other Meadow Run shaft, in Jackson county, have not yet excavated the required amount necessary to bring them within the penalty of the law in such cases made and provided.

There have been two fans and thirteen furnaces erected in this district since I entered on my duties. It is absolutely necessary to have artificial means of ventilation in all mines. When a mine becomes extended, it is an utter impossibility to ventilate it by natural forces. In summer, when the air of the mines becomes about equal in density to that outside, there is no perceptible current, and the smoke from firing shots lies in clouds all through the working places. The furnace gives very satisfactory results, if properly constructed, and the air ways are large enough. The largest amount of air noticed by me, produced by a furnace, was at Centre Valley mine in Jackson county. This furnace was four and one-half feet wide and about four feet high above the bars.

The coal producing counties of this district are, Athens, Hocking, Jackson, Meigs, Lawrence, Vinton, Gallia and Washington.

In Athens county mining is very extensively engaged in, and in point of production it is one of the foremost in the State. Veins numbers six and seven are worked in the county. The former is very extensively worked, and covers quite ten square miles. This vein is very regular all through the county, varying from five to six feet in thickness. Owing to the long contested strike, or lockout in this mining region, the output of coal will not reach what it did last year.

Much coal is also mined in Jackson county. In fact this county possesses more mines than any other in the State. The veins worked are numbers one and two. The former is mined about Jackson, and is used largely in the manufacture of iron. The latter vein is opened and mined all the way from Jackson to Wellston. These mines lay upon the Ohio Southern and the Toledo, Cincinnati & St. Louis R'y (narrow gauge). This vein varies in thickness from two and one-half feet, near Jackson, to four and five feet at Wellston. At the latter place it is used in the blast furnaces.

In Meigs county coal is also mined to a considerable extent, but owing to the flood in the Ohio River last spring, which filled the mines with water and washed away a number of tipples, the output will not be very great this year.

In Lawrence county number five vein is mined to some extent. This vein averages about three and a half feet in thickness. A long strike in this county will lessen the production considerably this year.

In Vinton county mining is limited, but five companies working to any extent, and Gallia and Washington possess but one mine each.

The mines of this district are unusually free from fire-damp, there being but two mines in which it was noticed, viz.: Jacksonville, in Athens county, and Star Furnace shaft, in Jackson county. Both of these mines are kept in spendid condition, and wherever fire-damp appears in any of the working places, the whole available current of air is turned upon it until it disappears.

The number of mines in this district is one hundred and twenty, but many of them are shut down, some of which will probably never start again.

In this district there are 5,521 persons employed about the coal mines. Of this number, 4,747 are employed under ground and 774 outside. These are divided among the different counties as follows:

	Inside.	Outside.
Athens county	1,684	227
Jackson "	1,366	230
Hocking "	725	100
Meigs "	501	136
Lawrence "	305	41
Vinton "	177	33
Gallia "	27	4
Washington county	12	3
Total	4,777	774

Below will be found a statement of my expenses to November 15, 1884.

WM. DALRYMPLE,
District Inspector First District.

EXPENSES FROM MAY 1 TO NOVEMBER 15, 1884.

Date.	On what account expended.	Amount.
May.	Paid for expressage	$ 25
	" telegraphing	64
	" tape line	45
	" railroad fare	19 75
	" hotel bills	7 35
June.	" "	8 90
	" railroad fare	16 90
	" expressage	95
July.	" railroad fare	12 20
	" hotel bills	11 75
	" expressage	85
August.	" railroal fare	6 45
	" hotel bills	14 10
Septem'r.	" "	9 65
	" railroad fare	8 95
October.	" "	18 35
	" hotel bills	12 90
Novemb'r.	" "	2 50
	" livery	3 50
	" expressage	25
	Total	$156 64

ATHENS COUNTY.

JOHNSON'S,

Located at Nelsonville, and owned by Johnson Bros. & Patterson. It is a drift opening, and extends into the second hill, as do nearly all the mines in this vicinity. It was visited in May and found in very bad condition, for want of air. An air shaft was sunk, but the furnace was not built; it has, however, been put up since, and was all that was necessary to furnish plenty of air. The mine is well laid out,

and the roads kept in good condition. The main entry is worked double, and the east and west entries, single. Superintendent, Joseph Slater; mine boss, Thos. Johnson.

LAUREL HILL.

A drift, located about two miles from Nelsonville, on the C. H. V. & T. R'y, and operated by Guild and Pendergast. Worked by double entry and ventilated with a furnace. The furnace was not going at the time of my visit, but from the plan of working, and the places in which the doors are located, the air should be good when the furnace is fired. There is considerable water to contend with, as the workings dip in nearly every direction from the main entry. Superintendent and boss, Wm. McLeod.

SOUTH SIDE,

Located at Nelsonville, and owned by C. L. Posten & Co. It is worked on the single entry plan, and when visited was in very fair condition. A locomotive draws the coal out of the mine to a distance of half a mile, and the furnace is located near the mouth of the mine to move the smoke away from the working places. There was a good current on the main entry. C. L. Posten, superintendent, and C. Mullinger, boss.

OLD MINE,

A short distance from the South Side, and owned and officered by the same parties. With the exception of one entry, it was found in very bad order for want of air. It is ventilated by natural forces, and there were two entries very far in advance of the air. The proper persons were notified to improve its condition.

L. D.

This mine is about one and a half miles east of Nelsonville, and is operated by Lewis Steenrod. It was in good condition as to air, drainage, and general security. On my second visit, I found a furnace had been built, which caused 1,200 cubic feet of air per minute to traverse the working faces. Superintendent and boss, Wm. Halbert.

HAYBRON,

Located two miles east of Nelsonville. When visited, in May, I found there were two west entries in which all the working places were ahead of the air. On my second visit, it was improved, somewhat, but not what it should have been. I notified them to improve the condition of the air in the mine at once. The mine has recently changed hands, and it is now owned by N. Pickett. Superintendent, Fred. Dilcher, and Frank Wise, bank boss.

HAPPY HOLLOW (OLD MINE).

This is a drift opening, located at Happy Hollow, near Buchtel, and owned by the Nelsonville Coal & Coke Co. It is worked by double entry, but was in poor

condition, when visited, because of there being no furnace, and the natural forces were not sufficient for ventilation. The attention of the company was called to this fact, and a furnace has since been built. The roads were found in good order, and the general security was good. Superintendent, F. R. Allen; bank boss, J. J. Fisk.

HAPPY HOLLOW (NEW MINE).

This mine, near the above, and belonging to the same parties, when visited, was found in excellent condition for air and drainage. It is worked on the double entry plan, and ventilated by a furnace which moves 125 cubic feet of air per minute for each person employed in the mine.

NEW PITTSBURGH.

This is a slope opening, at Buchtel, and is operated by Johnson Bros. & Patterson. It has not yet begun operating, but they are getting ready. The entries are all being driven double, and all outside improvements are being erected substantially. The hopper is one of the best I have seen in the State. Superintendent, Edward Johnson; mining boss, Joseph Slater.

JACKSONVILLE.

This shaft is 135 feet deep, located on the O. C. R. R., and owned by W. P. Rend & Co. It is worked by double entry, and ventilated by a Brazil fan. It is in splendid condition in every respect. I found over 21,000 feet of air per minute in circulation, which was well distributed. This mine generates fire-damp, to some extent, but it is well watched, and the breakthroughs are kept close to the working faces. It has a great deal of water in it, but by making bale holes and sumps to hold it, the miners are enabled to almost work dry. Thos. Corcoran, superintendent, and Wm. Palmer, bank boss.

NO. 25.

This is a drift opening, at Buchtel, and the property of the C. & H. C. & I. Co. This bank is well laid off, and worked on the double entry system, with pillars six yards thick between each parallel entry. There are three outlets from this bank, besides the main entry. It is ventilated by a furnace, which produces a spendid amount of air. The roads are kept in good condition, and the drainage and general security is excellent. Thos. N. Black, superintendent, and Josiah Wells, boss.

NO. 23,

A drift, at Buchtel, also the property of the C. & H. C. & I. Co. When visited, this bank was found to be in moderate condition It is worked by double entry, and ventilated by a furnance. The furnace is rather too small for the work required. The air produced was carried all through the working faces, but there was not the amount required for the number of persons employed. It is the intention to make a breakthrough into the furnace bank and use the furnace there to assist in

ventilating this bank. This can be done in a short time, and will materially improve the air current. Thos. N. Black, superintendent, and Jno. McGinetty, boss.

NO. 21,

A drift opening, at Buchtel, and owned by the C. & H. C. & I. Co. It was found in first-class condition in every respect. One of the entries is double, and the others single. The ventilation is by furnace, and the roads are kept perfectly dry and in good condition. Thos. N. Black, superintendant, and John McGinetty, boss.

NO 31.

This mine, situated on the Monday Creek branch east of Nelsonville, is the property of the C. & H. C. & I. Co. It is worked by single entry, and ventilated by a furnace. The air was good, but might be improved by putting up some doors that would turn the current so as to conduct it more fully through the working faces. The roads were found in good order. The superintendent is George Devore.

HALL'S.

This mine, located one mile east of Nelsonville, is a drift opening. It is worked by single entry. When visited the air was very sluggish, as dependence is placed for ventilation on an adjoining mine, and the furnace was not fired up. Geo. Hall, Superintendent and boss.

BRIAR HILL,

Located on the Monday Creek branch, and operated by Ricketts & Matthews. It was found in very bad condition for want of air, it being worked by singly entry, and nearly all the working places were in advance of the air. There is no other means of ventilation than by natural force. The roadways were in good order. Superintendent and bank boss, Lewis Powell.

DOAN'S.

This mine is located at Nelsonville, and is operated by Lama & Doan. When visited it was found to be in a very poor condition. There was not enough current in any part of the mine to move the instrument. It has a furnace, but at the time of my visit there was no fire in it. It was ordered to be improved, and I was assured that steps would be taken to do so. Superintendent, J. Lama; bank boss, John Doltier.

COE HILL.

This mine is located on the Monday Creek branch about two miles from Nelsonville, and is owned by Juniper Bros. & Myers. It is worked by single entry and ventilated by furnace. At the time of my first visit, there was no fire in the furnace and the current was very feeble. Two entries were also ahead of the air some hundreds of feet, but expected to be holed through in a short time. At my next visit these entries were not working, but the balance of the working places were in good condition. Superintendent, A. Juniper; mine boss, Thos. Edgel.

GLEN EBEN.

This mine is owned by W. D. Hamilton & Co. It has two entries, which are only in a short distance. It is ventilated by natural means, and a brattice is put up near the mouth of the bank, to force the air to the face of the entries. Bank boss, Thos. Shippard.

CARBONDALE,

Located at Carbondale, and owned by the Carbondale Coal Co. It is worked on the single entry plan and ventilatied by furnace. When I visited it the mine was not in good condition, as the air course had fallen in, and the air had to circulate over the fall. On my second visit they had abandoned the entry in which the air was the worst, and the other part was nearly all pillar work. I requested the air-course to be opened so as to give as much air as possible for the time being. New works are being opened, which will be ready in a short time, when the old workings will be abandoned. Superintendent and boss, C. A. Smith.

MAPLE HILL.

This is a drift, situated east of Nelsonville, and operated by W. A. Shoemaker & Co. It is worked by single entry, and in summer ventilated by a furnace. At my first visit there was no fire, and the air was poor in nearly all the entries. On my second visit, I found an air shaft had been sunk, and the furnace fired. This being all that was necessary, the air was greatly improved. Superintendent, G. P. Marshall; mine boss, Geo. W. Snyder.

HAMLEY RUN

Is a shaft, operated by H. Will & Co., near Salina, on the C., H. V. & T. Ry. It is worked by single entry, and ventilated by a fire at the bottom of the air shaft. When I reached there the fire was not going, but it was started presently, and I found 4,500 cubic feet of air per minute. The machinery here is good, and the cages are supplied with safety catches. Superintendent, Jas. A Benson; mine boss, J. A. Finney.

GALLIA COUNTY.

CHESHIRE

Is a drift opening, two miles from Cheshire, on the O. & W. Va. Ry., owned by the Cheshire Coal Co. When visited it was found in good condition, except in one entry, which was in advance of the air course and was ordered stopped. Has been worked by single entry, but is now being started entirely on the double entry plan. Jas. Wilson, Superintendent and bank boss.

HOCKING COUNTY.

SNAKE HOLLOW.

This is a drift opening, located one mile north of Nelsonville, and operated by W. B. Brooks & Son. Eight coal-cutting machines are used in this mine. It is worked on the single entry system, and is ventilated by natural forces. It was found in very bad order for want of sufficient air. I have notified them, by letter, to improve its condition. Superintendent, W. B. Brooks jr.; mine boss, Robt. Beattie.

THOROUGHFARE,

A drift opening, owned by the same parties, and located one mile north of Nelsonville. It was inspected May 9th and found to be in good order all through. L. L. Scott, bank boss.

NO. 19,

Located at Longstreth, on the Monday Creek branch of the C., H. V. & T. R'y, and owned by the C. & H. C. & I. Co. Two drift openings are working here at present. The west side opening is worked on the single entry system, and ventilated by a furnace. The east side is worked on same system by natural ventilation. Coal-cutting machines are used in these mines. The air was found to be very sluggish and not well distributed. This is owing, in a great measure, to the injury done to the works by the carelessness of the former person in charge of the mine. Efforts are being made to improve its condition, and better results are expected in the near future. Superintendent and boss, Joseph Hemingway.

NO. 29,

Is a slope at Murray City, owned by C. & H. C. & I. Co. It was visited Oct. 29th and found in first class condition in every respect. It is worked by double entry, and has a magnificent furnace, which makes 30,000 ft. of air per minute. The machinery is excellent and in good condition. The bank is laid out with good judgment, and promises to be one of the best in the State. There is a separate traveling way, provided by an old drift from the mine. Thos. N. Black is superintendent and Wm. Black bank boss.

NO. 17,

Also owned by the C. & H. C. & I. Co., is located at Carbon Hill. It was in good order, as they work by double entry, and wherever this system is practiced, and sufficient ventilating power is provided, the mine will always be found in good condition. There are three double entries in this mine, and several outlets through old workings to the surface. These are utilized so that each entry gets its pure air from the outside through a separate opening, and all are conducted by one return air course to the furnace. Superintendent, Thos. N. Black; bank boss, W. M. Davis.

JACKSON COUNTY.

GARFIELD.

This mine is a drift, located on the T., C. & St. L. R'y, one mile from Coalton, and operated by the Southern Ohio Coal Co. It was found in good condition. The air is well distributed all through the working places. The roads are kept in the best of order and are perfectly dry. It is worked by singly entries, which are about 100 yds. apart, and the air is forced to the face of the entries by doors upon the necks of the rooms. The ventilation is by furnace. Superintendent, Jas. Redding; bank boss, Jas. J. Donahue.

CANNEL.

This is also upon the T., C. & St. L. R'y, and worked by the Jackson County Cannel Coal Co. When first inspected it was found in very bad condition. One entry was stopped because of its being too far in advance of the air, and another because of its unsafe condition. When revisited it was somewhat improved, but not as much as it might have been. Superintendent, Adam Scott, and John Crotty, bank boss.

INDIANA,

A slope opening, located on Ada switch, and operated by Drew & Wasson. It is worked by single entry and by furnace ventilation. The air is split near the slope, part going to the south and part to the north. It was in very poor condition at the time of my first visit. At the second inspection it was greatly improved, as the air was better distributed through the working places. As the south entry was too far in advance of the air it was directed to be stopped. Superintendent and mining boss, R. W. Evans.

HURD SLOPE,

Also on Ada switch, and operated by the Hurd Coal Co. Worked by single entry, and furnace for ventilation. It was in good order all through, plenty of air and good track and dry roads. J. C. Hurd, superintendent; Geo. Bartlett, boss.

HURD SHAFT,

Near the Slope, and owned by the same company. It is 50 feet deep, and the main entry is worked by entry and windway. Ventilated by a fire at the bottom of the air-shaft. It was found in fair order. I notified them to put safety catches upon the cage, and I understand they have been ordered.

M'KITTERICK.

This is a slope, at Ada switch, operated by McKitterick Bros. When first inspected it required a few doors put up on the mouths of the rooms to force the air up the entry. At a subsequent visit this had been done, but more men had been employed, and the air in circulation was insufficient. I notified them to improve it.

It is worked by single entry and is ventilated by furnace. Superintendent and boss, Jas. Harper.

MOHLER.

This is a slope, operated by M. Kessinger & Co. It is worked on single entry plan, and ventilated by a furnace. At my first visit the air was not well distributed. The air courses were filled with slate, and I directed a breakthrough to be made between the entries. When revisited, I found this had not been done, and there was no fire in the furnace. The boss, however, promised to attend to it at once. Bank boss, Solomon Brown.

ADA.

This is a drift, located at Ada switch, and operated by the Hall Coal Co. The ventilation has been greatly improved by building a furnace. The roads are kept in good condition. It is worked by single entry, the entries being about 100 yards apart. The air is forced up to the face of the entries by doors at the mouths of the rooms. Superintendent, L. W. Lake; mine boss, Patrick Hayes.

EAGLE NO. 1,

A drift, situated one mile south of Coalton, on the Ohio Southern R. R. On my first visit it was in very bad condition, but was afterward greatly improved by building a furnace. The roads also were in better condition. Superintendent, D. W. Evans, and J. H. Powell, bank boss.

EAGLE NO. 2

Is also a drift, and owned by the same company. It has two openings. The air-shaft to the second opening is nearly down, and the intention is to build a furnace and abandon the old work entirely. It is worked by single entry, and, at present, ventilated by natural forces.

HIPPEL'S.

This is a drift, located at Coalton, and worked by Hippel & Co. It was found in very bad condition, but the ventilation was very much improved by putting up a furnace and sinking an air-shaft. When last visited it was in good order, except in one entry, which was in advance of the air. Superintendent, Jno. Hippel; mine boss, Wm. Rowe.

PATTERSON NO. 1.

This is a drift, and situated at Coalton, operated by the Southern Ohio Coal Co. When last visited it had improved very much, and was in good order all through. It is ventilated by furnace, and worked on the single entry system. Jas. Redding is superintendent, and J. F. Helphinstine, bank boss.

PATTERSON NO. 2

Is located near Patterson No. 1, and the coal from both passes over one hopper. It is all pillar work, and in a short time will be abandoned. It was found in very good condition.

STERLING.

Also located at Coalton, and worked by the Southern Ohio Coal Co. It is worked by single entry, and by natural ventilation. It was found in very good condition, except in two entries, which were being driven to test the coal. The roadways were also in good condition. Superintendent, Jas. Redding; boss, Norris Cameron.

WESTERN.

A drift opening, located at Coalton, and operated by Southern Ohio Coal Co. It is worked by single entry, and natural ventilation. It was in good order all through. Only four men are employed in it at present.

DARLING NO. 1.

This mine is near Coalton, and is operated by John F. Hall. It is worked on the single entry plan, and is ventilated by a furnace. It was not in as good condition at my last visit as it had previously been, and instructions were left for its immediate improvement.

DARLING NO. 2.

Also a drift opening, and operated by John F. Hall. As with the Darling No. 1, its condition is not improving, but rather getting worse, there not being sufficient air in circulation for the number of men employed. Superintendent, J. F. Hall, and J. M. Lonberger, mining boss.

KELLY.

This mine is on the Ohio Southern R. R., near Coalton, and is worked by the Kelly Coal Co. It is ventilated with a furnace, and, when inspected, was found in excellent condition. The air was abundant and well distribeted, and the works generally were in the best of order. Superintendent, C. R. John; mine boss, Thos. Cole.

NO. 2.

This is a slope opening, on the T., C. & St. L. R. R., about one mile from Coalton. It is being worked by Jones & Morgan. It was found in good order throughout. David C. Jones is superintendent, and Joseph Harper, bank boss.

NO. 3,

Also a slope, and worked and officered by the same parties. It is worked by single entry, and ventilated by furnace. It was found in good condition in every respect. The roads are kept dry and in good shape.

JONES.

This is a shaft 60 feet deep, about one mile from Glen Roy, on the T., C. & St. L. R. R., and operated by the Jones Coal Co. It was found in good condition, with

the exception of the east entry, which was caused by the falling of a room, which cut off the air. A breakthrough had been made, however, and it was only necessary to put up a few doors and force the air to the face of the entry. Safety-catches have been ordered for the cages. Superintendent, E. T. Jones, and Wm. Moorehead, bank boss.

CENTRAL VALLEY.

A shaft, located two miles south of Wellston, on the O. S. Ry., and operated by Drew & Wasson. There has been much improvement manifested in this mine. A fine furnace has been built; the air-courses which were full of slate, have been cleaned out, a syphon has been put in, and the water drained off, so that in nearly all the working places the miners are permitted to work without trouble from this source. It is worked by double entry, and an immense volume of air circulates in all the working places. Superintendent, Wesley Evans; mining boss, John James.

COMET.

This shaft, one and a half miles from Wellston, is operated by the Emma Coal Co. It is ventilated by furnace and worked by double entry It was only in moderate condition at the time of my first visit. It has, however, gradually improved, and at my last visit I found 12,000 feet of air per minute well carried to the working places. Safety catches will be put on the cages, but there is a good stairway for ingress and egress, in a shaft 6 feet square. Peter Gallagher is Superintendent and boss.

FLUHART'S.

This shaft is located at Wellston, and is 87 feet deep. It is worked by Fluhart & Co., limited. At my last visit it was in splendid condition, there being plenty of air in all the places. It is worked by double entry, with about 6 yard pillars between the entries. Safety catches are on the cages, and a stairway in the air-shaft for ingress and egress. Superintendent, Theo. Fluhart; mining boss, John McMillan.

MILTON.

A shaft, worked by the Milton Coal & Iron Co., at Wellston. It is worked by double entry. The hoisting machinery is good, and safety catches are upon the cages. It is ventilated by furnace, and the air current was excellent. Superintendent, and boss, Vinton Pierce.

WELLSTON NO. 1.

This is a shaft opening owned by the Wellston Coal & Iron Co., at Wellston. This mine is well laid out and the entries are all worked double. The air in this shaft for a long time was very poor, owing to the furnace being used to ventilate it and Wellston No. 2. It is greatly improved, however, since the furnace has been used for this mine alone. I have directed safety catches to be placed upon the cages. Geo. A. Willige is Superintendent and boss here and at Wellston No. 2.

WELLSTON NO. 2,

Owned and operated by the same company. Great improvement has been made in this mine by sinking an air shaft 8 feet square and building a furnace. This furnace is located in No. 1, but is used to ventilate this mine, and one entry in No. 1. Entries are driven double, with a 6 yard pillar between them. The roads are kept in the best of order, and safety catches are upon one cage which is used for hoisting men.

ELIZA.

This shaft is about one mile east of Wellston, and is owned by the Eliza Coal & Iron Co. It is worked partly by double and partly by single entry. I advised safety catches on the cages, which was promptly complied with. This mine has been found in good condition whenever visited. Superintendent, Miles Jones; mine boss, Thos. McGuire.

NO. 3,

A slope, located at Corse, and worked by the Southern Ohio Coal Co. It was inspected twice and found to be in the best of order each time. It is worked by double entry and ventilated by a furnace, giving 23,000 cubic feet of air per minute. Allen Stiff is superintendent and Ebenezer Moses, bank boss.

COAL RUN NO 7.

This is a drift, worked by the Southern Ohio Coal Co. It was found in very good condition. It is worked by single entry, and depends upon the natural ventilation. The seam is cannel coal and about 14 inches thick. But 8 men are employed in the bank, as most of the coal is got by stripping it on the hill. Rees Thomas is superintendent and boss.

MEADOW RUN,

A shaft opening, located about one mile from Wellston, and operated by the Meadow Run Coal Co. This mine was visited by the chief inspector in April, and by myself in May and October. On each occasion it has been found in *very* bad condition. What little air is in the mine, is got by exhaust steam from the pump at the bottom of the shaft, and that little is not distributed at all. Neither safety catches nor covers are on the cages, notwithstanding orders to put them on were given by the chief inspector, in April last, and by myself since. There is a great deal of water in the mine. The person in charge is not a practical miner, and no attention is paid to the advice given by those who are. In fact but few mines exist in the State that are not better condition than this one. Proceedings in injunction have been commenced against the company. Thos. Cudderback has charge of this mine, and is superintendent and boss.

GLEN ROY SHAFT.

This shaft is located at Glen Roy, and operated by the Glen Roy Coal Co. It is a new opening, 92 feet deep. The entries are only in about 50 yards. It is ven-

tilated by exhaust steam at present. It has fine hoisting machinery and safety catches. Superintendent, Thos. J. Williams, of Churchill; bank boss, T. A. Evans.

MURFIN'S,

A shaft, 106 feet deep, on the O. S. R'y, 2 miles south of Wellston, and worked by Murfin & Co. This mine was in poor condition, but was remedied by putting up a ten-foot Brazil fan, which is capable of moving six times the air required by the present force. Safety catches are on the cages, and it possesses fine hoisting machinery. Both single and double entries are in use. Superintendent, H. C Murfin, and E. J. Harry, bank boss.

EMMA,

Also a shaft opening, located at Glen Roy. and operated by the Emma Coal Co. The air here has been very much improved, and is now amply sufficient and carried to all the working places. The roads are also in good condition. Safety catches have been ordered, and are expected daily. Ventilation is obtained by a furnace. Moses D. Jones is superintendent, and E. T. Davis, boss.

STANDARD,

A shaft, at Glen Roy, operated by Jones, Morgan, Armstrong & Co. On my first visit this mine was found to be in poor condition, but subsequently a furnace was built, which causes a splendid current of air to traverse the working places. The roads are in good order, and safety-catches on the cages. Superintendent, D. C. Jones; boss, D. L. Jones.

GLOBE.

This is a slope, located at Jackson, and owned by the Globe Iron & Coal Co. It is worked by single entry, and ventilated by a furnace. It was found in excellent condition whenever inspected. There is about 13,000 feet of air per minute circulating, which is split at the bottom of the slope, part going to the first west entry and part to the second and third west entries. Superintendent, E. C. Crandel, and Jno. R. Roland, bank boss.

STAR.

This is a shaft opening, located at Jackson, and owned by the Star Furnace Co. It is laid out and managed with intelligence, and is never found in any but first-class condition. This is a very difficult mine to manage, as the coal lies in basins, and it produces a great deal of water. The entries are nearly all driven in the swamps, in order to drain the rooms. Fire-damp is met with to some extent, but I have not seen any during my visits. A fine volume of air sweeps through all parts of the mine. Superintendent and boss, Henry Price.

EUREKA,

A shaft opening, at Jackson, owned by the Eureka Coal Co. The air here was not conducted to the face of the entry, but it is now very much improved, and when

last inspected, was in good condition. It works by single entry, and is ventilated by a furnace. Superintendent, J. Long; bank boss, Daniel Howe.

KYLE.

This is a slope, situated at Jackson, and worked by Kyle, Shotts & Co. It is worked by single entry, and ventilated by a furnace. L. K. Shotts is superintendent, and Jas. Kessner, boss.

NEWPORT,

A drift opening, located at Price's switch. It is worked by single entry, and with natural ventilation, and its condition is found to be poor whenever visited. Jas. Newport, superintendent and boss.

PRICE'S NO. 1,

A drift, at Price's switch, owned by Price Bros. It is worked on the single entry plan, and is ventilated by a furnace. It can only be said to be in moderate condition.

PRICE'S NO. 2.

Immediately adjoins No. 1, and is operated by the same firm. It was found in very good condition when inspected. Frank Price is superintendent, and G. A. Lonberger, boss, at both places.

CHAPMAN,

A drift, on the Ohio Southern R. R., two miles from Jackson, operated by the Chapman Coal Co. This mine works by single entry, and is ventilated by a furnace. The breakthroughs have been bratticed, and the condition of the mine greatly improved since my first visit. Volney H. Benton is superintendent, and D. R. Garterd. boss.

DIAMOND,

A drift opening, on the Ohio Southern R. R, two miles north of Jackson, operated by Chapman & Williams. On each occasion, when I visited this mine, it was idle. It is worked double entry on the main south entry, and single entry on the butts, and ventilated by furnace. It was found to be in very good order, and the roads kept in very good condition. Superintendent and boss, D. R. Williams.

SPRINGFIELD.

This is also a drift, located at Springfield switch, three miles from Jackson, and is owned by the Springfield Coal Co. At my last visit, this mine was found to be in splendid condition. The roads were dry and in good order, and plenty of air swept through the working faces. It is worked on the single entry system, and is ventilated by a furnace. Superintendent and bank boss, John Hayes.

FORREST,

A drift, at Springfield switch, worked by the Forrest Coal Co. It was found in very poor condition, but a furnace was built, and everything is now in good shape. It is worked single entry, and the roads are in good condition. Superintendent, H. L. Summers; bank boss, Wm. Brady.

WORTH.

This drift is also located at Springfield switch, and is operated by M. Kessinger & Co. This mine is worked by single entry, and is well laid out. I advised the building of a furnace, which was done, and it now has plenty of air. The roadways are also in good condition. Marion Kessinger is superinrendent, and W. J. Chatfield is boss.

LAWRENCE COUNTY.

LAWRENCE.

This is a drift opening, located on the Narrow Guage R. R., seven miles from Ironton. This mine has been in operation 35 years, and is driven in a distance of one mile. It is worked by single entry, and ventilated by a furnace. It was found in good condition at each visit. Superintendent and boss, Henry Pirrang.

BELFONT

Is also a drift opening, on the same railroad, and owned by the Belfont Iron Works. At my first visit the air was very sluggish, but on my next it had been greatly improved by sinking an air-shaft at the head of the main entry. It is worked on the single entry plan, and ventilated by furnace. The roadways are kept in excellent condition. Superintendent and mine boss, Thos. Harris.

OLD MILL.

This is also a drift opening, located on the same railroad, and property of the New York and Ohio Iron & Steel Co. It was found in splendid condition in every respect. Single entry system, and furnace ventilation. Superintendent and boss, John Phillips

KELLY.

This mine is a drift, and located at Ironton, being owned by the Kelly Iron & Nail Co. It is worked by single entry, and ventilated by natural forces. The air was found to be in excess of the amount required by law, and was well distributed throughout the working places. Thos. Miller is superintendent and bank boss.

NEW CASTLE

Is situated upon the Ohio River, two and one-half miles below Hanging Rock, and owned and operated by Means, Kyle & Co. It is worked in the second, third, and

fourth hill. In the second hill, all of the entries are through to daylight, except he main entry. This was found to be too far in advance of the air, and was ordered stopped. In this hill the air was good. Quite an improvement has also been manifested in the fourth hill since my first visit. Superindendent and bank boss, John Dinkel.

AETNA ORE MINE.

This is a drift, located at Pedro, and owned by the Aetna Iron Co. The entry is only in a short distance, and is ventilated by natural means. The ore is from 6 to 9 inches thick. The entries are 7 feet wide and 5 feet high, and cross timbered on top, as the roof is very tender. The rooms are about 24 feet wide, and the roof is shot down to about 8 feet high, to give room to work in. Superintendent, A. T. Dempsey; mining boss, John Herron.

WILLARD ORE MINE.

This mine is a drift opening, situated on the Narrow Gauge R. R., at Steece, and owned by Willard & Creighton. Iron and limestone are both mined in it. The limestone is 5 feet thick, and the ore runs from 6 to 9 inches. The mine extends through the hill a distance of about 800 yards. The air was good all through the mine, and the circulation well distributed. The superintendent and mining boss is Robert Clutts.

MEIGS COUNTY.

GLOBE.

This is a drift opening, four miles below Middleport, on the O. & W. Va. R'y. It is worked by double entry and by natural ventilation; but the intention is to build a furnace at once. The roadways are kept in the best of order, and the air was found to be good, except in two of the entries which were in advance of the breakthroughs and were ordered stopped, Superintendent, J. M. Waters; mine boss, Wm. Blackburn.

DABNEY.

This mine is owned by the Pomeroy Coal Co., and is a drift, extending into the third hill, a distance of three miles. There are two parts to this mine, each worked by double entry, and ventilated by its own furnace. The air was good and well distributed, and everything was found in good order. Superintendent, Thos. Middleton; mining boss, Edmond Gregory.

PEACOCK,

Owned by the same company, is also a drift. It extends back into the third and fourth hills. It is worked by double entry, and each hill has its own furnace. The roadways are kept in the best of order, the air is ample, and carried into all the working faces, and the mine is in splendid condition in every respect. Superintendent and mine boss, Thos. Middleton.

MINERSVILLE,

Located at Minersvill and owned by the Pomeroy Coal Co. Its condition, when first visited, was not first class, owing to it having been drowned out during the flood in the Ohio river, and, at the time I was there, they were engaged in getting it once more into working order. It is worked by double entry, and is ventilated by a furnace. V. B. Horton, superintendent; Arthur Roberts, mine boss.

BUCKEYE.

This drift is located at Pomeroy, and owned by the Buckeye Salt Co. It was visited twice and found in bad condition each time, owing to the furnace being of insufficient capacity. The owners have been notified to improve its condition. Superintendent, A. D. Brown; bank boss, Wm. Joseph.

COAL RIDGE,

A drift, owned by the Coal Ridge Salt Co., and located at Pomeroy. The ventilation is natural, and when visited it was found in fair condition. Superintendent, B. M. Skinner; mine boss, D. W. Daniels.

GLENDALE,

Located at Minersviile, and owned by the Glendale Salt Co. It is a drift opening, and was found in very good order when inspected. Work is done by double entry, and ventilated by furnace. Superintendent and boss, David L. Lewis.

WILLIAMS,

Owned by Ebenezer Williams, and located at Minersville. It is a drift opening, and extends into the hill nearly two miles. All work is done by double entries, and ventilated by furnace. Although it had been flooded during the high water, it was found in excellent order, and the air well into the working faces. Superintendent, E. Williams; bank boss, T. W. Evans.

SYRACUSE.

This is a shaft, 85 feet deep, located at Syracuse, and the property of the Syracuse Coal and Salt Co. The entries are all driven double, with a pillar of 8 yards

between them. It is ventilated by a furnace, and is in good order all through. Superintendent, John Blair; bank boss, T. C. Mainwaring.

ANTIQUITY.

This is a shaft, 200 feet deep, owned by the Ohio Coal Co., and located at Antiquity. Having but one opening, their working force was reduced to ten men by the chief inspector, who visited it in May. It is ventilated by furnace, and on my visit, in June, was found in very good condition. In sinking this shaft, fire-damp was met with, but, after a salt well had been driven near by, all signs of gas disappeared. Robt. A. Slobart, superintendent.

VINTON COUNTY.

INGHAM'S.

This is a drift opening, on the C., W. & B. R'y at Ingham's switch, and owned by Pat'k McDermott. It was visited twice during the year, and found in good condition both times. Work is carried on by single entry, and the ventilation is by natural means. Superintendent, Patk McDermott, and John McDermott. boss

MOONVILLE,

Also a drift opening, situated on the C., W. & B. R. R. at Moonville, and owned by Stephen McNamara, of Zaleski. It is only in about 100 yards and but poorly ventilated, at present, owing to breakthroughs being required, which are promised in the near future.

COMSTOCK'S

Is a drift openiog, located at Hawk's Station on the Ohio & West Va. R'y, and owned by Wm. Comstock, Esq. There are two openings, the coal from each passing over one hopper. One opening is worked on the double entry plan, and has natural ventilation. It is in very good condition, except in a few rooms where breakthroughs are needed, and promised. The other opening has but one entry and no return air course. A breakthrough into the first opening is being made, whereby the air will be greatly improved. Wm. Comstock, Esq., is superintendent, and Jas. Mehaffey, bank boss.

RACCOON,

A drift opening, at Minerton, on the O. & W. Va. R'y, owned by J. L. Lawler. It was visited August 16, and found in good condition. Worked by single entry, and natural ventilation. Mining boss, Jacob Oiler.

MINE NO. 6,

A drift opening, at Zeleski, on C., W. & B. R'y, and owned by the Zeleski Co. I visited this mine three times during the year. On my first and second visits it was in very poor condition as to air, but on my last visit it was found greatly improved all through. Single entry system, and ventilated by a fire at bottom of the air shaft.

NO. 4,

Is owned by the same company, and is a drift opening. It has improved in its condition until, at present, the air is sufficient, and well distributed about the mine.

NORTH NO. 4,

Also a drift opening, and owned by the same company, was found in excellent order in every respect. The coal from all three of these mines is dumped over the same hopper. Robt. Thompson, superintendent, and T. L. Watkins, mine boss.

VINTON FURNACE.

This mine is situated on the C., W. & B. R. R., about two miles from Vinton Station, on the property of the Vinton Coal & Iron Co. It has not been worked for some years, but has recently been opened up and started by Messrs. Foreman & Whitlatch, of McArthur. At present there is no artificial means of ventilation. Entries are being driven double, and a breakthrough is being made near the face of the workings, which will be through in a short time, and after the mine gets into operation there will be no trouble with the air. It has a very good roof, and the roads are as good as could be expected, considering the time the mine has been idle. The vein is seven feet thick, and of excellent quality throughout, particularly the middle seam of the vein, which cannot be surpassed for purity. Mr. Wm. Rankin, an experienced miner, is in charge of the mine.

WASHINGTON COUNTY.

COAL RUN,

Located at Coal Run, on the Muskingum river, and owned by Harden & Keever, is a slope opening, worked upon the single entry plan, and ventilated by furnace. Mining is not very extensively carried on here, as they only employ about 15 men. The mine, however, was found in very good condition. Superintendent, Albert Harden.

REPORT OF WM. A. DAVIS, DISTRICT INSPECTOR OF THE SECOND DISTRICT.

Herewith I submit my report of the condition of the mines of this district, as found May 1st, when the present mining law went into effect, and a comparison of the results attained to November 15th. In some instances mines in the district have been visited four times; in others, where the attention of the inspector was not so urgently required, but twice. My aim has been to devote my time and attention to those places most needing inspection, and to the credit of mine owners and bosses, I must say that prompt attention has always been given to my suggestions and directions, and the work of improvement has been commenced at the earliest possible convenience. My communications with both miners and operators, in the discharge of my official duties, have been of the most pleasant character, and I trust the same friendly feeling may continue to exist in the future. I would prefer that parties knowing of any violation of the law, would send notice thereof to the Chief Inspector, at Columbus, as my duty is principally in the district, *inspecting* mines.

The opinions of mining bosses have been asked in many instances, relative to their preferences as to fans or furnaces, as means of ventilation. The fan seems to be the favorite in point of results and economy. Excellent results, however, are attained by furnaces at Shawnee Valley, Upson's, and several other places, where they have nearly 20,000 cubic feet of air per minute in circulation. Wheeling Creek, No. 1, perhaps has better results from a furnace than any other mine in the State. Without any extra effort, they are able to circulate 24,000 feet per minute around their extensive works. I am informed by the Superintendent, that he hopes to add 6,000 feet to that amount, when the furnace and stack are completed.

During the last six months there have been seventeen new mines opened in this district. Several second openings have been made to mines in the district, while in mines where previously no artificial means of ventilation existed, there have been erected twenty-two new furnaces and two ventilating fans.

Below will be found an account of my expenditures from May 1st to date.

WM. A. DAVIS,
District Inspector 2d District.

TRAVELING EXPENSES FROM MAY 1 TO NOVEMBER 15, 1884.

Month.	On what account expended.	Amount.
May.	Paid for railroad fare	$12 65
	" hotel bills	33 75
	" livery	8 00
	" expressage	25
June.	" railroad fare	11 85
	" hotel bills	25 25
	" livery	2 00
	" expressage	90
July.	" railroad fare	8 65
	" hotel bills	34 40
	" livery	8 50
	" expressage	1 00
August.	" railroad fare	18 95
	" hotel bills	28 25
	" livery	4 00
Sept'mbr.	" railroad fare	11 00
	" hotel bills	14 64
	" livery	3 00
	" expressage	25
October.	" railroad fare	14 15
	" hotel bills	29 70
	" livery	8 50
Novemb'r.	" railroad fare	6 85
	" hotel bills	14 15
	" livery	7 00
	" telegraphing	1 37
	Total	$303 51

BELMONT COUNTY.

Mining in the interior of this county was very limited until 1880, when the southern extension of the C., L. & W. R'y was completed. Since then several large coal fields have been developed, and the county now ranks as second in my district; Perry county alone leading it in annual output of coal. The product of the mines is shipped over the C., L. & W. R'y to the northern markets, to Columbus and to other cities along the line of the B. & O. R. R. to the west; upon the Ohio river south, whilst much is used by towns on the river division of the C. & P. R. R. The mines of the county are opened principally on the river vein, or No. 8, of the series. The condition of the mines, on the whole, is very good; the roadways clean, and a good current of air circulating.

ROCK HILL

Is the property of Butler & Harrison, and opened along the line of the C., L. & W. R'y, one mile north of Flushing. It is a drift opening, worked principally on the single entry plan. When first visited, in June, the working force was small, but since then the capacity of the mine has been greatly increased, under the manage-

ment of Robert Pearson. An air shaft was sunk, in May, and a furnace built in July, so that now the ventilation of the mine is good. Joseph Butler is at present the mining boss and Superintendent.

FLUSHING.

This is a drift opening. The Superintendent is John L. Davis; the mining boss, Wm. Williams. The mining law is regarded in all its details, consequently there are no complaints as to ventilation of the mine. A Murphy fan is used for ventilating purposes.

WHEELING VALLEY

Is situated two miles north of Maynard. When first visited, in June, the ventilation was deficient. Of this the owners and mining boss were promptly notified. When revisited, in September, I found the mine in a far better condition, doors having been put up, abandoned stoppings closed, and a new furnace built. H. L. Campbell is the Superintendent and boss.

MAYNARD.

This mine consists of two separate openings, about 300 yards apart, each opening being used as an intake. The return air-ways are also separate, but it is the intention of the mine boss to intersect the mines at the extreme end and there erect a fan, or a large furnace of sufficient capacity to ventilate the workings of both openings. In order to move a sufficient quantity of air around the mines until this can be accomplished, two temporary furnaces have been built near the entrance to the mine. All entries are worked on the double entry plan, with breakthroughs from 100 to 120 feet apart. The coal has, in many places, a soapstone top, and great care is exercised in timbering the entries, to evade danger to men traveling to and from their working places. J. E. Waters is Superintendent, and J. S. Humphreys, boss.

KIDD'S,

Located at Kidd's Station, on the C., L. & W. R. R., is a drift opening. The laying out of this mine was greatly interfered with by a heavy fall in the main part of the workings. This threw the main roadway off its right course and necessitated the opening of another drift. A furnace was being built when I visited the mine, in September. The mine is worked principally on the double entry system.

BARTON'S.

This mine has been opened during the past summer. When I stopped to make inquiries, in August, there was very little else than entries being worked. The product is shipped north, over the C., L. & W. R'y, to Black river and Cleveland.

WHEELING CREEK, No. 1.

This mine is superintended by J. E. Waters, and W. Neil is mine boss. Its workings are planned, perhaps, more systematically than any other mine outside of Jefferson county. Along the boundary line an entry has been driven through the solid coal, keeping a pillar of 120 feet between it and the workings of the mine, so that should a portion of the mine be closed at any time, by a fall of roof, the return airway is kept intact. The mine is worked in 400 yard sections, so that whenever a square of rooms is worked to the boundary line, the track is taken out and transferred to another section. Another decided advantage is, that there is far less timbering needed than if one entry was continued for a distance of 2,000 yards, as is sometimes the case. All entries are worked on the double entry system. On main entries, the empty cars are taken in over one entry, the full ones going out over the other, each moving the same direction as the air current. A large furnace was completed the beginning of last summer, which, when heated to its capacity, is capable of propelling 30,000 cubic feet of air per minute around the mine.

WHEELING CREEK No. 2

Is upon territory adjoining the latter mine. It is also worked on the double entry system, but a deep swale, running through the mines, interferes greatly with the workings. In some instances cross-entries have to be started on the half course, as the hill is too steep to pull empty cars up it, and too dangerous to man and mule to bring them down. Boss, H. J. Wilson.

STANDARD.

These mines are owned and operated by the Standard Iron Co., the product of the mine being consumed in their iron works at Bridgeport. The ventilation was found to be excellent. The roof of the mine (in some instances from 6 to eight feet thick) is composed of a rotten soapstone. This requires much attention to keep entries in a safe condition for men to pass to and from their work. Capt. O. Davis is Superintendent and bank boss.

ÆTNAVILLE

Is located east of the Standard mines. The product is consumed by the Ætnaville Iron Works in the immediate vicinity. The workings of the mine are kept in a good, healthy condition. It is the intention of the company to sink an air shaft at the extreme end of the workings. The furnace will then be removed to that place, where better results will be obtained than where it is at present located. All the entries are worked on the double entry system. L. Jones, Superintendent, and Wm. Herbert, boss.

LAUGHLIN'S,

Situated at Martin's Ferry, and owned by the Laughlin Iron Co. The product of the mine is consumed in their nail mill, a distance of about 800 yards from the

entrance to the mine. The coal is lowered into the mill yard over a steep inclined plane, the loaded car drawing the empty car up by its greater weight. The mine is worked by double entry. The only fault I found was in the breakthroughs being made 80 yards apart, instead of 40, as prescribed by law. I found this to be the case at several other mines in the county, but since my first visit the law has been complied with.

RAINEY'S.

This mine has been idle the greater part of the summer, from a dispute over summer prices. I have been unable to make an inspection from that cause. John Hyers is superintendent and mining boss.

BARNARD'S.

This is owned and operated by —— Barnard, and E. Jones is the bank boss. It is worked by double entry, and ventilated by a furnace of sufficient capacity to propel 5,000 cubic feet of air per minute around the workings. The roads are kept clean, sump holes being dug wherever necessary, to drain the water from the tracks.

BELLAIRE NAIL CO.

This mine, owned by the Bellaire Nail Co., is located half a mile east of the city limits. It has been in operation for many years, the coal being used by the nail works, about one mile from the mine. The ventilation and roadways are excellent. Adam Long is superintendent and bank boss.

PITTSBURGH NO. 1

Is south of Bellaire, about 1½ miles, and owned and operated by Berkershausen, Sterritt & Bros. Last spring, during the high water in the Ohio river, the mine was inundated, causing great loss to the company, not alone from the expense of pumping, and the loss through idleness, but it was found that the iron rails and miners' tools had been almost eaten up by the mixture of water with the sulphur of the mine. When I was there, in June, one side of the mine had been pumped dry. From all indications to be seen, I noticed that the workings were well arranged. Low water in the Ohio, during the summer and fall, has prevented their shipping much coal. The bank boss is John Hines.

WEGEE

Was also flooded last spring. There has been but little done since then, except pumping. The superintendent is Peter Shafer.

BELMONT NO 2.

This is a drift opening, one mile south of Bellaire. It is worked by double entry and ventilated with a furnace. This mine was also inundated by the flood of February last, but the damages were not so great as at some others. The ventilation is good, there being over 10,000 feet of air in circulation, when visited, and the furnace can increase it to 18,000 feet, if necessary. Like all other river mines, they have been unable to do much on account of low water. The mining boss is Wm. Turnbull.

BELMONT NO. 1.

This is at present operated by Heatherington & Kelley. It has been in operation for nearly 25 years. The distance to the first working place is nearly 1½ miles. The air shaft and furnace are located near the entrance of the mine, the intake being at the extreme end of the mine. The entries are worked on the double entry plan. The roadways and ventilation are in good condition. The product is consumed by two glass works in the immediate vicinity. Elmer Heatherington is the boss.

CAPTINA.

This mine is on the B., Z. & C. R'y, about 20 miles southwest of Bellaire. It is a shaft opening, owned by the Captina Coal Co. When visited the air shaft was about completed. It will be used for a time as a down cast. Steam, exhausting inside of a partition in the hoisting shaft, is used for ventilating. Jas. Buell, superintendent; bank boss, S. Fielding.

HESLOP'S,

Located 2 miles west of Bellaire, on the B. & O. R'y, and operated by Heslop & Scheck. It is a drift opeaing, worked by double entry, and ventilated by a furnace. The mine, although an old one, is kept in good condition as to roadways and ventilation. The mining boss is C. Heslop.

ROBINSON'S

Has been opened on the B. & O. R. R., a short distance from the Heslop mine. The first company failed, about two years ago, and the mine was allowed to stand idle until last May, when Mr. Robinson undertook to clean up and open it. Much trouble is found from a soft fire clay bottom in the mine. J. Robinson is the superintendent and mining boss.

KIDD'S.

This mine, located at Quincy, on the B. & O. R. R., is the property of John Kidd, of Kidd's Station. When first visited the ventilation was bad. I notified

Mr. Kidd of this fact, and he promptly built a furnace, to the great satisfaction of the miners. Jno. Kidd, superintendent, and Chas. Kidd, boss.

FRANKLIN,

Owned and operated by Messrs. Stewart & Meehan. I found the roadways and ventilation in good shape, with the exception of the entries, where breakthroughs were made at a distance of 80 yards instead of forty. On being notified, this was at once changed. Jas. Stewart is superintendent, and W. J. Williams, bank boss.

CARROLL COUNTY.

The mines of this county have been developed during the past five years, since the extension of the Connotton Valley R. R. to Sherrodsville, from Canton.

ALLEN.

This mine is located on the outskirts of Dell Roy. It is ventilated by a furnace, with very good results. J. C. Allen, superintendent, and Jas. Guy, mine boss.

RUSSELL HILL.

This shaft is the property of twelve miners who sunk a shaft forty-five feet deep, and opened out the work during the progress of the strike at Dell Roy, this year. It is now opened sufficienty to accommodate eighteen miners, and seems to be doing well.

CONNOTTON.

This mine belongs to the New York & Ohio Coal Co., and was leased by some of the miners during the strike. They are now working about eighteen miners, with fair prospects of success.

NEW HAZELTON NOS. 1 AND 2.

These are two separate openings, on each side of a ravine, near Sherrodsville. Both mines dump their product over the same tipple. They were visited about the latter part of July, but, as the strike was in progress, I made no inspection. Andrew Lee is superintendent, and J. W. Miller, boss.

WHEELING & LAKE ERIE.

This mine, owned by the Orange Coal & Iron Co., was opened last summer. The tipple is now about completed. The company expect to give employment to about fifty miners on the first of the year. John McNamar is superintendent and boss.

OSBORNE NO. 1.

This mine is owned and operated by the Osborne Coal Co., with Sam'l Madison superintendent and boss. It was inspected twice, and each time was in good condition. It is worked on the single entry plan, and is ventilated by furnace power. The coal mined is the "Strip" vein of Salineville, and is about three feet thick.

OSBORNE NO. 2.

This is also owned by the Osborne Coal Co., but was abandoned the past summer. The coal was the same as is mined in No. 1.

COSHOCTON COUNTY.

The mines of this county are, with one exception, situated on the P., C. & St. L. R. R.; that of the Morgan Bros. being on the Connotton Valley R. R.

Mining was commenced in this county over twenty-five years ago. The vein averages about 3 feet 6 inches in thickness, and is of a superior quality. There are, at present, six mines in the county, employing over ten men each. In this county there has been two air-shafts sunk, and two furnaces built since May 1st, and I am confident that in the future the mining law will be more thoroughly complied with than it has been in the past.

HARD SCRABBLE.

This mine, owned by Ricketts & Matthews, is at present superintended by John Harris. Efforts have been made, since May, to secure all the coal possible before January 1, 1885, as the distance of hauling is great, necessitating much repairs upon the roadways. Temporary changes have been made to bring it as near as possible up to the requirements of the law.

MORGAN RUN,

The property of the Morgan Run Coal & Mining Co., of Cleveland. Superintendent, Capt. J. L. Morris; mining boss, Wm. Morris. Great care has been exercised in the opening of this mine to put everything in first-class condition. The opening was commenced 15 feet below the outcrop of the coal, thus securing good drainage should any part of the mine take a dip. It also gives an advantage in easy transportation of coal from the interior of the mine to the tipple. All entries are worked on the double system.

ROCK RUN.

This is owned and operated by Messrs Harris & McNeil. It was in bad condition, in May, owing to the closing of an entry leading to the air-shaft. When

visited, in October, everything was complete, and the mine in a greatly improved condition.

COALPORT NOS. 1 AND 2.

These are both new openings, one on each side of a narrow ravine. The company are Messrs Matthews, Rickets & Barnes, of Columbus. The double entry will be adopted. Thos. Williams is in charge of the mine.

CONESVILLE,

Operated by the Davis Coal Co., and situated 7 miles west of Coshocton. The attention of the manager being drawn more to the building of a railroad to the mine, than to operating the mine, it was found deficient in ventilation when visited, in October. Efforts were then being made to sink an air-shaft, and a furnace has been built since. Mr. D. Davis, the superintendent, informed me the entries would, in future, be driven double.

GUERNSEY COUNTY.

The mines of this county are opened on No. 7*a* of the series. Its outcrop is traced north near the town of Cambridge. No. 7 is found near the bed of Wall's Creek, number 6 laying from 60 to 70 feet below. Tests made on the Barr farm, north of Cambridge, and on the McPherson farm, in the corporate limits, show it to be of a workable thickness. There are at present 12 mines in the county working a force of over ten men each.

GUERNSEY.

This mine, located on the B. & O. R. R., is owned by the Guernsey Coal Co. David Collins is in charge of the inside workings of the mine. It has been worked through the first hill, and the opening on the second is now the principal part of the mine. The second opening is being worked on the double entry plan, and as a good furnace is being built, I have no fear but that the ventilation will more than meet the requirements of the law.

CAMBRIDGE,

Owned by the Cambridge Coal Co ; W. A. Williams, Superintendent. The inside workings are in charge of Jonathan Todd, a thorough practical man. Here the first hill has been abandoned, and the workings are now in the second hill. Considerable dissatisfaction was manifested among the miners when a locomotive was put in the mine, as fears were entertained that the smoke would be conveyed to the working places. This, however, has been arranged satisfactorily, since the visit of the Chief Inspector, in April last.

SCOTT'S.

This is owned by the Scott Coal & Salt Co., and is in charge of James Wilson, a veteran mine boss, who has been in the employ of the company for many years. This mine is worked on the double entry system, and breakthroughs are made every hundred feet. Much trouble was experienced by the presence of a horseback, that for several hundred feet cut off all traces of the coal. The coal on the inside shows good quality and thickness. The mine is ventilated by a furnace, and the exhaust steam from pumps.

NORRIS.

This is a slope opening, and situated on the B. & O. R. R., 5 miles east of Cambridge, and owned by the heirs of Wm. Norris. The mine is in charge of S. P. Anderson. When visited in June, the ventilation was deficient. The attention of Mr. Anderson was called to this fact, and his promise obtained that a furnace should be built at once. When revisited sixty days later, the ventilation was found to be excellent. Considerable trouble is experienced at this mine from a horseback, running in a south-east direction, interfering greatly with the systematic working of the mine. The double entry is used almost exclusively. The machinery of the mine is in good condition, and it is probably the only mine in the State where the endless rope is used successfully.

MATTHEWS.

This mine is on the Cleveland & Marietta R. R., two miles south of Cambridge, and is the property of D. Matthews & Co. Berry Matthews, Superintendent, and Joseph Quick, bank boss. The original workings of this mine were operated by D. Nicholson, depending on teams to convey the product to Cambridge and other parts of the township. So far as ventilation was concerned, the mine was in poor condition when Matthews & Co., took it. An air shaft was sunk, in July, and preparation was made to build a furnace, when a squeeze came over the old workings and part of the new. The mine was closed in August, and no attempt has since been made to reopen.

NICHOLSON,

Owned by Ohio Coal Co, of Marietta; A. Wiper, Sr., mine boss, is located one-half mile south of the Matthews mine. The mine was, with one exception, in good condition when visited. It has been worked principally on the single entry plan. A dip on one side of the mine, and a horseback on the other, interfere with the working to a great extent. A furnace and exhaust steam from a pump are used for ventilating purposes.

FARMERS'.

This is a shaft, near Byesville, owned by the Manufacturers' Coal Co., of Cleveland. W. A. Smith, Superintendent and boss. The mine is worked on the single

entry system. The attention of Mr. Smith was called to the necessity of closing the necks of the old rooms that were broken into by the butt entries, in order to force the air to the working places. A door was also requested to be put on No. 1 entry, to turn a sufficient quantity of air into Nos. 2 and 3. On my next visit I found this had been complied with. A good traveling way has been opened. The mine is ventilated by a fan.

AKRON NO. 1

Is owned by the Wheeling & Lake Erie Coal Co.; Geo. Atherton, Superintendent, and Thompson Sowden, boss. Situated about one mile south of Byesville, on the C. & M. R'y. The mining law, in all its details, is strictly observed. The Harrison Mining Machine is used to undermine the principal part of the coal. It evidently gives good satisfaction, as they now propose to use them at

AKRON NO. 2,

A new mine, owned and operated by the same company, and superintended by the same officers. It is being opened on the double entry plan, and the machinery and apparatus for the quick handling of coal is perhaps the best in the State. It is the intention to give the mine a capacity of 2,000 tons per day.

HARTFORD,

A shaft owned by the Buffalo Coal Co., and superintended by J. E. Spaid, is on the C., N. & N. Y. R. R. When visited, in May, the mine had but one opening, and thirty days was allowed to make the second. When revisited, July 1st, the second opening was completed. It is the downcast, and is convenient for ascending or descending, by flights of winding stairs. It is ventilated by steam exhausting from a pump at the bottom of a hoisting shaft.

ROBBIN'S.

This is a new shaft opening, made during the past summer and fall. The tipple and siding will be completed by December 1st. The machinery and outside arrangements are constructed with a view of handling a large quantity of coal.

SENECAVILLE.

This is a shaft, and the property of the Seneca Coal Co.; J. M. Umstot, Superintendent. It is 150 feet deep. When sinking, the presence of fire-damp was detected, but in a small quantity. When visited in November, there was only a force of nine men at work, but it is the intention to employ 40 or 50 miners, as soon as the mine is opened sufficiently to turn rooms.

HOLMES COUNTY.

The coal fields of this county are as yet undeveloped, although a large portion of it is underlaid with coal. West of Millersburgh I was shown the outcrop of three veins. One of these was a vien of cannel coal. I was informed that a test was made of the latter a few years ago, and it was shown to be of very good quality.

BOWEN MINE.

This is the only mine in the county at present working a force of more than ten men. It is operated by Messrs. Bowen Bros., and is opened, principally, on the single entry system, but some of the entries are worked double. The mine was found to be in good condition, having room to work a force of 100 men if desired.

JEFFERSON COUNTY.

The mineral resources of this county have been given so much attention in the report of Hon. Andrew Roy, and his assistant, that it is useless to go into any further details in regard to them at present. Mr. King, prior to my appointment, had made a thorough inspection of the mines of the county. The mines in and about Steubenville are well ventilated, and ably managed. Their systematic form of working shows the result of practical and scientific training. The mines in the southeastern part of the county are, Rush Run, Kelley's, and Walnut Hill.

WALNUT HILL.

This mine was visited in June, and found to be in bad condition as to ventilation. A letter was addressed to the owners in regard to it. It was again visited, about sixty days later, but no improvement was observed. It shut down, that day, for an indefinite period. I learn that it has since been undergoing repairs, and I hope, when operations are again resumed, it may be found up to the standard.

RUSH RUN.

An injunction to restrain this company from working more than ten men was obtained by the Hon. Andrew Roy, over two years ago, and is still in force. The air shaft has not yet been completed, and the force is necessarily too small to bring it within the law.

KELLEY'S.

This mine was opened during the past summer and fall, and no inspection has yet been made of it. Wm. Leper is superintendent and boss.

GROFF.

This mine is situated on the Ohio river, above Yellow Creek Station, on the C. & P. R'y, and is operated by Nesly & Smith. When visited it was found to be very badly ventilated. Holes and rooms were open, from one entry to another, over 100 yards from the face. The furnace was entirely too small for the requirements of the mine, and the fire would not burn, for want of oxygen to support it. Instructions have been given for its improvement. Elias Roberts, superintendent and bank boss.

HIGH SHAFT.

This mine, located in Steubenville, is the property of the Steubenville Coal Mining Co., and is superintended by Mr. Wm. Smurthwait, a manager of well known ability. Some fire-damp exists in this mine, but great care is used in regard to it. The ventilation is brought about by exhaust steam and furnace, and is beyond reproach. The air is conducted through the workings by means of splits and separate returns, and is well distributed, which is the great object to be attained in mine ventilation. The general arrangement of the mine is the same as most Steubenville mines, while the roadways and everything connected with the mine are in class condition. M. B. Watson is the mining boss.

ROLLING MILL SHAFT.

This mine is operated by the Jefferson Iron Co. at Steubenville. This shaft is about 195 deep, and the working places are a mile from the bottom of the shaft. It is one of the oldest of the Steubenville mines, and was the scene of a disaster by explosion of fire-damp, June 1865, whereby nine persons lost their lives. It is well managed by an old and experienced miner, and is worked altogether on the north of England system of bord and pillar. A good current of air is maintained at the face of the workings, and all working places are examined each morning by the manager and his deputies before the men are allowed to go to their places. C. R. Thompson he superintendent and boss.

AVERICK'S.

This shaft is located about half a mile below the Rolling Mill shaft, and is operated by the Ohio & Pennsylvania Coal Co. Henry Ewing, superintendent, and William Chayter, bank boss. It is an old mine, as are most of the Steubenville mines, and is worked after the same principle as the others. It is ventilated by a furnace and exhaust steam, and its ventilation and general condition is excellent, and speaks well for its management.

BRILLIANT.

This shaft is the property of the Spaulding Iron Co., and is located at Brilliant, on the C. & P. R. R. It is 260 feet deep, and in first-class condition. Though the

shaft has been sunk for about ten years, the works are not yet very extensive, as it lay idle a long time. Everything about the mine is orderly, and shows good management. Although visited on a very warm day, the air below was as cool and refreshing as a summer breeze. John Nicholson has charge of the mine.

MUSKINGUM COUNTY.

Coal mining was practiced in this county at as early a date as in any other county in this district. The vein is of small thickness—in some instances less than 2½ feet. It is a thing of rare occurrence to find a mine with coal of sufficient height to admit of the entrance of a mule. For the purpose of hauling to and from the mines, a substitute is found in the canine race, and the burly mastiff supplies the motive power. Where the roads are level, and in good order, a dog weighing about 70 pounds is capable of drawing a small mine-car loaded with from 12 to 15 bushels of coal. Where the grade is heavier two or three dogs are hitched, one in front of the other, each one seemingly doing its best to pull its share of the load. I inquired if they did not, when wearied, become ill-tempered and baulky, but was told that cases of that kind were the exception, rather than the rule.

There are no mines in this county having a capacity of over 30 tons per day, but there are several whose capacity is less than 10 tons, of which no mention has been made. The mines in and around Zanesville are dependent for a market on the rolling mill, machine shops, and domestic trade of the city, there being but one mine shipping coal by rail, and two by river.

EBEN HARPER.

This mine is about two miles north of the city, on the rolling mill road. The mine, when visited in May, was in such bad condition that work was suspended. An air-shaft had been sunk, and a furnace was in course of construction. Since then its condition has been much improved. Eben Harper, superintendent, and L. H. Garrett, mine boss.

L. HARPER.

This mine is located on the adjoining territory, and is working a force of less than 10 men. It was it fair condition when visited, although depending on natural ventilation.

SEALHOVER'S,

Located two miles south of Zanesville, on the Marietta pike, and owned by Sealhover Bros., of Zanesville. When visited, I found one entry, where 12 miners were at work, in very bad condition. I called upon W. A. Sealhover, and asked that it be

improved at once, but, as the amount of coal would not justify the expense, that part of the mine was closed.

WHEELER'S.

This mine was found free from black-damp, as compared with other mines of the neighborhood. Nearly every entry was worked through the hill. In spring they only work from 3 to 8 men.

OWENS.

This mine is south of Zanesville, on the Muskingum river. Its coal is marketed at Marietta, and towns along the Muskingum river. There is no artificial means of ventilation, the air coming directly through the hill. It was in fair condition, but I suggested to Mr. Owens the propriety of putting a double force on the room furthest from the mouth of the mine, thus shortening the air-way, and allowing pure air to sweep through the working places. This has since been done, and proves beneficial. James Owens is the owner and boss.

PERRY COUNTY.

Perry county has, within the last ten years, become one of the leading mining counties of the state. In connection with Hocking and Athens counties, it forms the great Hocking Valley district. It is penetrated by five railroads, viz.: The Columbus, Hocking Valley & Toledo, the Straitsville division of the Baltimore & Ohio, the Ohio Central, the Cincinnati & Muskingum Valley, and the Columbus & Eastern. On all of these roads mines have been developed to a greater or less extent. Considerable iron ore is found in the hills, but in quantity far more limited than the vast coal deposits. Owing to the depressed condition of the iron trade, the furnaces, with one exception, have been out of blast for many months, with but small prospect from present indications of blowing in for many months to come.

The mines thrown idle by the strike have not been inspected. The low veins around Bristol tunnel, Ferara, and McLuney, have been given special attention, and are now in a greatly improved condition. The mines opened on the great vein were found in good condition, with few exceptions. The attention of the owners and managers of the latter was drawn to their condition, and it has been improved. Only four of the mines about Straitsville were visited before the strike commenced. These were numbers 3, 9, and 5, belonging to the Columbus & Hocking Coal & Iron Co., and Rend's Chicago mine.

No. 3, OR ROCK RUN.

This mine is opened on the double entry system. When visited, early in June, a large furnace was in course of construction. It would have, when finished, a capaci-

ty sufficient to propel 30,000 feet of air around the mine. Brice Guess is the bank boss.

NO. 5

Is composed of two openings, one on each side of a ravine, the tipple, built in the center, being used to dump the coal from both mines. I inspected the new side, and found the ventilation in fair condition. A new air-shaft and furnace was contemplated to enable them to work the extreme end of the mine, which was then idle. Job Storey is boss in the old, and Jas. W. Hepple on the new side.

NO. 9

Had been in operation but a short time prior to my visit, it having been inundated by the heavy rains of January and February. There is considerable trouble experienced from a bad top, and in many instances the floor of the mine is composed of a soft fire-clay, causing the main roadways to be in a bad condition. An air-shaft had been sunk but no furnace built. The attention of the Superintendent was called to this fact. John Sines is bank boss here.

CHICAGO,

Operated by W. P. Rend & Co; Thos. Weatherborne, Superintendent. This mine was working more than double force, the miners having places in the mine dividing their work with those formerly employed in the adjoining mines, but then thrown out of employment on account of the strike. The attention of Mr. Weatherborne was called to the necessity of placing a double door on the main entry, as the single door (being open so often to allow haulers to pass) allowed too much air to pass directly to the furnace, instead of passing around to the working places of the mine. This was promptly attended to. The roadways were in good condition.

FARQUAR.

This mine is on the B. & O. R. R., four miles south of Junction City. It is owned and operated by John Farquar. It employs less than 10 men in summer, but the force is increased to 25 in winter. The roads were found in good condition, and as every entry is worked through the hill the ventilation was good.

DAUGHERTY'S.

When visited, in June, one entry of this mine was found in very poor condition. Mr. Daugherty was notified and requested to make immediate improvement, but the company concluded it would be economy to abandon the old workings and open a new mine on an adjoining territory. The owners are Daugherty Bros; Superintendent, Phil. V. D gherty.

MATTHEWS',

Near to Daugherty's, and is operated by Ricketts & Matthews, of Columbus; Wm. Matthews boss. When first visited it was in bad condition, there being but a single entry, and no air-shaft. Prompt notice was given the company, and on our next visit we found two shafts sunk, one used for ventilation and the other a pumping shaft.

RARICK'S.

This mine, near Bristol tunnel, is owned and operated by Levi Rarick. The capacity of the furnace was insufficient to propel the necessary amount of air around the mine. It has since been greatly improved.*

SIMPSON'S,

Owned and managed by Ed. Simpson, is located one-quarter mile south of Rarick's. At the time of my first two visits this bank was idle and being repaired. The workings are principally on the single entry system. When last visited an air-shaft had been sunk at the face of the workings. A furnace was to be built in the new opening, and the old air-shaft near the mouth of the mine to be used during the winter as an intake.

DICKSON'S.

This is owned and operated by J. C. Hamilton, and is located at Dickson's Station on the B. & O. R'y. When visited in September, the old workings, inspected by the Chief Inspector in May, had been abandoned. A new entry driven through the hill, formed the main part of the workings. A good supply of air swept through the mine J. M. Foreman is the Superintendent, and Jas. N. Nye, mining boss.

UPSON'S.

This mine is in the corporate limits of Shawnee. It is operated by the Upson Coal Co.; Walter H. Upson, Superintendent, and Reese Williams, bank boss. Visited during the last week in May, and with one exception (an entry that was being driven for a direct return air way!) was in good condition, the main part being worked on the double entry plan. The mine was since fired, but I am unable, at present, to make an estimate of the damage.

XX SHIPPING BANK,

H. C. Stanwood, Receiver; W. C. Smith, Superintendent, and J. Bailey, bank boss. This is an extensive mine, employing, when visited, 160 miners. Its ventilation was not sufficient. The officers of the company were notified, and a favorable reply

*NOTE.—I found many small mines in Perry county that during the summer employ less than ten men, but on account of the Hocking Valley strike, more than double this number were employed in them. In these instances I have been lenient, allowing owners a reasonable time to better the condition of their mines, knowing that we already had too many idle miners in the district.

received, but before anything was done the mine was thrown idle by the strike. Had this not been the case it is believed the condition of the mine would have been made satisfactory.

FANNY FURNACE.

This bank is operated by the Licking Iron Co. The product, with the exception of nut and slack coal, is consumed by the Fanny Furnace. A large furnace in Shawnee Valley mine furnishes a quantity of air, more than sufficient to give 100 cubic feet for each man employed in the mine. This is distributed in such a manner as to sweep through the face of the workings, keeping them in perfectly healthy condition. The mining boss is Wm. Richards.

SHAWNEE VALLEY

Is one of the few mines whose owners find no trouble in keeping it up to the standard of the law, but seem to take pleasure in excelling it. The ventilation of the mine is excellent, its roadways faultless. A tail rope, attached to a 60-horse power engine on the outside, is used to haul the coal from the interior of the mine, a distance of one mile, to the tipple on the outside. Twenty car loads of coal makes the regular number for each trip. Thos. Phillips, Superintendent, and Lewis Jones, bank boss.

TWIN SISTERS,

Situated about half a mile from the corporation limits of Shawnee. Worked mainly on the single entry plan, with the usual drawbacks connected therewith. When visited, in May, I found no fire in the furnace. I asked that a fire be started at once, and the request was promptly complied with, and I had the satisfaction of seeing the anemometer record 9,000 feet, at 8:30 a. m. The furnace is well built, and would have a capacity of 12,000 feet if properly attended to. Wm. Wallace is the mining boss here, as well as at the

PLEASANT VALLEY.

This adjoins the Twin Sisters, and is managed by the same parties, and worked on the same principle.

NO. 21,

Owned and operated by the Ohio Central Coal Co., and located on the Buckingham branch of the O. C. R. R. The outcrop of the coal is about on a level with the valley, the coal being hoisted on cages to the tipple. Prior to my visit, the Chief Inspector had called the attention of the management to the necessity of erecting a fan or building a furnace. Some delay was experienced, but I had the satisfaction of seeing the fan shipped to the mine May 29th. The mine is worked on the double

entry plan. Since the fan was put in motion the ventilation was good, until the mine was closed in September, awaiting the result of the strike. Thos. Corcoran, superintendent, and John Byrne, mine boss.

NO. 19,

Owned and operated by the same company, is situated at Buckingham. When visited, it was in excellent condition, the anemometer recording the largest volume of air in any mine in this district (85,000 feet per minute). The workings are entirely on the double entry plan. Thos. Corcoran, superintendent, and John Nairn, mine boss.

NO. 12,

Ohio Central Coal Co., consists of an opening on each side of a ravine, the tipple being in the centre. The coal is found high up on the hill, and the covering very light. As the coal field, on both sides, is often broken by ravines, the coal cannot be worked very systematically. The mine will be abandoned the coming winter. Thos. Corcoran, superintendent, and Thos. Pirt, boss.

NO. 13,

Situated in the corporate limits of Corning, is a shaft opening. Owned and operated by the Ohio Central Coal Co. Ventilated by a Murphy fan, with good results. The double entry plan is followed exclusively. The roadways are dry and in good condition throughout. Thos. Corcoran, superintendent, and Malcolm Penman, boss.

NO. 11,

Situated in the corporation of Corning, is a shaft opening. Owned by the Sunday Creek Mining Co. This mine was purchased by this company to get access through it to an adjoining territory owned by them. At the time it was in a very bad condition from a squeeze, brought on by removing pillars with the intention of abandoning the mine. It was saved from closing by the greatest skill and vigilance. The return airway was almost entirely blockaded, but when visited, in September, I found men at work making a return airway in solid coal. This was completed when I was at Corning, in the early part of November, and the volume of air in circulation was naturally increased. C. E. Smith is superintendent and mine boss.

NO. 9,

Owned by W. P. Rend & Co., is a shaft opening. This mine has been idle, but about the middle of September a large force of men were put to work. This was unexpected by the person in charge of the mine, consequently his arrangements were not as perfect as he desired when I called on him. A force of men were put to work

at once, and the mine now ranks well with other first-class mines in the valley. Thos. Corcoran, superintendent, and Frank Corcoran, mining boss.

NO. 7,

Owned and operated by the Sunday Creek Mining Co., is situated half way between Corning and Rendville. It was found in excellent condition at both visits. The roadways, for a long distance on the main entry, are double. A furnace of good capacity is used for ventilating purposes. Fred. Miller is superintendent and boss.

NO. 5,

Owned and operated by W. P. Rend & Co., is situated at Rendville. When visited, in June, the ventilation was deficient. An attempt was being made at the time to use the ventilator in No. 3 to ventilate No. 5 also The attention of the superintendent and the owners was called to its inefficiency. Their response was prompt, and a fan was erected, since which time there has been no ground of complaint. The mine is worked mainly by double entry. The roadways and travelingways are in good condition. Thos. Corcoran is superintendent, and D. S. Williams, bank boss

NO. 3.

This mine is opened on territory adjoining No. 5, and is worked exclusively by double entry. The roadways are kept in good order, and the ventilation is above reproach. Thos. Corcoran, superintendent, and David Wilson, mining boss.

Before leaving this part of my district, I desire to say, that the owners of Nos. 8, 5, 7, 9, 11, 13, and 21, have spared no expense in putting their mines in healthy condition. In some instances there have been momentary grounds for complaint, when, for instance, the boss would be undecided about the location of an air-shaft, until an entry would reach a given point, thus sometimes being able to use one shaft for pumping and ventilating, but invariably, matters have been arranged in the end satisfactorily. A convenient travelingway is made at each place, where men can enter and return from the workings independent of the hoisting-shafts. Much saving of coal is also secured by the employing of competent mining engineers at these mines, as also at the mines of the C. & H. C. & I. Co., at Straitsville, and at other mines located at Shawnee.

It would be economy were the owners of all mines in the State to engage the services of a practical mining engineer to make a survey of their mines, at least once in three months.

FERARA.

This is a drift opening, nine miles north of Corning, on the O. C. R. R. It is now owned and managed by V. M. George. The ventilation was good each time I visited it.

TUNNEL HILL.

This is a drift, and is owned and managed by D. E. Davis. It is situated on the south side of the Moxahala Tunnel on the O. C. R. R. The ventilation is good.

TUNNEL MINE,

Owned and operated by the Lyonsdale Coal Co., and located 4 miles east of New Lexington on the C. & M. V. R'y. It is a drift opening, and like all the small mines on this road, in the neighborhood of McLuney, it generates much black damp, or carbonic acid. I ordered a shaft sunk, in May last, but, owing to being closed for want of orders, it was not completed till July 1st. M. Meenman, superintendent.

TAGUE'S TUNNEL MINE.

This is a new opening and just being developed. It is the intention of the owners to be able to develop sufficiently to make room for 100 miners. M. Tague is superintendent, and J. L. Mullen, bank boss.

OLD MINE,

Situated at McLuney Station, and owned and operated by S. & J. Jones. When visited, in May, they were suffering from a discharge of black damp on one of the cross entries. I requested Mr. Jones to build a furnace, and brattice the necks of the rooms that made connections with the old workings. When I returned, about the middle of July, I found a furnace capable of moving 8,000 to 10,000 feet of air per minute. Wm. Lucas is the mine boss.

NEW MINE,

Owned and operated by S. & J. Jones. Mr. Lucas is also boss at this place. An entry had been laid off at my last visit, and an air shaft will be sunk to connect with this entry, and a furnace put in.

THE HORN.

This is situated near Reed's Station. I complained of the condition of this mine, in May, and requested an air shaft sunk to connect with the left entry. This has since been complied with. M. & P. Tague are the owners, and Thos. West, boss.

REDFIELD NOS. 1 AND 2.

These are opened on each side of a ravine. The product is shipped over the Columbus & Eastern R. R. to Columbus. In making the opening it was driven about 12 feet wide, a portion of which was bratticed off with inch-boards, and used as a return air way; but the crumbling of the roof allowed the greater portion of the air to return before going to the working places. This is now remedied by sinking

a shaft in the face of the workings at No. 1 mine, and driving an entry from the mouth of the mine in No. 2, thus avoiding the use of the brattice. The coal is from 3½ to 4 feet thick, and of remarkably good quality. D. Davis is superintendent and mining boss.

TUSCARAWAS COUNTY.

The mines of this county are opened and worked principally on the veins known as numbers 5 and 6 of the series. Although somewhat inferior in quality to other first class coal of the State, there is a large quantity consumed annually for steam purposes on the lakes and by the railroads. The railway facilities of this county are good. Passing through it are the P. C. & St. L. R'y, the C., L. & W. R'y, Valley R'y, the C. & M. R'y, the W. & L. E. R'y, and the Tuscarawas branch of the C. & P. R'y. In addition to the coal shipped over these roads, there is a large quantity conveyed to northern markets over the Ohio canal. In addition to its coal mining interests, there are large deposits of black band ore, and hard fire clay, which is mined and shipped from the county. Much of the fire clay is used by the Dover Fire Brick Co. in the manufacture of fire brick. The good quality of the fire brick made in this county has earned for them a wide-spread reputation, and shipments of fire clay and brick have been made as far as to the Pacific coast.

PIONEER

This mine is the property of Ridgeway, Burton & Co., and is opened near the corporate limits of Mineral Point. Old openings, made years ago, have greatly interfered with the working of the mine systematically. The present boss, J. J. Klein, has greatly improved its condition by straightening the roadways and enlarging the air courses. The ventilation of the mine was found excellent at each of my visits. David Johns is the superintendent.

EMPIRE.

These mines are located two miles north of Mineral Point. They work principally by double entry. Until recently there was but one opening to the mine, it being the intention of the Superintendent to locate his air-shaft at the bottom of a swale in the mine, as soon as the first butt entry reached the spot. This has been accomplished, and will serve the double purpose of an air and pumping shaft. It is five and a half feet square, and well timbered to the rock above the coal. The machinery, roadways, and ventilation were found in good condition. E. G. Williams is Superintendent, and S. Wargen, the bank boss.

TUNNEL.

This mine has been leased to J. Brick & Co., by the Rhodes Coal Co. The small force of men employed at the mine has not been sufficient to bring it within the province of the law. Hence, no inspection has been made of it.

DAVIS.

This mine, opened within the corporate limits of Mineral Point, is a drift opening. Considerable difficulty has been experienced since the opening was made, last spring, with entries running into the dip. The bottom had been reached at my last visit, and a syphon completed for the purpose of taking the water out of the mine. The ventilation of the mine is good, a small furnace producing the motive column. Louis Wolfe is Superintendent and mine boss.

ROBERTS.

This mine is the property of Geo. Roberts. It is a new opening, made this fall. It is the intention of the company to ship the product over the C. & P. and the Valley Railways. Henry Roberts, boss.

HOLDEN'S,

Owned and operated by C. E. Holden, is situated half a mile south of Mineral Point. It is a drift, and worked mainly by single entry, and is ventilated by a furnace. When first visited the mine was in bad condition, both as to roadways and ventilation. I called the attention of Mr. Holden to this fact, and at my next visit, it was found greatly improved, and I encouraged the boss to go on with the good work. When again visited, in November, the mine was in excellent condition. The roadways had been changed, ditches dug, and matters in general were in first-class order. R. Morrison is Superintendent, and Thos. Osborne boss.

RENNIE'S.

This mine is situated two and one-half miles south of New Philadelphia, and owned and superintended by W. R. Rennie. It shows for itself that it is managed by a thoroughly practical man. It is worked principally on the double entry system. The product is shipped by the Ohio canal to Northern markets.

GOSHEN,

Located at Goshen Station, on the C., L. & W. R'y. It was visited during the summer, but was idle, and no work has been done for some weeks. It is owned by the Massillon City Coal Co., and superintended by Arthur Brown. The mining boss is John Dougal.

PIKE RUN NO. 1.

No inspection has been made of this mine, as it has been idle all the year. It is owned by the Pittsburgh & Wheeling Coal Co.

BROCK HILL.

This mine, owned and operated by the Brock Hill Coal Co., is one of the mines in this district, where perfection in ventilation and management is aimed at. It is

worked exclusively on the double entry system, and ventilated with a fan. John L. Davis is superintendent.

MONARCH,

Situated at Dennison, on the Pan Handle R'y, is owned by the Monarch Coal Co. A tail rope, attached to an engine at the tipple, draws the coal from the mines. When visited, in June, it was found to be well ventilated. Since then it has been closed for repairs. J. C. Smith, bank boss. Beneath the coal at this mine, is found a vein of potters' clay. It is about 6 feet thick. Shipments of it have been made to several points, and invariably found to be of good quality.

YORK.

This mine is situated on the C. & M. R'y, three miles south-west of Canal Dover, at Yorkville Station. It is a new mine, having been opened this year. John Joyce, superintendent, and C. Sullivan, boss.

MORRIS,

Opened some years ago by the Rolling Mill Co. of Canal Dover. Having no use for the coal after the rolling mill closed, it was allowed to stand idle until leased, the past summer, by Morris Bros. Considerable trouble has been experienced by some parts of the mine running into a dip. An entry was driven from the outside for drainage, this fall. The ventilation is fair. J. Morris, Jr., is superintendent and mining boss.

IRON ORE MINES.

There are several iron ore mines opened throughout the county, but the dull state of iron market the past year has caused but little demand for black band ore, and the majority of these mines have been idle. To the east of Wolfe's Station, on the C. & M. R'y, is the mine owned by Andrews & Hitchcock, of Youngstown. The ventilation of this mine was good when visited.

Markley's is situated to the west, about one and one-half miles from Wolfe's Station. Its ventilation was in bad condition. I notified Mr. Geo. Markley of this fact, and since then the mine has been greatly improved.

REPORT OF AUSTIN KING, JR., DISTRICT INSPECTOR OF THE THIRD DISTRICT.

Upon entering upon my duties, May 1st, the majority of the mines in this district were not found to be in good condition. This is attributed to different causes, of which the following are among the principal:

First: Inspections of the mines were only made at long intervals, sometimes once, but never more than twice, each year. The cause of this, as all who are acquainted with mining matters in Ohio well know, was that the inspecting force was too small to do its work effectually.

Secondly: Inspections being but few at any one mine, enforcement of the mining law was still more rare. But the greatest evil was that the penalty of the law was insufficient; the State always paying more to prosecute, than the parties violating the law paid in penalties, and not a few times, owing to the looseness of its construction, the parties so violating triumphed, and scorned the efforts of the inspector and the authority he represented, until the office began to fall into disrepute amongst those it was intended to benefit. The remedy is only partially supplied by the increase in the number of inspectors. The other part to do is to increase the legal penalties for violation.

Third: The want of appreciation of the natural laws governing ventilation of mines. This should properly be called mismanagement, for such it is, no matter how brought about, whether from neglect or ignorance. In a great many mines that have good furnace or fan power, the air shafts, intakes, or returns have but small sectional area, and the power is consumed, not in increasing velocity, but in overcoming unnecessary friction In one instance the area of the upcast, over which a fan was placed, was nearly 17 feet, the outlet from the downcast was 14 feet section, while the air was obliged to travel nearly two miles around the workings. Surprise was expressed by these parties that they had not good ventilation.

In other mines where they work on the entry and windroad plan, the windroad is seldom straight for more than eight or ten yards, forming, in the course of a few hundred yards, a large number of crooks and turns, amounting frequently to right, and sometimes acute angles; their section sometimes as low as eight, and seldom exceeding sixteen feet. In one instance the main return near the upcast was only eight feet section, yet the mine was working 40 men. In other mines, where fair sized intakes and returns are maintained (mines worked on double entry plan), the error of having small breakthroughs is very common, some of them having not more than 10 to 14 feet section, thus greatly contracting the volume This is done because they have to be filled up again, but the same is seen where they have not enough room for their dirt.

In another class of mines (those worked by single entry), another trouble is met, viz.; the loss of circulation caused by doors being allowed to remain open. For ex

ample, the number of doors on an entry will range from six to sixteen. It takes from two to five minutes to take a car out from a room. During this time the door of the room from which the car is being taken is left open, and the doors nearest the intake are generally left open the longest, because of the greater distance to the face of the room from which the car must be brought. The number of cars will average from four to six per day, the cars not generally holding over 900 to 1,000 lbs. It can easily be seen that in this case the rooms near the head of the entry get little or no ventilation. Another great objection to this system, and which can be applied in a limited sense to the entry and windway system, is the fact that in drawing the entry pillars no return can be had without great expense, as the mouths of the rooms and the small breakthroughs between the rooms are filled with slate and debris of the mine.

Since assuming my office, the following improvements have been made in this district:

Twelve air shafts have been sunk, seven of which constituted second openings.

Eight furnaces have been built, and six fans erected for ventilation.

Safety catches have been placed on six shafts, and safety gates hung on twelve.

Five new mines have been opened, and seven have been worked out, or abandoned.

Fire-damp is found in seven mines in this district, and the methods of ventilation are in—

Ten mines by fan;

Twenty-nine mines by furnace;

Twenty-six, by exhaust steam;

Four, by steam and furnace;

Eight by natural forces.

Local strikes have taken place in the district, but none of sufficient importance to merit special mention in this report. Below will be found a statement of my expenses to November 15.

AUSTIN KING, JR.,
District Inspector 3d District.

EXPENSES FROM MAY 1 TO NOVEMBER 15, 1884.

nth.	On what account expended.	Amount.
May.	Railroad fare	$17 70
	Hotel bills	25 25
	Livery bills	5 75
	Expressage	30
June.	R. R. fare (including 1,000-mile ticket on Penn. R. R. lines)	50 85
	Hotel bills	15 35
	Livery bills	1 25
July.	Railroad fare	5 65
	Hotel bills	28 50
	Livery bills	6 50
	Expressage	1 10
August.	Railroad fare	2 70
	Hotel bills	26 00
	Livery bills	12 50
September	Railroad fare	12 25
	Hotel bills	29 00
	Livery bills	1 50
	Expressage	30
October.	Railroad fare	22 35
	Hotel bills	27 90
	Livery bills	12 75
November.	Railroad fare	4 10
	Hotel bills	5 95
	Expressage	25
	Total	$310 25

COLUMBIANA COUNTY.

FARMERS'.

This mine is owned and operated by the Manufacturers' Coal Co. James M. Smith, superintendent and mine boss. It was inspected twice. On the first visit, in May, they were busy building a furnace, which was ordered built some weeks before; the mine, however, was not working. On the second visit the furnace was constructed, but no fire whatever in it, and the air "blowing" down the furnace shaft. The vetilation was also deficient. They were ordered to keep a fire in the furnace in order to secure a steady circulation. In the winter plenty of air is circulated by natural ventilation. They employ about 45 persons, and the coal mined is the "Big Vein" or Upper Freeport.

ANDERSON'S.

This mine is owned and operated by the Manufacturers' Coal Co. Gomer Lewis, superintendent and mine boss. It was inspected twice. On the first visit the ventilation was very deficient, and some entries were driven more than 120 feet from an airway. An air-shaft was ordered to be sunk, and other matters remedied. On the second visit the ventilation, while sufficient at the pit mouth, was very poorly distributed; many doors were useless on account of carelessness in construction, and stoppings leaked badly. The shaft was not started as ordered, and the mine was consequently enjoined in order to have them comply with the law. The coal mined is the "Strip Vein," of Salineville, or Brush Creek coal, of Pennsylvania. It averages about three feet high, and about seventy persons are employed in the mine.

HAYS'.

This mine is owned and operated by the O. & P. Coal Co. Jas. Black, superintendent, and James Watkin, mine boss. It is nearly worked out, and they have been drawing pillars for the last two or three years, and a great part has been overrun with creeps or squeezes, and a goodly portion of coal lost. This is due to insufficient pillars being left to sustain the overlying strata. The roof is very strong, and the superincumbent strata thick; the coal is also of a soft nature, and the floor is of fire-clay, from five to seven feet thick; hence, thick pillars are required, which, it appears, were not left in. Large quantities of black-damp are given off by the old workings, which makes it difficult to ventilate. The mine boss does all he can to meet and overcome this, but an extensive outlay would not be justified, as the mine will not last long. The coal mined is the "Big Vein" or Upper Freeport. About thirty persons are employed.

HUSSEY—"STRIP VEIN."

This mine is owned and operated by the O. & P. Coal Co. James Black, superintendent, and Hamilton McPherson, mine boss. When inspected they were drawing the pillars on the sides of the entry, with a view to finish it; later, however, they abandoned it for a time. Some entries had no ventilation, having no return, as the mine was formerly worked on the single entry system; a system that ought to be abolished by law.

HUSSEY—"BIG VEIN."

This mine is owned, operated, and managed by the same parties as Hussey—"Strip Vein." It is an old mine, and had been abandoned. They reopened it this summer with a view to draw all the pillars. It was inspected twice; the first time very little of the air passing in the pit mouth was circulating around the working faces. It was ordered improved so as to comply with the law. On the second visit the mine was fairly ventilated, excepting the left entry. Some doors were ordered erected, which they at once did, and the mine was since in good condition. They employ about thirty persons in the mine.

EMPIRE.

This mine is owned and operated by the Cleveland Coal Co. James Black, superintendent, and S. S. Carnahan, mine boss. It was inspected twice, and was found very deficient in ventilation each time. Suggestions were made and orders given, some of which were complied with. It was holed into the the Slope mine, but the opening was filled some eight feet in thickness with slate and fire-clay. This was ordered removed so as to constitute a second opening for the slope, which, up to this time, had not been made. This was complied with, only a thin brattice remaining so as not to derange the air-current. The coal mined is the "Big Vein," and averages about 5 feet high; some parts of this mine having been as low as 4 feet. They employ about seventy-five persons in the mine.

NEW SHAFT.

This mine is owned and operated by the Salinville Coal Co.; Samuel Madison, superintendent, and Robt. Vasey, mine boss. It was inspected twice. On May 2d an air shaft was ordered sunk within sixty days. On June 14, a strike took place which lasted ten weeks, during which time the shaft was sunk and furnace built. The air shaft is six feet in diameter and the furnace is 6 feet breadth of bar and 3½ feet high above bars. During the strike, and at the request of the superintendent, the mine was examined and considerable fire-damp was found in it. On the second visit the ventilation was greatly improved, but great leakages occurred through the stoppings between the intake and return. These were ordered plastered and made tight as possible. Some fire-damp is still giving off, and the working places are examined every morning with a safety lamp. The coal is hauled a distance of eight

hundred yards with an endless rope. The coal mined is the "Big Vein," and about 65 persons are employed in the mine.

FOSTER'S.

This mine is owned and operated by the Columbiana Coal Co. Jessie Thornton, superintendent and boss. When inspected first, large leakages were discovered through stoppings and doors, and the ventilation at the working faces was consequently deficient. This was ordered fixed, which was done, and on the second visit the ventilation was fair in all the working places. The coal mined is the "Strip Vein," or Brush Creek coal. About 35 persons are employed.

PROSPECT HILL (DRIFT).

This mine is owned and operated by Prospect Hill Coal Co., James Sutherin, Sr., superintendent, and George Sutherin, mine boss. It was visited twice, and was found in as fair condition as the system pursued would permit (single entry system). Some doors were a little out of order, and one entry driven in excess of 120 feet from an airway. These things were ordered fixed, and they cheerfully promised to comply. They employ about 50 persons in the mine. It is ventilated by furnace power.

PROSPECT HILL (SLOPE).

This mine is owned and operated by same parties as Prospect Hill drift; excepting mine boss, who is James Sutherin, Jr. It was not in good condition when inspected. The roof in the roads was very tender, and in many places fallen to a height of several feet. It is worked on the single entry system, and the doors on some of the rooms were faulty and would not close properly. The furnace was also small. They were directed to timber the roads, fix the doors, and improve the ventilation. They employ about 33 persons.

CHERRY VALLEY NO. 1 (SLOPE).

This mine is owned and operated by the Cherry Valley Iron Co. Zach. Tetlow, superintendent, and John Briggs, mine boss. It was inspected twice, and each time was found in good condition as to safety and ventilation, though the last was not quite up to the standard. Mr. Tetlow takes pride in having the mines under his charge in good condition. They mine the Lower Kittaning, or No. 5 of Newberry, and employ about 120 persons in the mine.

CHERRY VALLEY NO. 2 (DRIFT).

This mine is owned and operated by the Cherry Valley Iron Co. Zach. Tetlow, superintendent, and Joseph Tetlow, mine boss. It was inspected twice since May 1, and both times found in excellent order—nearly three times the amount of air passing that is actually required. They have a good large air shaft and furnace, the dimensions of the latter being seven feet breadth of bar and five feet above the bars.

The stoppings on the main entry are built of brick and mortar. They employ about 50 persons in the mine.

ALBERTA.

This mine is owned and operated by the Alberta Coal Co. C. V. Dibble, superintendent, and Thos. Prosser, mine boss. It was inspected, but not as fully as desired, owing to a number of shots being fired almost simultaneously. It is ventilated by a five-foot fan, which is used as forcing fan. It would do very well, but the section of the airways are too small for it to do very effective work. They were experimenting with a piece of long wall work, but after a short trial, they gave it up; their reason being that it did not make the coal dig any easier, and from their point of view nothing was gained. They kept no record of the per cent. of nut, slack, or lump made by the two methods, or the amount of coal gained that otherwise would be lost by room and pillar working. Safety catches were ordered put on the cages, and have so been placed. The mine makes a small quantity of fire-damp. They employ about 75 persons in the mine.

NEW SLOPE.

This mine is owned and operated by the O. & P. Coal Co. James Black, superintendent, and David McPherson, mine boss. It is the largest mine in the Salineville district; having a capacity of 400 tons per day. It was inspected four times, and each time found wanting in ventilation, no change of importance being made—in fact, an almost total disregard of recommendations or improvements suggested or ordered by the district inspector. It was found necessary to have the company enjoined to bring them to a sense of their duty. The superintendent of this company is very negligent in matters pertaining to ventilation, making improvements only when compelled. An air shaft is now being sunk, and when completed will be 130 feet deep and 5 feet in diameter. The coal mined is the "Big Vein," and the locomotives on the C. & P. R. R. are coaled here. About one hundred persons are usually employed in the mine.

STAR.

This mine is owned and operated by Thomas & Jenkins. Stanley Jenkins, superintendent, and John F. Waters, mine boss. It is a new mine, having been in operation only three months. The coal lies 102 feet from the surface, and has a very tender roof, consisting of two feet of soapstone immediately over the coal; the slate above this is 7 feet thick to the rock, which is about 85 feet thick. The coal is about three feet thick, and the opinion is that it is the same seam as is mined at Franklin Square. It is situated half a mile north of Columbiana, and is the only mine around that vicinity. No coal is shipped from it, there being a good market at home. On inspection it was found that a cover and safety catch were required on the cage and safety gates around the landing. These were ordered put on. They employ 16 persons in the mine.

OLD SHAFT.

This mine is owned by the O. & P. Coal Co. James Black, superintendent, and Benj. Roberts, mine boss. It was inspected three times, and was found very defective in ventilation each time. Orders were given, which resulted in a new and larger furnace being built, which, when fired and assisted by the exhaust steam, was sufficiently powerful to produce a current of air sufficient for all the needs of the mine; but they seemed to forget the object sought to be accomplished by building the furnace, and days would pass without fire being kept in it, while the miners consequently suffered from bad air, After having been notified that this negligence would not be tolerated, and that the law would be applied, they kept a fire in the furnace, added a 16-foot length to the stack on top of air shaft, and repaired stoppings and doors, by which the amount of air circulating in the workings was trebled. Since that time the mine has been well ventilated. The coal is the "Big Vein," and about fifty persons are employed in the mine.

MAHONING COUNTY.

AUSTIN.

This mine is owned and operated by Tod, Wells & Co. E. G. Marshall, superintendent, and Wm. Dunn, mine boss. It was inspected twice. When first inspected it was fairly ventilated, but some doors were needed for the better distribution of the circulation, and safety gates around the pit mouth and safety catches on the cages. They were notified of these wants, some of which they complied with. At the time of the next inspection the ventilation was poor in some parts of the mine, a larger number of doors were required than before, they had been using canvas sheets instead, and they were torn to shreds, a poor excuse at best, and now they were worse than nothing; and the safety catches were not put on. In regard to the safety catches, they claim that, having a traveling way by which persons could enter and leave the mine without being hoisted on the cages, they were not needed. They were also ordered to start the pumps at least two hours before the men started to work in the mine. Exhaust steam being used to ventilate with, and the pumps not running at night; the gases and powder smoke pervaded the atmosphere of the mine until the air was set in motion by the exhaust steam; hence, the above order. They employ about one hundred persons in the mine.

JOHN HENRY.

This mine is owned and operated by Homer Baldwin. Charles Bowers, superintendendent; Stephen Thornton, mine boss. It was inspected in May. They had only natural ventilation, which was consequently very poor. They were ordered to adopt means to bring the ventilation up to the standard. They shut down two or three weeks after and have remained idle since. They employed about forty-five persons in the mine.

BROWNLEE.

This mine is owned and operated by the Powers Coal Co. R. A. Beechert, superintendent, and Robert Hunter, mine boss. It was inspected once, and the ventilation was very bad; some places were in excess of 120 feet from the airway, and no second opening. A second opening was ordered made. The mine, however, was shut down in two or three weeks afterwards, the owners claiming it did not pay to run it, owing to the coal being very thin and competition sharp. They employed 35 persons in the mine.

ALLEN.

This mine is owned and operated by the Mahoming Valley Iron Co. Henry Bonnell, superintendent; John Matthews, mine boss. It was inspected twice. On the first visit the ventilation was fair, and the second opening just finished, but was not large enough for a mule to travel in, and the men were hoisted on the cage without a cover or a safety catch. They were ordered to put a cover and safety catch on the cage. This resulted in the slope being enlarged so that men and mules could pass in and out by that means. About 26 persons were employed in the mine.

WITCH HAZEL.

This mine is owned and operated by the Witch Hazel Coal Co. Henry Wick, superintendent, and Evan S. Edwards, mine boss. When first inspected the air in the mine was more than the law required, and was fairly distributed. Safety gates were required around the lower landing, which was complied with. At the next inspection the number of persons employed had been doubled, but the ventilation was not increased. It was very feeble on the west side, and on the east side the entry was too far in advance of the ventilation. This condition of things was ordered remedied. When last visited they employed 55 persons in the mine.

POLAND.

This mine is owned and operated by Tod, Stambaugh & Co. A. J. McCartney, superintendent, and William Young, mine boss. When first inspected it was feebly ventilated, owing to the lack of power; the doors, stoppings, etc., were in good order and the air carried well forward. A fan was recommended, as both shafts were wet and would not do for furnace shafts. Some gas (fire-damp) was given off in the mine, but every working place was examined, as the law directs. Prior to the second inspection a ten-foot Brazil fan was put in place, and is producing good results, but the "drag" of the mine was considerable, some of the windroads being of small section. Other safety appliances were already adopted and in good order. The coal mined is the Mahoning block coal, and 125 persons are employed.

NATIONAL.

This mine is owned and operated by J. M. Walters & Co. J. M. Walters, superintendent, and Ralph Wainwright, mine boss. It was visited three times, but inspected only twice. On the first visit the ventilation was very feeble; they had two good air-shafts, but no furnaces. These were ordered built. When last inspected the mine was in good condition. The air-shafts are 87 and 127 feet deep, and the furnaces, 6′ x 4½′ and 6′ 4″ x 4′ 6″ above the bars, respectively. The single entry system prevails here; the roads are good, and a large force of men, ranging from 160 to 220, are employed in the mine. The coal averages about 28 inches in thickness.

FAIRVIEW.

This mine is owned and operated by Fairview Coal Co. J. B. Warner, superintendent, and John Hileman, mine boss. It was visited twice. When inspected it was deficient in ventilation, some entries driven too far in advance of an airway. An air-shaft was recommended, to bring the ventilation up to the standard, and a fan or furnace erected. The air-shaft is now being sunk and is nearing completion. Its diameter is not less than 9 feet, and between 90 and 100 feet of sandrock had to be gone through. They intend to build a large furnace, and it will be, when completed, one of the best ventilated mines in Ohio. They employ about 40 persons in the mine, and keep sufficient ventilation for this amount. The coal mined is the No. 4, or the Lower Kittanning of Western Pennsylvania geological enumeration.

MANNING.

This mine is owned and operated by the Manning Coal Co. George Frack, superintendent, and Alex. McIntosh, mine boss. When inspected the ventilation was poorly distributed, and it had but one opening. The company were notified to put down a second opening or reduce the working force to ten persons at one time. For a short time this was not heeded; they, however, finally complied, and work was suspended until the second opening was completed. It was visited a second time to inspect it, but the miners had fired their shots and were coming out of the mine, having quit about noon. They employ about 100 persons in the mine.

LEADVILLE.

This mine is owned by Leadville Coal Co. R. J. Wick, superintendent, and J. H. Thompson, mine boss. It was inspected twice, and each time found in good condition. A short time after the first inspection, an explosion occurred, by which three persons were burned, one of whom died the same day, and one overcome for sometime with after-damp. The gas had accumulated in a raise-entry while the mine was idle, and when the men working in the entry began to brush it out,—they had put their lamps eight or nine yards distant, in the return,—it came in contact with the light. The mine was inspected two days after and found in good condition. They employed over 100 persons in the mine.

FOSTERVILLE.

This mine is owned and operated by the Foster Coal Co. Jonathan Head, superintendent, and Jonathan Veitch, mine boss. It was inspected once and found in good condition. They were drawing the pillars, and it has since been worked out and abandonded.

MEDINA COUNTY.

DIAMOND.

This mine is owned and operated by W. B. Coleman; and Joseph Jordan, mine boss. This mine was inspected twice On the first visit the ventilation was exceedingly poor. They were notified that they must improve the airways and stoppings so that a sufficient volume of air would be circulated through the mine. On the second visit the air was found greatly improved, and a willingness shown to comply with the law. They were driving entry towards an old mine that was full of water, and kept a hole drilled in the left side of the entry, some 30 feet in advance of it, at an angle of 25 or 30 degrees with the direction of the entry I recommended, as a further precaution, a hole drilled in the middle of the entry in the course it was being driven. Information has been received that the water has been tapped with safety. They use the furnace and exhaust steam for ventilating power, and employ 65 persons in the mine.

CARD.

This mine is owned and operated by H. P. Card, Lawrence Gaskell, superintendent, and William Head, mine boss. This mine was visited three times, and inspected twice. The ventilation was found very deficient at the time of the first inspection, and a passage or traveling way at the bottom of the shaft (so that persons could cross from one side of the mine to the other without danger from ascending or descending cages) was needed. These things were ordered made and improved so as to comply with the law. A fan was recommended to be erected as a ventilating power, to which idea they seemed to agree, and promised to erect one as soon as it could be got. I visited the mine some thirty days after, but did not find the fan on the premises. They said they had ordered it some two weeks before, but it had not arrived. They employ from 90 to 100 persons in the mine.

EXCELSIOR SLOPE.

This mine is owned and operated by the Excelsior Coal Co. Fred. Reis, superintendent, and Wm. Ligard, mine boss. When first inspected the ventilation was feeble, and only one-third of the quantity required was passing the downcast. They were notified to improve the ventilation and comply with the law. On the second visit, a marked improvement in the ventilation was observed. It was carried well forward and largely increased in volume. The full amount of air required was

passing in the slope, but a good share was lost through a door near the bottom, through which the drivers frequently passed to and fro, and the air had a direct course to the upcast when this was opened. A second door was suggested to remedy this. It is a very large mine, and employs about 175 persons.

PORTAGE COUNTY.

HUTSON'S.

This mine is owned and operated by the Hutson Coal Co. H. H. Gillingham, superintendent, and Charles Muirhead, mine boss. It was inspected twice, and on the first visit was found in good condition, as to ventilation, but required covers and safety catches on the cages, and safety gates around the pit landings. Their attention was called to these requirements. On the second visit the ventilation was deficient, and some eight places working more than 120 feet in advance of an airway. The mine was ordered to suspend work until these were put in good order and made to comply with the law. The mine is a new one, opened in last May. The shaft is a very small one, 5′ x 10′, and was put down to test this field. It is situated near Davis Road station, two miles south of Palmyra station. They have also completed the second opening, a slope, and they show a desire to comply with the law. The coal mined is the same as that mined in Palmyra, but is somewhat thicker, and from appearance promises to be a good pocket or basin of coal. They employ 40 persons in the mine.

FILER'S.

This mine is owned and operated by Scott Coal Co. John F. Filer, superintendent, and J. N. Crawford, mine boss. It was visited four times, and inspected three times. Very few persons were employed during summer—not more than 12 or 15 persons. The ventilation was very feeble during the warm weather, only having natural ventilation. There were no covers on the cages, and they were notified to remedy the ventilation and cover the cages, but to no avail. On the last visit the ventilation was greatly improved, Jack Frost had come to their assistance; credit, however, must be given to the mine boss for the careful manuer in which the stoppings are made, each being well plastered over with clay. Finding the notifications in regard to covers on the cages disregarded, an injunction was placed on the mine to compel them to comply with the law. A passage way at the bottom of the shaft was ordered made so that persons might cross from side to side in safety. They employed 35 persons in the mine.

WILSON'S.

This mine is owned and operated by the Palmyra Coal Co. W. B. Wilson, superintendent, and Richard Jones, mine boss. When first inspected the ventilation was very bad, and black-damp abounded in large quantities, so that a lamp would

scarcely burn. An air-shaft was ordered sunk and a furnace or fan erected. They put an air-shaft down and built a furnace, and the ventilation was all that was required. Forty-five persons were employed in the mine. Joseph Simpson was killed on June 1st by falling down the air-shaft. He had gone down immediately after a blast, and on being drawn up fell back.

DIAMOND.

This mine is owned and operated by P. L. Kimberly. W. I. Murdock, superintendent, and Abel Dove, mine boss. It was inspected four times, and each time found deficient in ventilation and safety appliances. At some of the inspections, the velocity of the air was not enough to overcome the friction of the anemometer. The cages were without covers and safety catches, and though notified by word and letter, no attention whatever was paid them. An injunction was asked to restrain them from working more than ten persons at one time until they complied with the law. This was granted; but information, received at a later visit, gave us to understand that they had disregarded the order of the court, and continued working. Steps are being taken to have the parties tried for contempt of court. The coal mined is the Mahoning Valley block coal, and averages about 3 feet thick. The mine is worked on the entry and windroad and single entry system, and has no artificial means of producing ventilation; consequently, at times, they have no ventilation whetever. A fan or furnace was suggested, and it is thought they incline to the latter. From 50 to 70 persons are employed in the mine.

SUMMIT COUNTY.

BURNET.

This mine is owned and operated by the Brewster Coal Co. Frank Meacham, superintendent, and John Hutchinson, mine boss. It was visited three times, and each time it was idle. During the summer they worked less than 10 men for about four months. The mine is said to be well ventilated, furnace power being used

DENNISON.

This mine is owned and operated by Barrett & Jacobs. O. S. Jacobs, superintendent, and D. R. James, mine boss. When inspected the ventilation was deficient. They had adopted the double entry system in the mine of late, but prior to that time the entry and windroad plan was in operation. This was operating against them, as the intake to the main workings was only 10 feet section in some places, and great resistance was encountered in passing any considerable volume through these small sections. They ventilate with exhaust steam and a suspended fire-basket.

EXCELSIOR SHAFT.

This mine is owned and operated by the Excelsior Coal Co. Fred. Reis, superintendent, and G. S. Reis, mine boss. It was inspected twice. On the first visit it was poorly ventilated, not one-half of the air required passing the downcast. They were ordered to take steps to improve the ventilation and bring it up to the standard. This they promised to do cheerfully. On the next visit it was found that the ventilation had not been increased, but the working force was reduced nearly one-half, so that the standard was nearly reached. They are drawing back the pillars in most of the entries, and it is not expected that it will last the winter out. They employed, at that time, about 50 persons.

SUMMIT.

This mine is owned and operated by the Summit Mine Coal Co. John Beese, superintendent. This mine was twice visited to inspect it, but on both occasions it was idle. They are drawing it back as fast as possible — working three shifts of men on them — and they expect to have it worked out in from two to three months.

LAKE VIEW.

This mine is owned and operated by the Lake View Coal Co. A. J. McCartney, superintendent, and Wm. Phillips, mine boss. It was inspected twice, and the ventilation was fair, though in summer nearly one-third short of the requirement. In other respects the mine was in good order. At the time of the first inspection they were requested to put safety gates around the lower landing, which they did at once. The coal mined is the Massillon or No. 1 coal, and employ 85 to 90 persons in the mine.

STARK COUNTY.

WILLOW NO. 5.

This mine is owned and operated by the Willow Bank Coal Co. Milton Schuckers, superintendent, and George Fox, mine boss. It was idle the first half of the year, and when inspected, had only started up two or three weeks. The ventilation was feeble and deficient, many places driven beyond 120 feet from the airway, and black damp noticed in some of the places. In an entry which holed into the old Willow, the black damp was given off in large quantities, and in this place quite a number of rooms were turned and working without any attempt to ventilate them. Several doors were ordered erected, and the volume of air increased to comply with the law. More than one hundred persons were employed in the mine. Nearly all the coal was thin, and after running a few weeks they stopped work for an indefinite period.

WILLOW NO. 6.

This mine is owned and operated by same parties as No. 5, excepting mine boss, who is Charles Brinkamp. When inspected the first time the ventilation was good, but the cages were without covers or safety catches; these were ordered put on, and on the second visit everything was in good condition. It is a new mine, having been opened this year, and is very wet from the roof; the coal is a good thickness. It is located about 5½ miles north of Massillon, and about 138 persons are employed in the mine.

ELM RUN.

This mine is owned and operated by the Elm Run Coal Co. J. A. Wilson, superintendent, and William Penman, mine boss. It was inspected during the summer and was in fair condition. They have a good sized air shaft, which was put down this spring. Exhaust steam is used as a ventilating power. The coal in this mine is, on the average, the thickest coal in the Tuscarawas Valley, and from 100 to 110 persons are employed in the mine.

SIPPO.

This mine was owned and operated by the Sippo Coal Co. G. W. Phillips, superintendent and mine boss. When inspected the mine was being pulled back very fast, and everything in the way of rails, ties, pipe, etc., was being taken out of the mine as fast as they could be dispensed with. The ventilation was good and the appearance of the stoppings and doors indicated care, and good management in the direction of ventilation. It has since been worked out and abandoned.

LAWRENCE.

This mine is owned and operated by Ridgeway, Burton & Co. J. P. Burton, manager, and George Hands, mine boss. They are drawing the entry pillars, and it is about worked out. They are now working day work, finishing it, and it will scarcely last until the end of the year.

CAMP CREEK.

This mine is owned and operated by the O. Young Coal Co. Joseph Collier, superintendent and mine bess. When inspected it was found in good condition all through, with very good roads and drainage. The machinery and engine house is kept the best in point of neatness and cleanliness of any in the district. During the summer about 25 persons were employed.

GARFIELD.

This mine is owned and operated by the Massillon Coal Co. Joseph Collier, superintendent, and John Collier, mine boss. It was visited three times. On the first visit the ventilation was very bad, not one-fourth of the amount required passing

in the downcast, and as usual, much less made to circulate around the face of the workings. Improvement was ordered made in the ventilation, and the erection of a fan suggested for that purpose. On the second inspection it was found that a 4-foot Murphy fan had been erected, and was arranged as a forcing fan. The ventilation was greatly improved, and about 50 feet from foot of downcast the largest amount of air, of any mine in this district, was measured; the leakage ,however, was large, for only about one-fourth of the amount was found passing the return airway near the working face. ' The coal basin here is narrow and tortuous, scarcely any room for entries on the sides of the main entry. They employ 125 persons in the mine.

ROSE HILL.

This mine is owned and operated by the Howells Coal Co. Evan J. Evans, superintendent, and John Morgan mine boss. On the first visit the ventilation was found defective—a little less than one-half passing in the downcast, and somewhat less in the workings. The ventilation was ordered increased to the standard, and the erection of a fan recommended. On the second visit it was seen that the ventilation had been improved by the addition of a half-inch steam jet; it had increased the volume of air considerably, but there was still room for improvement. In regard to the general safety, the mine was in good order. They employed from 70 to 75 persons in the mine.

JUSTUS (SHAFT).

This is owned and operated by the Howells Coal Co. E. J. Evans, superintendent, and Matthew English, mine boss. It was only inspected once, having been idle some four months, on account of the water breaking in from some great spring or subterranean lake. The ventilation was poor, because of the water overpowering the pumps occasionally; the brattice and stoppings were damaged and leaky. They constructed a large dam to keep back the water, which it is partly successful, and the mine is now being worked, but four pumps are constantly kept going. About 130 persons are employed in the mine.

BEAVER RUN.

This mine is owned and operated by the Beaver Run Coal Co. Rhinehart Keller, superintendent, and George Swier, boss. It was inspected three times. On the first visit it was observed that they had completed the second opening, which was ordered in March. The ventilation was still deficient, only about one-third of the quantity required passing in the mine. Up to this time only exhaust steam was used to ventilate, and a large force of men being employed, the current produced was too feeble. A fan was recommended, in which they concurred, and after some delay a Brazil fan, 10 feet in diameter and 3 feet face, was erected and is doing good work. It is worked on the double entry plan, and about 150 persons are employed in the mine.

MINGLEWOOD.

This is owned and operated by James Mullin & Sons. Tobias Ellser, superintendent, and Martin Sutherin, mine boss. It was inspected twice. The first time the current was so feeble that it would not move the anemometer. They had a good sized air-shaft 8x8 and 130 feet deep, but no furnace was built, though the material was all ready to put it up. On the second visit a good furnace was in operation, 6 feet breadth of bar, and arch 4½ feet above the bars, and a good current passing through the mine.

LAWRENCE.

This is a new mine, opened in June, and is owned and operated by Ridgway, Burton & Co. J. P. Burton, Manager, and John Hodgens, mine boss. They had no covers or safety catches on the cages, or safety gates around the landings, and the rope for hoisting persons was worn, and a large number of wires broken. These were ordered fixed so as to comply with the law. On the second visit considerable improvement was noticed in the mine and on top of the shaft. Safety catches and a new rope were on hand, but not put on yet; they promised, however, to put them on at once. The mine is situated one and a half miles east of North Lawrence. Fifty persons are employed, and no doubt this force will be increased as the mine is more developed.

GREENTOWN.

This mine is operated by Smith & Borst. Louis Smith, superintendent and mine boss. The mine was inspected twice. The first time it was in good condition. On the second visit the ventilation was poorly distributed, the doors being left open and poorly constructed. These were ordered fixed and kept closed. The coal mined is the No. 4. It is a limestone coal, the Brookville coal of western Pennsylvania. From 16 to 20 persons are employed.

VALLEY.

This mine is owned and operated by the Valley Coal Co. J. F. Evans, superintendent, and James McLinden, mine boss. It was inspected twice, and each time was pooly ventilated. An air-shaft was sunk, but no furnace had been built, and they only had such ventilation as was produced by natural means. They were ordered to build a furnace, and I was informed by the superintendent that this was done, but a visit a week later revealed the fact to the contrary. The company was written that if they did not build it at once, legal proceedings would ensue. The coal mined is the same as Greentown, with some slight changes in the stratum. From 25 to 30 persons are employed.

HADLEY.

This mine is owned and operated by Hadly & Brown. J. K. Hadley, superintendent, and Ross Foster, mine boss. This mine was visited twice. On the first

visit a bad state of affairs as regards ventilation was found. There were no artificial means to secure ventilation; not a door, stopping, or canvass was in the mine, and it was, generally speaking, the best attempt to work a mine without ventilation, seen for some time. On the second visit the mine was idle, the men being on a strike for an advance in the price of mining. About 40 persons were employed in the mine when working. The coal mined is the Middle Kittaning, or No. 5 of Tuscarawas Valley.

OSNABURGH.

This mine is owned and operated by the Osnaburgh Coal Co. Zacharich Doll, superintendent, and John Zuper, mine boss. It was visited twice, but on one occasion the mine was idle, and was not entered. When inspected it was found in good condition, having two air-shafts and furnaces. They employ about 80 persons in the mine. The coal mined is the same as Hadley's.

MOUNTAIN.

This mine was one of the largest mines in the Tuscarawas Valley. It has been worked out and abandoned this year.

RICHARD'S.

There are two separate openings to this mine, one of which has been made during the past summer. The volume of air was found to be large enough to meet the requirements of the law; but, as the mine is worked by single entry, it did not, in some instances, reach near enough to the working places. The boss was requested to put up doors in the first right entry, in the new mine, to force the air up to the face of the entry. The old mine will soon be abandoned. Thos. Smith is the mining boss.

WILLOW SPRING.

This mine is well ventilated. The roadways, in some instances, were in bad condition, but new T rails are being laid in the mine, and the roads cleaned and ballasted. D. John is superintendent, and Ed. H. Jones, mine boss.

TRUMBULL COUNTY.

NO 9.

This mine is owned and operated by Mahoning Coal Co. R. J. Wick, superintendent, and Charles Herbert, mine boss. It was inspected twice, and found in good condition both times, both as to ventilation and general security. On the second visit the hoisting-rope was found to be worn and broken considerably. The attention of the company was called to it, and they promised to put on a new one

at once. They employ 125 persons in the mine, chiefly drawing pillars, and it is expected to be worked out by next summer.

SECEDER.

This mine is owned and operated by Sampson Coal Co. John W. Sampson, superintendent, and John Lewis, mine boss. During the summer they scarcely worked more than 12 to 15 persons in all. It was visited three times, but on each occasion the mine was idle. It has one opening only, although an old mine. They have been notified to make a second opening or reduce their working force to 10 persons.

GARFIELD.

This mine was owned and operated by McCurdy, Margerum & Co. Thos. G. Phillips, mine boss. It was inspected once and found in good order. It has since been worked out and abandoned.

BROOKFIELD.

This mine is owned and operated by the Sharon Iron Co. John McIntosh, superintendent, and Frank Ramage, mine boss. It was visited twice, but on one occasion was idle. Only a portion of the mine was inspected, as it is the most extensive mine in Ohio, perhaps. They have opened up some of the old workings of the Cleveland shaft, and some of these places are three miles, or more, from the mouth of the tunnel. Such portions of the mine as were visited were in good condition. The tunnel is considered a first-class man trap; because, in case of accident to the locomotive, there is no visible means of escape. A person could not pass it, and no refuge places are made the entire distance. It is said, however, that very few persons travel in or out by that way. They employ about 160 persons in the mine.

CAMBRIA.

This mine is owned by Wm. T. Williams & Co. Wm. T. Williams, superintendent and mine boss. It was visited three times, but was idle on two occasions. It was well ventilated, excepting one entry, which was more than 120 feet from airway, but it was almost devoid of safety appliances; no safety gates, or catches, and no brake on drum. Mr. Williams' attention was called to these matters, and he promised to comply with the law. They employ 30 persons in the mine.

CHURCH HILL SLOPE.

This mine is owned and operated by the Church Hill Coal Co. A. J. McCartney, superintendent, and T. J. Williams, mine boss. It is one of the oldest mines in the Mahoning Valley, and is also an extensive one. When inspected they were drawing back the pillars as fast as the work would permit. The mine was in very

good condition, and everything connected with it indicated good management. They employ nearly 100 persons in the mine.

CHURCH HILL SHAFT.

This mine is owned, operated, and managed by the same parties as the Church Hill Slope. It was inspected once and found in very good condition. It is connected with the Slope, and is ventilated by a fan 8 or 9 feet in diameter, and over 19,000 cubic feet of air was measured at bottom of downcast shaft, with fan running about 80 revolutions per minute, and the temperature of the atmosphere 75°. Everything was as desired, excepting catches on one cage, and it was said no one was allowed to ride on it. They employed about 115 persons in the mine.

KLINE SLOPE.

This mine is owned and operated by the Tod Iron Co. H. C. Marshall, superintendent, and Wm. Parker, mine boss. It was inspected twice and found in good condition on both occasions. It has been a very extensive mine, some parts of it being nearly two miles distant from bottom of slope. Thirty persons are employed.

BLAINE.

This mine is owned and operated by Morris, Sampson & Co. David Morris, superintendent, and John Kennedy, mine boss. It was in poor condition; the ventilation not half meeting the requirement, and had only one opening. A second opening was ordered made, which they promised to do without delay. On the second visit it was found they had not kept their promise. Mr. E. Morris accounted for this by saying that they had encountered some difficulties with the Church Hill Coal Co., through whose coal they expected to make the second opening, by holing into the Church Hill Shaft. A further length of time was granted; and some five weeks after it was visited again, but no second opening was made. An injunction was applied for, to stop the mine working with more than ten men at once. This was granted, but five days were allowed by the court before it became operative, as Mr. Morris promised to have such an opening as could be made available in from five to ten minutes in case of accident. An opening of this kind was made, within the time granted, then the case was dismissed; defendent paying costs. They employ about 50 persons in the mine, and are now drawing pillars in some parts of it. It is expected that it will be worked out by next spring.

VIENNA.

This mine is owned and operated by the Stewart Coal Co. John P. Morris, superintendent, and Thomas E. Thomas, mine boss. It was inspected once, and on two other occasions was visited but not entered. The ventilation was deficient, and the mine has only one opening. A second opening was ordered put down. On the

second visit the order was repeated, or the working force should be reduced to ten men at once. The latter course has been adopted. They have been drawing pillars for some time, and expect to have it worked out in three or four months.

OSBORNE.

This mine is owned and operated by Todd, Wells & Co. E. G. Marshall, superintendent, and William Dunn, mine boss. It was visited twice, but on both occasions it was idle. Information, however, was received that the mine was well ventilated. They worked very ltttle during the summer, and employed from 40 to 50 persons in the mine.

WAYNE COUNTY.

HAMETOWN.

This mine is owned and operated by the Loomis Coal Co. H. E. Loomis, superintendent, and John Weldy, mine boss. When first inspected it was in very bad condition, not more than one-sixth of the air required passing the downcast, and a number of places working more than 120 feet in advance of an airway, and the ropes were worn and wires broken. The company were notified to bring the ventilation up to the standard, and to accomplish this the removal of the fan and fan engine to the top of the air shaft (and arranged as a forcing fan) was suggested, and new ropes ordered put on. At the second inspection the ropes were put on, but the ventilation was still extremely bad. In some parts of the mine so much black damp was present that a lamp would hardly burn. Finding the suggestions and requests disregarded in the main, proceedings were instituted against one of the officers of the company. They have changed the mine boss since that time. Over one hundred persons are employed in the mine.

FOX LAKE NO. 1.

This mine is owned and operated by Fox Lake Coal Co. J. B. Zerbe, superintendent, and Evan J. Evans, mine boss. It was inspected twice, and each time found very deficient in ventilation, only about one-fourth of the air required passing the downcast, and when the leaks, such as usually occur where slate and other rubbish is used for making stoppings, are taken into consideration, much less than this amount was circulating in the working faces. An air shaft was ordered sunk near the face of the workings, or a good sized fan erected, to bring the ventilation up o the standard. This was not heeded, for on the second inspection the ventilation was worse than before. The company was notified to reduce the working force to ten men or comply with the law. Information was received from the manager (to whom all improvements were referred before action was taken on them) stating that he had been absent several weeks in the north-west, and that he would sink a shaft as

quick as possible. The work was commenced, and the shaft is now completed. They employ from 175 to 200 persons in the mine, and ventilate with exhaust steam.

FOX LAKE NO. 2.

This mine is owned and operated by the Fox Lake Coal Co. J. B. Zerbe, superintendent, and David Naysmith, mine boss. It was in good order, both as to safety appliances and ventilation. It was opened last spring, and began to load coal some time in May. It promises to be a large mine. It is located about one and one-half miles from Clinton on the Doylestown road. Some sixty-five or seventy persons are employed in the mine. A second opening will soon be necessary.

The following acts, passed by the General Assembly since this report was written, are deemed of sufficient interest to all parties engaged in mining coal to be inserted at this point:

AN ACT

To authorize the creation and to provide for the operation of tribunals of voluntary arbitration to adjust industrial disputes between employers and employed.

SECTION 1. *Be it enacted by the General Assembly of the State of Ohio,* That the court of common pleas of each county, or a judge thereof in vacation, shall have the power, and upon the presentation of the petition, or of the agreement hereinafter named, it shall be the duty of said court, or a judge thereof in vacation, to issue in the form hereinafter named, a license or authority for the establishment within and for each county of tribunals for voluntary arbitration and settlement of trade disputes between employers and employed in the manufacturing, mechanical, or mining industries.

SEC. 2. The said petition or agreement shall be substantially in the form hereinafter given, and the petition shall be signed by at least forty persons employed as workmen and by four or more separate firms, individuals, or corporations within the county, or by at least four employers, each of whom shall employ at least ten workmen, or by the representative of a firm, corporation, or individual employing not less than forty men in their trade or industry; provided, that at the time the petition is presented, the judge before whom said petition is presented, may, upon motion, require testimony to be taken as to the representative character of said petitioners, and if it appears that the said petitioners do not represent the will of a majority, or at least one-half of each party to the dispute, the license for the establishment of the said tribunal may be denied, or may make such other order in this behalf, as to him shall seem fair to both sides.

SEC. 3. If the said petition shall be signed by the requisite number of both employers and workmen, and be in proper form and contain the names of the persons to compose the tribunal, being an equal number of employers and workmen, the judge shall forthwith cause to be issued a license substantially in the form hereinafter given, authorizing the existence of such tribunal and fixing the time and place of the first meeting thereof, and an entry of the license so granted shall be made upon the journal of the court of common pleas of the county in which the petition originated.

SEC. 4. Said tribunal shall continue in existence for one year from the date of the license creating it, and may take jurisdiction of any dispute between employers and workmen in any mechanical, manufacturing, or mining industry or business, who shall have petitioned for the tribunal, or have been represented in the petition therefor, or who may submit their disputes in writing to such tribunal for decision. Vacancies occurring in the membership of the tribunal shall be filled by the judge

or court that licensed said tribunal, from three names presented by the members of the tribunal remaining of that class in which the vacancies occur. The removal of any member to an adjoining county, shall not cause a vacancy in either the tribunal or the post of umpire. Disputes occurring in one county may be referred to a tribunal already existing in an adjoining county. The place of umpire in any of said tribunals and vacancies occurring in such place, shall only be filled by the mutual choice of the whole of the representatives, of both employers and workmen constituting the tribunal, immediately upon the organization of the same. The umpire shall be called upon to act after disagreement is manifested in the tribunal by failure during three meetings held and full discussion had. His award shall be final and conclusive upon such matters only as are submitted to him in writing and signed by the whole of the members of the tribunal, or by parties submitting the same.

SEC. 5. The said tribunal shall consist of not less than two employers or their representatives, and two workmen. The exact number which shall in each case constitute the tribunal, shall be inserted in the petition or agreement, and they shall be named in the license issued. The said tribunal, when convened, shall be organized by the selection of one of their number as chairman and one as secretary, who shall be chosen by a majority of the members, or if such majority cannot be had after two votes, then by secret ballot, or by lot, as they prefer.

SEC. 6. The members of the tribunal shall receive no compensation for their services from the city or county, but the expenses of the tribunal, other than fuel, light, and the use of the room and furniture, may be paid by voluntary subscription, which the tribunal is authorized to receive and expend for such purposes. The sessions of said tribunal shall be held at the county seat of the county where the petition for the same was presented, and a room in the court-house for the use of said tribunal, shall be provided by the county commissioners.

SEC. 7. When no umpire is acting, the chairman of the tribunal shall have power to administer oaths to all witnesses who may be produced, and a majority of said tribunal may provide for the examination and investigation of books, documents, and accounts pertaining to the matters in hearing before the tribunal, and belonging to either party to the dispute; provided, that the tribunal may unanimously direct that instead of producing books, papers, and accounts before the tribunal, an accountant agreed upon by the entire tribunal, may be appointed to examine such books, papers, and accounts, and such accountant shall be sworn to well and truly examine such books, documents, and accounts, as may be presented to him, and to report the results of such examination in writing to said tribunal. Before such examination the information desired and required by the tribunal shall be plainly stated in writing and presented to said accountant, which statement shall be signed by the members of said tribunal, or by a majority of each class thereof. Attorneys at law or other agents of either party to the dispute, shall not be permitted to appear or take part in any of the proceedings of the tribunal, or before the umpire.

SEC. 8. When the umpire is acting he shall preside, and he shall have all the powers of the chairman of the tribunal; and his determination upon all questions of evidence, or other questions, in conducting the inquiries then pending, shall be final. Committees of the tribunal consisting of an equal number of each class may be con-

stituted to examine into any question in dispute between employers and workmen which may have been referred to said committee by the tribunal, and such committee may hear and settle the same finally, when it can be done, by a unanimous vote, otherwise the same shall be reported to the full tribunal, and be there heard, as if the question had not been referred. The said tribunal, in connection with the umpire, shall have power to make, ordain, and enforce rules for the governm of the body when in session, to enable the business to be proceeded with in order, and to fix its sessions and adjournments; but such rules shall not conflict with this statute, nor with any of the provisions of the constitution and laws of Ohio.

SEC. 9. Before the umpire shall proceed to act, the question or questions in dispute shall be plainly defined in writing, and signed by the members of the tribunal, or a majority thereof of each class, or by the parties submitting the same; and such writing shall contain the submission of the decision thereof to the umpire by name, and shall provide that his decision thereon, after hearing, shall be final. The umpire shall be sworn to impartially decide all questions that may be submitted to him during his term of office. The submission and his award may be made in the form hereinafter given, and said umpire must make his award within ten days from the time the question or questions in dispute are submitted to him. Said award shall be made to the tribunal; and if the award is for a specific sum of money, said award may be made a matter of record by filing a copy thereof in the court of common pleas of the county wherein the tribunal is in session. When so entered of record it shall be final and conclusive, and the proper court may, on motion of any one interested, enter judgment thereon; and when the award is for a specific sum of money, may issue final and other process to enforce the same.

SEC. 10. The form of the joint petition or agreement praying for a tribunal under this act shall be as follows:

To the Court of Common Pleas of ———— County (*or to a judge thereof, as the case may be*):

The subscribers hereto, being the number and having the qualifications required in this proceeding, being desirous of establishing a tribunal of voluntary arbitration for the settlement of disputes in the ———— (*here name the branch of industry*) trade, and having agreed upon A, B, C, D, and E, representing the employers, and G, H, I, J, and K, representing the workmen, as members of said tribunal, who each are qualified to act thereon, pray that a lincense for a tribunal in the ———— trade may be issued to said persons named above.

Employers.	Names.	Residence.	Works.	Number Employes.

Employes.	Names.	Residence.	By whom Employed.

SEC. 11. The license to be issued upon such petition, may be as follows:

State of Ohio, }
—— *County,* } *ss.*

WHEREAS, The joint petition and agreement of four employers (*or representatives of a firm, corporation, or individual, employing forty men, as the case may be*), and forty workmen has been presented to this court (*or if to a judge in vacation, so state*), praying the creation of a tribunal of voluntary arbitration for the settlements of disputes in the ———— trade within this county, and naming A, B, C, D, and E, representing the employers, and G, H, I, J, and K, representing the workmen. Now, in pursuance of the statute for such case made and provided, said named persons are hereby licensed and authorized to be and exist as a tribunal of voluntary arbitration for the settlement of disputes between employers and workmen for the period of one year from this date, and they shall meet and organize on the —— day ————, A. D. ——, at ————.

Signed, this —— day of ————, A. D. ——.

———— *Clerk of the Court of Common Pleas of* ————*County.*

SEC. 12. When the tribunal agrees to submit a matter in controversy to the umpire, it may be in form as follows:

We, A, B, C, D, and E, representing employers, and G, H, I, J, and K, representing workmen, composing a tribunal of voluntary arbitration, hereby submit and refer unto the umpirage of L (*the umpire of the tribunal of the* ———— *trade*) the following subject-matter, namely: [*Here state fully and clearly the matter submitted.*] And we hereby agree that his decision and determination upon the same shall be binding upon us, and final and conclusive upon the question thus submitted; and we pledge ourselves to abide by and carry out the decision of the umpire when made.

Witness our names this —— day of ————, A. D. ——.

[*Signatures.*]

SEC. 13. The umpire shall make his award in writing to the tribunal, stating distinctly his decisions on the subject-matter submitted. And when the award is for a specific sum of money, the umpire shall forward a copy of the same to the clerk of the proper court.

SEC. 14. This act shall be in force from and after its passage.

AN ACT

To provide against the payment of wages in scrip, orders, etc., and against selling goods or supplies to employes at excessive prices.

SEC. 7015. It shall be unlawful for any person, firm, company, or corporation to sell, give, deliver, or in any manner issue, directly or indirectly, to any person employed by him or it, in payment of wages due for labor, or as advances on the wages of labor not due, any scrip, token, check, draft, order, or other evidence of indebtedness payable or redeemable otherwise than in money; any violation of the provisions of this section shall be punishable by a fine of not less than twenty-five, nor more than one hundred dollars, or imprisonment of not more than thirty days, or both; and the amount of any scrip, token, check, draft, order, or other evidence of indebtedness, sold, given, delivered, or in any manner issued, in violation of the provisions of this section, shall be recovered in money at the suit of any holder thereof, against the person, firm, company, or corporation selling, giving, delivering, or in any manner issuing the same; provided, that nothing in this section shall apply to any person, firm, company, or corporation employing less than twenty men; and provided further, that nothing in this section shall apply to or affect the right of any person or private individual from giving orders on any store or business house or firm in the business or profits of which he has no interest, directly or indirectly.

SEC. 7016. Whoever compels, or in any manner seeks to compel, or attempts to coerce an employe of any person, firm, or corporation to purchase goods or supplies from any particular person, firm, or corporation, shall be fined not more than one hundred nor less than twenty dollars, or imprisoned not more than sixty days, or both; and whoever sells goods or supplies of any kind, directly or indirectly, to his employe, or pays the wages of labor of his employes in goods or supplies of any kind, directly, or through the intervention of scrip, order, or other evidence of indebtedness, at higher prices than the reasonable or current market value in cash of such goods or supplies, shall be liable to like punishment and penalties above specified, and shall, in addition thereto, be liable in civil action to the party aggrieved, in double the amount of any charges made for such goods or supplies in excess of the reasonable or current market value in cash, of such goods or supplies.

SEC. 7017. The prosecuting attorney of any county, upon complaint made to him of any violation of either of the two preceding sections within his county, shall cause such complaint to be investigated before the grand jury.

LIST OF MINES EMPLOYING MORE THAN TEN MEN IN THE STATE OF OHIO.*

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Athens County.			
Glen Eben	Drift.	W. D. Hamilton	Floodwood.
Carbondale	"	Carbondale Coal Co	Carbondale.
No. 21	"	Col. & Hocking Coal & Iron Co.	Columbus.
No. 23	"	" "	"
No. 25	"	" "	"
No. 27	Shaft.	" "	"
No. 31	Drift.	" "	"
Briar Hill	"	Ricketts & Matthews	"
Coe Hill	"	Juniper Bros. & Lampman	Nelsonville.
Lick Run No. 1	"	W. A. Shoemaker & Co	Columbus.
Lick Run No. 2	"	" " "	"
Maple Hill	"	" " "	"
Poston's	"	C. L. Poston & Co	Nelsonville.
Doan's	"	Doan & Lama	"
Section 29	"	W. B. Brooks & Son	"
Johnson's	"	Johnson Bros. & Patterson	"
New Pittsburgh	Slope.	" "	"
L. D	Drift.	Lewis Steenrod	"
Jacksonville	Shaft.	W. P. Rend & Co	Chicago.
Happy Hollow No. 1	Drift.	Nelsonville Coal & Coke Co.	Columbus.
Happy Hollow No. 2	"	" "	"
Hamley Run	Shaft.	H. C. Will & Co	"
Nickel Plate	Drift.	George Hall	Nelsonville.
Laurel Hill	"	Gould & Pendergast	Lick Run.
No. 39	"	N. Pickett	Nelsonville.
Floodwood	Shaft.	Ohio & Western Coal & Iron Co.	Floodwood.
Belmont County.			
Ætna	Drift.	Ætna Mill Co	Ætnaville.
No. 1	"	Pittsburgh & Wheeling Coal Co.	Bridgeport.
No. 2	"	" "	"
No. 3	"	" "	"
Laughlin's	"	Laughlin Mill Co	Martin's Ferry.
Burlington	"	W. J. Rainey	Don P. O.
Flushing	"	Flushing Coal Co	Elyria.
Nail Mill	"	Bellaire Nail Works	Bellaire.
Robinson's	"	Geo. O. Robinson	"
Bernard's	"	Wm. G. Bernard	"
Standard	"	Standard Iron Co	Bridgeport.
Wheeling Valley	"	J. B. Ramage	Bannock.
Rock Hill	"	Rock Hill Coal Co	Flushing.
Captina	Shaft.	Captina Coal Co	Armstrong'sMills.
Franklin	Drift.	Stewart & Meehan	Stewartsville.
Kidd's	"	John Kidd	Kidd P. O.
Kidd's	"	Kidd Bros	"
Scheck's	"	Heslop, Scheck & Co	Bellaire.
Belmont No. 1	"	Heatherington & Kelly	"
Belmont No. 2	"	W. S. Heatherington	"
Pittsburgh	Slope.	Rockershausen, Sterritt & Bros.	"
Wegee	"	D. Smith	Wegee.
Union	Drift.	J. C. Israel	Moundv'le, W.Va.

*NOTE.—If any errors are found, or corrections needed, in this list, I will be obliged to persons discovering the same, if they will notify me of them. THOS. B. BANCROFT.

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Belmont County—Cont'd.			
McConaughey	Drift.	Milt. McConaughey	Bridgeport.
Orchard Hill	"	John Wilson	"
Kenline's	"	Kenline Bros	"
Sullivan's	"	Sullivan & Hynes	Bellaire.
Columbiana County.			
Farmers'	Drift.	Manufacturers' Coal Co	Cleveland.
Anderson's	"	" "	"
New Shaft	Shaft.	Salineville Coal Co	"
Old Shaft	"	Shaft Coal Co	"
Hays'	Drift.	Ohio and Penna. Coal Co	"
Slope	Slope.	" "	"
Hussey	Drift.	" "	"
Washingtonville	"	Cherry Valley Iron Co	Leetonia.
Leetonia	Slope.	" "	"
Empire	Drift.	Cleveland Coal Co	Cleveland.
Rock Hill	"	Rock Hill Coal Co	Robbinsville.
Foster's	"	Columbiana Coal Co	Salineville.
Grafton	Shaft.	Grafton Iron Co	Leetonia.
New Lisbon	Drift.	R. G. Eells	New Lisbon.
Prospect No. 1	Slope.	Prospect Coal Co	East Palestine.
Prospect No. 2	Drift.	"	"
Alberta	Shaft.	Clifford Coal Co	Franklin Square.
Wolf Run	Drift.	Wolf Run Coal Co	Teegarden.
Star	Shaft.	Thomas & Jenkins	Columbiana.
Coshocton County.			
Morgan Run	Drift.	Morgan Run Coal Co	Cleveland.
Home	"	Franklin Coal Co	Coshocton.
Franklin	"	"	"
Prosser	"	McNeil & Harris	"
Conesville	"	Davis & Co	Conesville.
Carroll County.			
Osborne No. 1	Drift.	Osborne Coal Co	Cleveland.
New Hazelton No. 1	"	New York & Ohio Coal Co	"
New Hazelton No. 2	"	" "	"
Empire No. 1	"	" "	"
Empire No. 2	"	" "	"
Empire No. 3	"	" "	"
Allen	"	S. Allen & Son	Dell Roy.
Russell Hill	Shaft.	Co-operative Coal Co	"
No. 3	Drift.	New York & Ohio Coal Co	"
Wheeling and Lake Erie	Slope.	Orange Coal Co	Sherrodsville.
Guernsey County.			
Scott's	Drift.	Scott Coal & Salt Co	Cambridge.
Cambridge	"	Cambridge Coal Co	"
Guernsey	"	M. D. & J. W. Robbins	"
Robbins	Shaft.	"	"
Norris'	Slope.	Mrs. E. Norris	Danford.
Nicholson	Drift.	Ohio Coal Co	Marietta.

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Guernsey County—Cont'd.			
Akron	Shaft.	Wheeling & Lake Erie Coal Co.	Elyra.
Trail Run	"	" "	"
Briar Ridge	Drift.	D. Matthews & Co	Cambridge.
Farmers'	Shaft.	Manufacturers' Coal Co	Cleveland.
Hartford	"	Buffalo Coal Co	Buffalo.
Seneca	"	Seneca Coal Co	Senecaville.
Gallia County.			
Cheshire	Drift.	C. A. Carl	Cheshire.
Holmes County.			
Myers'	Drift.	Bowen Bros	Millersburg.
Hocking County.			
No. 1	Drift.	Col. & Hocking Coal & Iron Co.	Columbus.
No. 13	"	" "	"
No. 15	"	" "	"
No. 17	"	" "	"
No. 19	"	" "	"
No. 29	Slope.	" "	"
Sand Run	Drift.	Sackett & Smart	"
Consolidated	"	Consolidated Coal Co	Cincinnati.
Black Diamond No. 1	"	Haydenville Mining & M'f'g Co.	Haydenville.
Black Diamond No. 2	"	" "	"
Morris'	Slope.	Morris Coal Co	Sand Run.
Snake Hollow	Drift.	W. B. Brooks & Son	Nelsonville.
Thoroughfare	"	"	"
Orbiston	"	Ohio & Western Coal & Iron Co.	Floodwood.
Monday	"	" "	"
Star	"	Star Gas Coal Co	Logan.
Jackson County.			
Comet	Shaft.	Comet Coal Co	Wellston.
Central	"	Drew & Wasson Mining Co	Jackson.
Indiana	Slope.	" "	"
Meadow Run	Shaft.	Meadow Run Coal Co	Wellston.
Wellston No. 1	"	McClintick & Smith	Chillicothe.
" No. 2	"	"	"
Milton	"	Milton Furnace Co	Wellston.
Eliza	"	Eliza Coal & Iron Co	"
Fluhart	"	Theo. Fluhart & Co, limited	"
Franklin	"	Franklin Coal Co	Jackson.
Huron	"	Huron Iron Co	"
Star	"	Star Furnace Co	"
Globe	Slope.	Globe Iron Co	"
Tropic	Shaft.	Tropic Iron Co	"
Hurd No. 1	Slope.	Hurd Coal Co	"
" No. 2	Shaft.	"	"
Chapman	Drift.	Chapman Coal Co	"
Diamond	"	Chapman & Williams	"
Springfield	"	H. L. Chapman	"
Eagle No. 1	"	Eagle Coal Co	"

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Jackson County—Cont'd.			
Eagle No. 2	Drift.	Eagle Coal Co	Jackson.
Kyle	Slope.	Kyle, Shotts & Co	"
Eureka	Shaft.	Jacob A. Long & Co	"
Emma	"	Emma Coal Co	"
McKittrick	Slope.	McKittrick & Bros	"
Standard	Shaft.	Standard Coal Co	"
Jones	"	Jones Coal Co	"
Newport	Drift.	James Newport	"
Price	"	Price Bros	"
Union	"	Kelly Coal Co	Springfield.
Ada	"	Hall Coal Co	Ennis.
Darling No. 1	"	John F. Hall	Coalton.
Darling No. 2	"	"	"
Forrest	"	Forrest Coal Co	Ennis.
Hippel	"	Hippel & Co	Coalton.
Mohler	Slope.	M. Kessinger & Co	"
Worth	Drift.	"	"
No. 1	Slope.	Morgan & Jones	"
No. 2	"	"	"
No. 3	"	"	"
Sterling	Drift.	Southern Ohio Coal Co	Dayton.
Western	"	" "	"
Garfield	"	" "	"
Patterson No. 1	"	" "	"
Patterson No. 2	"	" "	"
No. 3	Slope.	" "	"
Coal Run No. 7	Drift.	" "	"
Glen Roy	Shaft.	Glen Roy Coal Co	Glen Roy.
Cannel	Drift.	Cannel Coal Co	Coalton.
Jefferson County.			
Everick's	Shaft.	Ohio & Penna. Coal Co	Cleveland.
Walnut Hill	Drift.	" "	"
High Shaft	Shaft.	Steubenville Coal Mining Co	Steubenville.
Jefferson No. 1	"	Jefferson Iron Works	"
Jefferson No. 2	"	"	"
Bustard's	"	Jefferson Coal Co	"
Groff	Drift.	W. H. Wallace & Sons	Hammondsville.
Diamond	"	S. N. & W. G. McCullough	Linton.
Brilliant	Shaft.	Spaulding Iron Co	Brilliant.
La Grange	"	A. Gilchist	"
Rush Run	"	Rush Run Coal Co	Rush Run.
Calumet	Drift.	Calumet Clay Co	Calumet.
Kelly's	"	Kelly Coal & Coke Co	Portland Station.
Lawrence County.			
Belfont	Drift.	Belfont Iron Works	Ironton.
Old Mill	"	N. Y. & Ohio Iron & Steel Co	"
Lawrence	"	Lawrence Iron Works	"
Kelly	"	Kelly Iron & Nail Co	"
New Castle	"	Means, Kyle & Co	Hanging Rock.
Sheridan	"	Sheridan Mining Co	Sheridan coal wks

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Medina County.			
Diamond	Slope.	W. B. Coleman	Wadsworth.
Excelsior	"	Excelsior Coal Co	Akron.
Card	Shaft.	Card & Son	Cleveland.
Muskingum County.			
Greiner	Drift.	H. L. Greiner	Zanesville.
L. Harper	"	L. Harper	"
E. Harper	"	Eben Harper	"
Wheeler	"	Benj. Wheeler	"
Seelover	"	Seelover Bros	"
Peacock	"	D. Matthews & Co	"
Locust Grove	"	James Owens	"
Lehigh	"	Muskingum Valley Coal Co	New Holland.
Meigs County.			
Williams	Drift.	Ebenezer Williams	Minersville.
Glendale	"	Glendale Salt Furnace Co	"
Syracuse	Shaft.	Syracuse Coal Co	Syracuse.
Antiquity	"	Ohio Coal Co	Pomeroy.
Minersville	Drift.	Pomeroy Coal Co	"
Peacock	"	"	"
Dabney	"	"	"
Coal Ridge	"	Coal Ridge Salt Co	"
Buckeye	"	Buckeye Salt Co	"
Charter Oak	"	J. N. Williamson	"
Excelsior	"	Martin Ebersbech	"
Globe	"	Globe Coal Co	Cheshire.
Mahoning County.			
Welingdorf	Shaft.	Andrews Bros	Hazelton.
Manning	"	Manning Coal Co	Youngstown.
Kline	Slope.	Tod Iron Co	"
Poland	Shaft.	Tod, Stambaugh & Co	"
Austin	"	Tod, Wells & Co	"
Enterprise	"	Mahoning Valley Iron Co	"
Brownlee	"	A. & W. Powers	"
National	Drift.	J. M. Walters & Co	"
Witch Hazel	Shaft.	Witch Hazel Coal Co	"
Leadville	"	Leadville Coal Co	"
Harroff	"	Harroff Coal Co	"
Pennell	Slope.	New Lisbon Coal Co	"
Beloit	Shaft.	Ziegler & Shaerer	"
Dressell	Slope.	Woods' Coal Co	Greenford.
Fairview	Drift.	Fairview Coal Co	Niles.
Perry County.			
No. 3	Drift.	Col. & Hocking Coal & Iron Co	Columbus.
No. 5 (new side)	"	" "	"
No. 5 (old side)	"	" "	"
No. 7	"	" "	"
No. 9	"	" "	"
No. 11	"	" "	"

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Perry County—Continued.			
Upson	Drift.	Upson Coal Co	Shawnee.
No. 3	Shaft.	Ohio Central Coal Co	Toledo.
No. 18	"	"	"
No. 19	"	"	"
No. 21	"	"	"
No. 5	"	W. P. Rend & Co	Chicago.
No. 9	"	"	"
Chicago	Drift.	"	"
XX Shipping Bank	"	Ohio & Western Coal & Iron Co	Floodwood.
XX Furnace Bank	"	" "	"
Pleasant Valley	"	N. Y. & Straitsville C. & I. Co	Shawnee.
Twin Sisters	"	" "	"
Smith's	"	Shawnee Valley Coal & Iron Co	Newark.
Fanny Furnace	"	" "	"
No. 7	Shaft.	Sunday Creek Coal Co	Rendville.
No. 11	"	"	"
Black Hill	Drift.	Levi Rarick	Maholm.
Daugherty	"	Daugherty & Co	"
Black Diamond	"	E. Simpson	"
Diamond	"	S & J. Jones	McLuney.
Beech Grove	"	"	"
No. 1	"	M. & P. Tague	"
No. 2	"	"	"
Davis	"	J. E. Davis	New Lexington.
Pewee	"	O'Conner & Friel	Straitsville.
Bristol	"	Bristol Coal Co	Columbus.
Maholm	"	Forquer & Murray	Maholm.
Manly	"	Gosline & Barbour	Toledo.
Brilliant	"	Harbaugh & Crawford	McCuneville.
Dickson	"	J. C. Hamilton	Shawnee.
Ferara	"	V. M. George & Co	Clay Bank.
Tunnel Hill	"	M. Meenan	Lyonsdale.
Redfield	"	Buckeye Coal Co	Buckeye Cottage.
Portage County.			
Black Diamond	Shaft.	P. L. Kimberly	Sharon, Pa.
Wilson's	"	Palmyra Coal Co	Palmyra.
Scott	"	Scott Coal Co	Diamond.
Hutson	"	Hutson Coal Co	"
Summit County.			
Lake View	Shaft.	Lake View Coal Co	Akron.
Summit	Slope.	Summit Mining Co	"
Dennison	"	Dennison Coal Co	"
Burnett	"	Brewster Coal Co	"
Excelsior	Shaft.	Excelsior Coal Co	"
Thomas	Drift.	Phillip Thomas	Cuyahoga Falls.
Stark County.			
Elm Run	Shaft.	Elm Run Coal Co	Massillon.
Beaver Run	"	Beaver Run Coal Co	"
Rose Hill	"	Howell's Coal Co	"
Justus	"	"	"

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Stark County—Continued.			
McKinley	Shaft.	Sippo Coal Co	Massillon.
Willow Spring	Drift.	Ridgway, Burton & Co	"
North Lawrence	Shaft.	"	"
Lawrence	"	"	"
Garfield	"	O. Young Coal Co	Elyria.
Camp Creek	"	"	"
Minglewood	Slope.	Jas. Mullen & Son	Wooster.
Willow Bank No. 5	Shaft.	Willow Bank Coal Co	Cleveland.
" 6	"	"	"
Oakland	Drift.	Oakland Coal Co	North Industry.
Greentown	"	Smith & Borst	Greentown.
Richards'	"	Richards Coal Co	Canton.
Hadley	"	Hadley & Brown	"
Osnaburgh	"	Osnaburgh Coal Co	Osnaburgh.
Evansdale No. 1	"	Valley Coal Co	Cleveland.
" 2	"	"	"
Chestnut Grove	"	C. H. Tucker	Canton.
Alliance	Shaft.	Cunningham & Vanaman	Alliance.
Tuscarawas County.			
South Side	Drift.	C. E. Holden	Mineral Point.
Roberts'	"	Geo. Roberts & Co	"
Pioneer	"	Ridgway, Burton & Co	Massillon.
Empire	Slope.	Strawboard Coal Co	Akron.
Tunnel	Drift.	Rhodes & Card	Cleveland.
Brock Hill	"	Brock Hill Coal Co	Elyria.
Goshen	"	J. A. Bidler & Co	N. Philadelphia.
Goshen Run	"	Wm. R Jones	"
Rennie's	"	W. R. Rennie	"
Trenton	"	Nicholas Hert	Tuscarawas.
Mount Carbon	"	C. P. Minich	"
Stone Creek	"	Morris Bros	Canal Dover.
York	"	York Coal Co	" Fulton.
Monarch	"	Monarch Coal Co	Dennison.
Pike Run No. 1	"	Tuscarawas Valley Coal Co	Cleveland.
Walton Ridge	"	C. J. Nungesser	N. Philadelphia.
Davis	"	Davis Coal Co	Cleveland.
Trumbull County.			
Churchill	Slope.	Churchill Coal Co	Youngstown.
"	Shaft.	"	"
No. 9	Slope.	Mahoning Coal Co	"
John Henry	Shaft.	Homer Baldwin	"
Osborne	Slope.	Tod, Wells & Co	"
Blaine	Shaft.	Morris, Sampson & Co	Girard.
Seceder	Slope.	Sampson Coal Co	"
Stewart	Shaft.	Stewart Coal Co	"
Brookfield	Drift.	Sharon Iron & Coal Co	Sharon, Pa.
Cambria	Shaft.	Wm. T. Williams	Mineral Ridge.
Prevost	Slope.	E. Nicholas & Co	"
Jacobs'	Shaft.	P. Jacobs & Sons	Hubbard.

LIST OF MINES EMPLOYING MORE THAN TEN MEN, ETC.—Continued.

Name of mine.	Kind.	Name of owner or operator.	P. O. Address.
Vinton County.			
Ingham's	Drift.	Pat'k McDermott	King's Switch.
No. 4	"	Zaleski Co	Zaleski.
North No. 4	"	"	"
No. 6	"	"	"
Comstock's	"	Oscar Hawk	Hawk's.
Raccoon	"	John L. Lawler	Minerton.
Moonville	"	Stephen McNamara	Zaleski.
Wayne County.			
Fox Lake No. 1	Shaft.	Fox Lake Coal Co	Cleveland.
" 2	"	"	"
Hametown	"	Loomis Coal Co	Wadsworth.
Washington County.			
Sycamore	Slope.	Hardin & Keever	Coal Run.