

5th AR

year ending

Oct 31

1884

## REPORT OF INSPECTOR.

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WASHINGTON, IND., January 1, 1885.

To His Excellency ALBERT G. PORTER, Governor of Indiana :

SIR—In compliance with the requirements of the Act of the General Assembly entitled "An Act Regulating the Working of Coal Mines," approved March 8, 1879, and of the Acts of 1881 and 1883, I have the honor herewith to submit my fourth annual report for the year ending the 31st day of December, 1884.

This report contains estimated statistics of the coal industry of the State, including all mines; the number of persons given is the average employed in and about the mines during the year; a brief description of the labors of the Mine Inspector; a short sketch of the new coal fields of the State; a list of the fatal accidents during the year; also, in my judgment, recommendations for the improvement of the mining law, including a copy of the law governing the working of coal mines of Indiana, and such other matters in connection with mines and mining as I have deemed of importance.

Respectfully submitted.

THOMAS WILSON, JR.,  
*Inspector of Mines State of Indiana.*

I have never been able to furnish an accurate statement of the coal tonnage of the State, on account of an unwillingness of some of the operators to furnish the desired information on the first day of last year. Printed blanks were sent out for each of

them to fill out the statistics of their coal production in tons, and capital employed, but a large number of them, after three and four applications, were never answered. There was no effort made on my part the present year for the collection of them, consequently I have estimated them to the best of my knowledge and ability. The mining industry of the State is yearly growing in magnitude, more especially in the southern part of the State, since the completion of the Louisville, Evansville & St. Louis Railway; it has furnished an excellent outlet and markets for the southern part of the State. With the low stage of water in the Ohio during the present year, excluding the up river coals, for a few months of the year, our coal operators in the southern part of the State have built up a trade in Louisville, New Albany and Jeffersonville, with a fair price for coal the whole year (regardless of very high or low water in the river), a trade which they are going to control. There has been a slight decrease in the production of coal in Daviess county during the year owing to the great depression in business in the country. There has been an increase in the production of Parke county from the territory at Minshal station. There has been a large falling off from Clay county, caused from the great strike which lasted three months in the busy season of the year.

#### ANNUAL PRODUCTION OF COAL.

The following is an approximate estimate of the annual coal tonnage for the past six years:

1879.....	1,196,490 tons.
1880.....	1,550,375 tons.
1881.....	1,771,536 tons.
1882.....	1,990,000 tons.
1883.....	2,560,000 tons.
1884.....	2,260,000 tons.

In reference to the collection of our Mineral Statistics, it should be made compulsory on the operators' part to furnish the necessary statistics when application is made to them, or all efforts for the collection of them should be abandoned. These returns should be treated as confidential, and should only be published in the aggregate production of the State.

THE COAL PRODUCTION OF THE STATE AND MINING CASUALTIES FOR  
THE PAST SIX YEARS.

The number of fatal accidents, which occurred in and about the mines during the year 1884, was nine. These have been noted during my visits to the mines; no provision being made by law for the operators to report them as they take place. I have examined the places these accidents have happened, and I find, after careful inquiry, that three-fourths of these accidents were due to carelessness and negligence on the part of the unfortunate ones themselves. Miners, as a class, the more experienced and older they are at the business the more careless they become, and the more they rely on their judgment in case they are working under a loose piece of slate; they think they know just when it is going to fall. In the year 1879 the coal out-put of the State was 1,196,490 tons; the fatal accidents were not reported; number of persons employed, 3,459. In the year 1880 there was no report made of statistics. In the year 1881 there was mined 1,771,536 tons of coal; average number of persons employed 4,567; there was during the same year ten fatal accidents in the mines. Number of tons of coal mined for each fatal accident 177,153, or one death for every 456 persons employed. During the year 1882 there was mined 1,990,000 tons of coal; average number of persons employed 4,952. During the same year the fatal accidents were nine; number of tons of coal mined to each fatal accident 221,111, or one death for each 550 persons employed. There was mined during the year 1883 2,560,000 tons of coal; total number of persons engaged in and about mines 5,403; number of fatal accidents attributed to mines, seven. There was one life lost for every 365,714 2-7 tons mined, making one to every 772 persons employed. The estimated tonnage produced in the year 1884 is put down at 2,260,000; average number of persons employed is 5,716; number of mine accidents were nine; number of tons coal mined to each life lost 251,111, or one life lost for every 635 1-9 persons employed. This is a creditable showing, as our annual coal production and number of persons engaged in mining is increasing. One of the accidents was a young man eighteen years of age, caused by falling down a shaft; another was with a premature blast, where a miner was tamping a blast of powder in the coal, the drill striking sulphur, which

ignited the powder; another was where a miner was carrying four pounds of powder in an open dinner pail, when a spark from the light he carried on his head dropped in the powder, the powder burned him so that he died two weeks afterwards. Most of the other accidents could have been avoided with a strict watch by the mine foremen over their employes, and I consider that they are responsible for three-fourths of the mine accidents in the State of Indiana.

#### MINING SUITS.

A number of suits have been filed during the year against some of the operators for neglect or refusal to comply with the requirements of the mining law. The cases have been placed in the hands of Prosecuting Attorneys, where they properly belong, but for some cause or other they have never been prosecuted. There has not been one violation of the law but what has been promptly informed on by myself, and the information put on record. I have met some opposition from a few operators, and also from miners, who violate the law themselves more than their employers do, especially in respect to the number of men to ride up the shaft on a cage, and leaving trap doors open. They will go through a door and leave it open, which cuts the air off from themselves and their co-laborers—then complain about bad air in their working places; and in going up the shaft on a cage, from ten to twelve persons would crowd on a cage, in direct violation of the law, and against the orders of the bank bosses. In the year 1883, the General Assembly, on my recommendation, provided sealed weights for the testing of scales used at coal mines, where the miners were paid by weight. The weights were purchased and audited by the Auditor of State, and paid out of the State Treasury; but they failed to appropriate for the transportation of them from one place to another. The weights, 1,500 pounds of them, were placed in the Auditor of State's office, and they are there yet. The miners, during the same session of the Legislature, introduced, through Hon. I. M. Compton, Senator from Clay county, a section, which was passed, giving them the right of selecting and keeping in the weigh office, or at the place of weighing the coal, a check weighman, or a person to watch the company's weigh boss; the check weighman to have the right to inspect

the weighing of coal so mined, and also to examine the books where the weight of coal is kept—the miners to pay the said check weighman. The miners soon got tired of paying for such right, and came to the conclusion that the weigh bosses were a pretty honest set of fellows, as at the end of the year I only found two check weighmen on duty in the whole State. In conclusion, I return my sincere thanks to some of the operators, mine superintendents and mine bosses for the courtesy and respect shown me by them. They have asked no favors, but were always willing to comply in anything reasonable that I might suggest, and I am under obligations to the conservative element of our miners for their advice, and it gives me satisfaction to know that I never betrayed one of them. As for the turbulent class, I have no favors to ask of them, and I am under no obligations to them whatever. I have tried faithfully to discharge the duties of the office without fear or favor, not being arbitrary with any one, but never failing to see that others lived up to the requirements as near as practical.

#### MINERS' UNIONS, STRIKES, ETC.

The miners of this State do not try to improve their opportunities to better their conditions in life. There are miners in every district, and in every mine in the State, of fine views, who possess intelligence and sound judgment, who might become with properly directed efforts, real benefactors to their fellowmen, and with their influence properly directed with the masses of miners make them respected and valuable citizens. In place of this, all their efforts seem to be directed to organization to keep the price of mining coal up to the highest point, regardless of the market price of coal. This is all wrong. Miners should carefully and calmly study and look at both sides of the question before coming to too hasty conclusions. Supply and demand will govern and regulate the price of mining. When there is more work to be done than there are workers to do it, the product of a certain labor will advance, and *vice versa*. There is no county in the State, no matter how well organized, can govern the market price of coal or the price of mining, nor a State organization, where the largest per cent. of their coal is marketed outside of the State. Saloons and intemperance are two of the greatest evils in a mining district.

Where the saloon element prevails there you can find the most trouble between miners and coal operators. Nine-tenths of all the strikes and mischief that is gotten up is proposed and concocted in saloons. In the latter part of the year 1883, two or three of the leading labor organizations of Clay county effected an organization called the M. A. and A. Association of Indiana, and called a delegate meeting to meet in Terre Haute, Indiana. Each mine was entitled to one delegate for every fifty miners employed and fractions thereof, four or five counties responding to the call. They were in session two days. They passed a large number of resolutions. One resolution was offered condemning some of the acts of the Mine Inspector, proposed by a delegate who did not know the meaning of the section of the mining law he offered the resolution upon. At the present writing he is a prominent applicant for the appointment of Mine Inspector. The fruits of this meeting brought on the great struggle of 1884, in Clay, Park, Vigo and Sullivan counties, which commenced on the first day of March, 1884, and lasting until the first day of June of the same year. Another object being to keep the price of mining at one dollar per ton, that being the price paid in the block coal districts. On the first day of March, the price of mining block coal was reduced to 75 cents per ton, and 70 cents for bituminous coal. There were about 2,000 miners lying idle who lost \$240,000 in wages. The operators lost considerable money and were at a large expense daily, in keeping their mines open, besides losing a large trade in Chicago, as that was their principal market, which during their idleness was supplied from the mines in Ohio and Illinois. Commissaries were established and aid solicited from all parts of the adjoining States wherever it could be procured, though principally from Ohio, from the mining districts that were supplying their Chicago trade with coal.

THE INTRODUCTION OF COAL-CUTTING MACHINERY IN THE STATE OF  
INDIANA, AND SOME OF THE PRINCIPAL REASONS  
WHY IT WAS DONE.

The Curriesville Coal Co. were the first operators to put in mining machinery. In the month of September their miners came out on a strike against a reduction of ten cents per ton—eighty cents was the price paid previous to the miners stopping

work. After the strike had been in progress some time, the operators tried to effect a compromise at seventy-five cents per ton, but failed. They then organized a stock company, purchased mining machines, and they are giving good satisfaction. About the 15th of September, 1884, the miners working for the Parke County Coal Company, at their No. 2 mine, Rosedale, Indiana, instituted a strike for ten cents advance per ton for mining; they were receiving at that time eighty cents. The superintendent, Mr. Joseph Martin, offered them seventy-five cents per ton, and a contract for one year. The miners declined the offer; the superintendent told them that if they did not accept the proposition the company would be compelled to put in mining machines, as they could not compete in the markets with other coal at present price paid. Machines were purchased, although against the wishes of the company and superintendent, at a cost of \$16,000. The machines are giving entire satisfaction, and have come to stay. After the miners found the company were in earnest, they sent their committee to the superintendent, offering to accept the proposition and sign a contract for one year from that date; but then it was too late. The company had purchased the machines on trial, and they were determined to establish and give them a fair trial before trying to make any agreement with the miners.

The following facts have been demonstrated by the strike:

*First.* That the market can be supplied with coal independent of Clay county.

*Second.* That the coal of Indiana can be mined successfully by machinery, a fact disputed by a large number of miners before machines were put in.

*Third.* That the price of mining in these counties in the future will be paid the same as that in the competing districts.

#### COAL CUTTING MACHINERY.

It is only a question of time, and not far in the future, when the largest per cent. of the coal mined in the State of Indiana will be undercut by machinery; that is, when the roof will allow of its being done. Coal cutting machinery possess great advantages, to the working miners, over hand mining; one being in the easy method of undercutting, as this is invariably done at the bottom of the coal seam. The miner is re-

quired to sit down on the floor of the mine, commencing to undermine; this is sometimes wet in the dryest of mines—is always damp, and in advancing with his work he is compelled to lie down on his side, oftentimes in the water. This is the most laborious and exhausting labor the miner is subject to, and besides is the most unhealthy, oftentimes bringing on rheumatism and kindred diseases. The mining machines are worked with compressed air, furnished by an air compressor stationed on the surface, generally adjoining the engine house at the hoisting shaft. The compressed air is conveyed into the mines from the receiver in a large pipe along the main entry, and branch pipes are used to convey the air from the main pipe into the rooms to the machines. A piece of hose is attached to ends of these branch pipes, and a valve is placed to cut off the air; a connection is on the other end of the hose to attach to the machine. The coal is cut, or undermined, in the bottom of the seam by means of a heavy bar of solid steel with a forked point for cutting underneath the coal. This drill, or pick, is attached to the piston, which works straight out from the cylinder with great force, and will strike two hundred blows per minute. The pressure of air for ordinary working is about 50 pounds. There is a skilled operator placed in charge of each machine, who in some cases are paid by the day, and others are paid by the lineal foot and a certain depth underneath. A laborer is employed with each machine to shovel away the dirt, who is generally kept very busy. Sixty-six lineal feet, five feet underneath, is an average day's work of ten hours with a Harrison Cutting Machine. The rooms are driven thirty feet wide, and when a room has been undermined across the breadth, the machine is put on a truck and taken into the next one, and so forth, until three rooms have been mined, which are reserved for each machine. After a room has been mined and vacated by the machine men, then comes the shooter and blasts down the coal, and next the loader who loads up the coal. These men are generally paid by the day.

Another great advantage consists in the increased purity of the mine atmosphere; the coal cutting being by compressed air, which being liberated at the working faces forms a discharge or return current, which carries off the noxious gases as fast as they are generated. The coal mined with machinery is supe-

rior and more desirable for the market than that produced by hand labor, as it comes out in larger pieces and does not slack up as much on exposure to the weather, and will yield a much larger tonnage to the acre. The machines are only twenty-two inches in height, and are consequently adapted to any seam of coal of workable thickness. There has been opposition from the miners with the introduction of coal cutting machinery in the mines of Indiana, and I suppose always will be. A very bitter feeling prevailed at the time, and any person who expressed himself favorable to them was hooted at. But the impression is all wrong; no intelligent miner will oppose but will try and do the best he can along with them. Disputes may arise as they do with hand labor, but they will be easier settled, as there will not be as many men to deal with, as every machine will take the place of twelve miners. If coal cutting machinery can be made to reduce the cost of mining coal without reducing the wages, they will as surely supplant hand labor as labor-saving machinery has done in other branches of industry; and if they can not be made to reduce the cost of getting coal they will prove a failure, and be cast aside as worthless. The coal cutters are operated by compressed air, furnished with a 24-inch. Norwalk compound compressor, of the latest improved pattern. I have often heard miners say that it would be impossible to substitute machinery for their labor in cutting or undermining coal, and that their trade or occupation could not be interfered with by modern improvements and inventions. I can not understand why coal miners wish to monopolize their most laborious and dangerous employment, and I think any improvement or invention that will lighten their labors must prove a blessing to their families and themselves, instead of any injury.

## TO OUR EMPLOYEES.

PARKE COUNTY COAL Co., }  
ROSEDALE, INDIANA. }

*To all Employes of Mines Operated by this Company:*

All employes must observe the following Rules and Regulations while at work in or about the mines of this Company:

## TIMBERMEN AND SHOOTERS

Must thoroughly inspect all rooms and entries each morning before any men are allowed to work in same, and properly secure all unsafe places and take down any loose coal or slate that may be found, and at once secure any dangerous places that may be reported to them during the day.

## MACHINE MEN

Will carefully examine any place they may have to cut before commencing work, and see that the place has been made secure, and at all times keep a careful watch of the top or face coal, and ascertain by sounding, that everything is secure; and on finding anything unsafe to immediately report the same to his timberman, and have it secured at once, and under no circumstances is he to work or allow his shoveler to work under any coal or slate which is found to be unsafe, without same having been removed or made secure.

## LOADERS

Will exercise great caution in loading coal where top coal, slate, or clog is hanging to roof after shooting, and must remove same or report it immediately to the Pit Boss, Mine Superintendent, or their Timberman, and have same properly timbered at once; and they must, as far as in their power, remove all loose or hanging coal, either top or face, when cleaning up a room or

entry before leaving the same, and at all times keep a careful watch of any coal or slate overhanging, which is considered safe, and by sounding know that same continues in a safe condition, and to immediately take down or have properly secured any place found to become unsafe since previous examination.

ALL EMPLOYEES

Are expected to use all possible precaution in the exercise of their duties, and report immediately to the Pit Boss, Mine Superintendent or Timberman any unsafe places they may see, whether in their own rooms or in any entries of the mine.

IT IS THE DUTY

Of the Pit Boss and Mine Superintendent to see that these rules are properly complied with, and that they shall at all times see that all precautions are taken against accident, and that timbers are provided and used whenever needed, and that all places reported to them be immediately examined and secured, and that their Timberman protect at once any unsafe place that may be reported to them.

IT IS EXPECTED

That all employes will carefully carry out these regulations, as it is their own safety we wish to secure.

By order of the Company.

JOSEPH MARTIN,  
*Superintendent.*

After the great strike of 1884, which lasted three months from the first day of March, the miners in Clay county very reluctantly returned to work at seventy-five cents per ton for mining coal; but the price had to be reduced, although it was a big drop from one dollar to seventy-five cents. When the block or non-caking coal could be used for iron working and manufacturing purposes, it commanded a good price and the operators could afford to pay a good price for mining, but when the blast furnaces, rolling mills and manufactories commenced to shut down, owing to the great depression in business, it forced the block coal on the market in competition with inferior grades of

bituminous coal. The seams of the latter coal are a great deal thicker and can be mined and put on board cars much cheaper in every respect than block coal.

There are a number of companies now working under annual contracts, and others on a basis and sliding scale governed by the selling price of coal for the adjustment of wages in Clay county. The coal operators of Clay county that have no contracts made with their miners are governed by the contracts existing between the Drew & Wasson and Brazil Block Coal Companies.

#### MINING CONTRACTS, ETC.

The following mining contract was agreed upon between Drew & Wasson, and the miners under their employ :

“We, the undersigned committee representing the miners employed by the Drew & Wasson Coal Mining Company, on the behalf of ourselves and the said miners, do hereby agree and bind ourselves and the said miners to mine all coal for said coal company, from this date until the first day of May, 1885, for (80) eighty cents per ton of (2,000) two thousand pounds. We hereby agree not to demand or request any additional rate what ever during the said period, and the said coal company does hereby agree not to demand any reduction in the said rate of mining. In witness whereof, we have hereunto set our hand and seal this second day of October, 1884. This contract is in force from this day, and includes the Gartshire No. 1 and No. 2 mines.” The contract system is becoming more in favor every year, both by operators and miners, this insures peace and good feeling between employers and employes, and enables operators to pay better wages, and insures the miners more work, because the coal companies can make yearly contracts and can always depend upon getting the coal to fill them.

#### ARTICLES OF AGREEMENT,

Made and concluded this 28th day of August, eighteen hundred and eighty-four, between the Brazil Block Coal Company, a corporation of the State of Indiana, and owning and producing a majority of the block coal mined in this district, party of the first part, and Maurice D. Gray, John Morgan, Noah Stephenson, William Lynch and Alexander Maxwell, a com-

mittee of miners appointed and elected in pursuance of a resolution passed at a regular mass meeting of the miners, of a large majority of the miners of the Brazil Block Coal District, of Clay county, Indiana, held on the 18th day of August, 1884, and to whom power was given by said mass meeting to make a yearly contract and fix up a scale of prices for mining block coal, party of the second part.

Witnesseth, That the party of the first part agrees to pay the party of the second part for mining block coal for one year from September 1, 1884, as follows: For the month of September, 80 cents per ton; for the months of October and November, 85 cents per ton, and this is based on a wholesale selling price for coal at the mines to large manufactories and large coal dealers at Indianapolis, Greencastle, Terre Haute, Chicago and Milwaukee, at the rate of \$1.60 per ton at the mines, with the price of coal at 85 cents per ton, and of \$1.35 per ton at the mines, with the mining price at 75 cents; and the party of the second part hereby agrees to accept this price for one year, on the following conditions, viz: It is mutually agreed that after the end of November, if the wholesale price of coal at the mines should be increased above \$1.60 per ton, that the price of mining should be increased 40 per cent. of such increase, and if the price should be diminished below \$1.60 per ton, the price of mining should be reduced 40 per cent. of such reduction, and so continue to increase or diminish in that proportion for the balance of the year, but the price of mining shall not be reduced below 65 cents per ton, let the price of coal at the mines be what it may.

The said parties of this agreement hereby bind the parties they represent to faithfully carry out all the provisions of this agreement for the term of time specified, and further, if either party desire to change this agreement after its expiration, they shall give thirty days notice of such desire and intention, in which case a new agreement shall be made, to take effect after this shall expire. It is understood that the above named committee are to act for the miners during the year covered by this agreement.

It is further agreed that a meeting of the above parties shall be held on the third Saturday of November, 1884, and every thirty days thereafter, to adjust the price of mining for the next month.

In adjusting the price of mining at any time, the statement as to the selling price of coal at the mines of G. R. Root & Bro., A. B. Mayer & Co., and A. M. Kuhn, Indianapolis; Greencastle Nail Works, Greencastle; E. M. Smith, A. Eaton & Co., and L. Mallowery, Terre Haute; O. S. Richardson & Co., A. C. Brackenbush & Co., C. B. Niblock, and North Chicago Rolling Mill Co., Chicago; also the Chicago and Industrial Works newspaper, Chicago; and R. P. Elmore & Co., Milwaukee, shall be taken as final, and if there is a discrepancy in the statements, an average shall be made of the prices named by them, and on this average the mining price shall be fixed.

It is further agreed that all new men coming into the district and engaging to work for said company shall sign an acceptance of complying with this contract.

In witness whereof the several parties have hereunto set their hands and seals in duplicate the day and year first above written.

Signed,	BRAZIL BLOCK COAL Co.,	
	By D. C. JENNE, Pres.	[SEAL.]
	MAURICE D. GRAY,	[SEAL.]
	JOHN MORGAN,	[SEAL.]
	NOAH STEPHENSON,	[SEAL.]
	WILLIAM LYNCH,	[SEAL.]
	ALEXANDER MAXWELL.	[SEAL.]

In presence of H. R. Ireland, F. Welker.

BRAZIL, IND.....188...

I hereby agree to enter into the employ of the Brazil Block Coal Company at the ..... mine, as a miner of coal, from date until September 1, 1885, upon the terms of the foregoing contract, agreeing also not to be absent without leave, except in case of sickness or other unavoidable contingency that would prevent me from work; also to abide by the Rules and Regulations established by the said Brazil Block Coal Company for the government and regulation of their different mines.

In witness whereof the parties have hereunto set their hands and seals on the day and year above written.

.....	[SEAL.]
BRAZIL BLOCK COAL COMPANY,	
By .....	[SEAL.]

The Brazil Block Coal Company own and control the following named mines, viz: Blaine Shaft, Chicago Shaft, No. 3 Shaft, No. 5 Shaft, Briar Hill Shaft, Hancock Shaft, Bartlett Shaft, Campbell Shaft and Morris Shaft, aggregating eight hundred men that are under the employment of this Company; the miners named in this agreement and elected at the mass meeting are acting for the above mines.

The Crawford Coal Company and the miners under their employment have a contract similar to the one drawn up by the Drew & Wasson Coal Company and their miners; agreement entered into October 2, 1884, and expiring May 1, 1885.

The miners working for the Indian Creek Coal Company at Indian Creek Shaft, in Knox county, September 15, 1884, came out on a strike for an advance of ten cents per ton for mining; they were then receiving seventy-five cents per ton; after lying idle two weeks they returned to work on a compromise of five cents, making eighty cents.

The Lancaster Block Coal Company of Clay City, Indiana, after considerable trouble and loss of time during the year 1884, adopted a scale of prices according to the height of coal. At the time of my last visit to the mine in November they were working coal varying in height from three feet to four feet eleven inches; three feet four inches being taken as the standard, all coal three feet four inches and under, eighty-five cents, and all coal above three feet four inches seventy-five cents per ton was paid.

The miners working at the Sullivan Shaft, owned by the Shelburn Coal Company, instituted a strike on the 1st day of October, 1884, and a demand of ten cents per ton, the price paid at that time being eighty cents; after remaining out about three months they returned to work without any advance.

On the first Monday in April, 1884, the miners working at the Shelburn Shaft, owned and operated by the Shelburn Coal Company, declared a strike, which continued until the 1st day of September, 1884. They were receiving eighty cents per ton for mining. Caused by a notice posted up of ten cents per ton reduction. After the strike had been in progress some time the operators tried to effect a compromise at seventy-five cents per ton, but failed; after lying idle nearly six months they returned to work at seventy-five cents.

## RECOMMENDATIONS.

Miners and other workmen blasting coal, slate or rock should be compelled by law to use five (5) inches of copper on the end of all drills and tamping-bars when tamping blasts of powder in coal or other hard substances; this would prevent fatal and serious accidents, caused from the tamping-bars or drills striking sulphur and igniting the powder. This is a section in the mining laws of Illinois and some of the other States, and is having a good effect in preventing fatal and serious accidents.

Section 2, as it now is, gives the operator the right to employ as many persons as he sees fit, provided he has not fifteen thousand square yards excavated. This ought to provide that it shall not be lawful for an operator or operators to allow more than ten persons to work in any mine in every twenty-four hours after five (5) thousand square yards have been mined out. This would have our mines opened in a more practical manner. The practice with a majority of operators now is to crowd a large number of persons into a newly-sunken shaft before their entries are driven any considerable distance, consequently the mine is practically ruined in the opening, as rooms are turned off too close to the bottom of the shaft, and the coal is worked out so near that it brings on weight from the superincumbent strata, and the shaft is never safe to work in afterwards.

Section 3 of the Acts of 1881, in reference to surveying and mapping of mines, should be amended so that before a mine or any part of a mine that adjoins other coal lands is abandoned, to have a survey made showing the farthest extremity of the entries or rooms worked in such mine towards the lines of adjoining lands, and also to have it properly staked on the surface. A map should be also required to be made and furnished to the Inspector of Mines, to be filed in his office for future reference. This I regard important, as when a mine is worked out and abandoned, and fills up with water, it becomes a very dangerous element in case a mine should break into it from lands adjoining. Again, a great expense and annoyance in approaching an abandoned mine where the extent of the worked out territory is not known. The survey and map should be made by a practical surveyor, so that the accuracy of the sur-

vey could be relied upon. When a mine is worked out and abandoned, all trace of it may disappear in the course of a few years, especially when the surface has been cultivated.

Section 8 of the Act of 1879 should be amended so as to compel operators to sink a third opening where a furnace is used for ventilating, and is situated at the bottom of the escapement shaft. Escapement shafts or outlets should be provided with safe and convenient stairs at an angle of not more than sixty degrees, and with landings at easy and convenient distances; or there should be kept proper apparatus erected on the top of every outlet or escapement shaft, available for use at all times. These escapements should not be allowed to be clogged or obstructed with machinery, pumps, or anything that would hinder persons from escaping in case of immediate danger. If the head gearing and engine house should take fire and burn down, when a mine has two openings and a furnace is used at the bottom of the air or escapement shaft for ventilating, the whole underground force would be suffocated to death. On account of the furnace being located at the bottom of the air shaft and being the upcast for the air, the main or hoisting shaft would be the downcast, and the smoke and heat from the burning building would be drawn into the mine until the fire at the main building should get to be the strongest. It would then produce an upcast of air, and the furnace shaft would be the downcast, and the smoke and heat from the furnace would be circulated through the avenues of the mine; consequently there would be no means of escape for the miners. If, however, fans were used for ventilating, placed at the top of the air shaft, stairways could be built in the shafts for the accommodation and escape of the miners. In case of accidents, the stairways would not interfere with the ventilation of the mine, and would not be in any danger of being burnt out. The fan would continue to run as long as there was any steam in the boiler; the air shaft would be the downcast, and consequently the air current would be in one direction as long as the fan continued to run. It would supply the miners with fresh air until they could be rescued.

This section provides that every such mine shall have ventilation affording one hundred cubic feet per minute for each and every person employed in such mine, which shall be circulated through the main headings and cross headings, to an extent

that will dilute and render harmless the noxious gases generated therein. The section should also be amended as to the manner of circulating in the rooms.

The law should also require breakthroughs in every room, at least every seventy-five feet. In this case, with rooms running parallel with each other, and the amount of air circulating on each entries passing each room, sufficient air would circulate through the rooms to thoroughly ventilate them. Some of the miners claim that the air current should be conducted into every room; but this could not be done, nor should it be demanded, as it would require a door at every room, and would be a continual and unnecessary expense to the operators. I hope at the next meeting of the General Assembly these important matters will not be overlooked. Mine owners or operators should be required by law to drive air courses parallel to all entries for the proper circulation of air in ventilating a mine, such air courses not to exceed seven feet in width, and sufficient pillar of coal left between them to secure the roof from falling on account of weight of the superincumbent strata forming the roof over the coal seams.

Section 10 of the act of 1879 enacts that no owners or agent of any coal mine shall place in charge of any engine used for conveying into or hoisting out of such mine persons employed therein, any but experienced, competent and sober engineers. Complaints have been made to me from miners that they have had to risk their lives in the hands of incompetent, drunken and careless engineers. Now, who is to be the judge in this matter. Not the Inspector, unless he should find an incompetent person in charge of an engine, or should see an unlawful act of an engineer while on duty, or have proof that others had. In any of these cases the Inspector should have the power to remove him at once. The law should define who shall be the judge in these cases, and by what rule he shall be governed. If it is to be left to the Inspector, then the person in charge of the engine should be required to produce a certificate of competency, showing that he has had charge of a hoisting engine for at least two years, or that he has served as an apprentice for at least that time, and it ought to be left to the Inspector to pass upon his competency.

An additional section should be added to the mining law for statistical purposes, to enable the Inspector to ascertain the

product of our mines. It should be compulsory upon operators to furnish the necessary statistics to the Inspector on application to enable him to make his annual report. The law makes it the duty of the Inspector to collect the coal tonnage and capital invested, but does not compel the operators to furnish the information. Provision should be made by law for the giving of this information, or all efforts in this direction should be abandoned. Four and five applications have to be made to some of them, and they fail to comply with the request. This is very unsatisfactory, and should be remedied.

Mine bosses should also be required to visit their miners in their working places at least once every day, where they employ from ten to fifty miners, and once every two days when they employ more than that number. It is the duty of the mine boss to put in his time amongst his miners and day hands, and the company that employs him expects him to do that, and pay him for that purpose. I have been told by miners that they do not see the bank bosses in their working places once a month, but can find them at the bottom of the shaft, or at one of the partings. Such men should be removed and their positions filled by men that will take an interest in the welfare of the persons that are in their employ, and look after their safety. Miners, as a class, become careless, more especially the experienced ones. They are often aware of the risks they take, but want to do something else before they secure the place, and think they know just when a loose piece of slate is going to fall. A large per cent. of our mine accidents happen in this way. One very seldom hears of a new hand, or greenhorn, as he is commonly called, getting killed or hurt, unless he is working with an experienced miner, and relying on his judgment of the latter as to safety.

Section 19 of the act of 1879 makes it the duty of the Mine Inspector to examine all machinery and boilers used for generating steam at all coal mines in the State. Some of the boilers in use look, from an external examination, as if they are in an unsafe condition. I am free, however, to confess that I can not tell whether a boiler is in a safe condition without going inside of it. All boilers used in generating steam in and about coal mines should be kept in good order, and the agent, owners or operator should have the boilers examined by a competent boiler-maker, or other competent person, as often as every

six months, or oftener if the Inspector deems it necessary. The result of such examinations should be certified in writing to the Mine Inspector. Our mining law should be made to apply to all mines in the State, as a man's life is just as dear to him or his family if he is working where there is only three or four men as if he was working where there is that many hundred, and he is entitled to the same protection.

Section 21 says that no boy under (14) fourteen years of age shall be employed to work in any of the mines of this State. This section of the law is being continually violated by the miners of the State. I am confident that sworn affidavits are furnished by parents and guardians of minor children, but the operators are not to blame for this. If they demand affidavits from parents, and receive them, they are doing their duty. Again, miners will take their children into the mines to help them, but will not demand cars for them from mine foremen. The law should read that no boy under fourteen years of age shall be harbored about or allowed to go into any of the mines of this State.

Whenever a mine or mining place is so situated that it can not be conveniently worked without a ditch or drain to convey the water away from such mine, which shall be necessary to pass over or through lands owned or occupied by others, the owner or operator of any such mine or mining place may enter upon such lands and construct a ditch of sufficient width and depth to convey the water that may be drawn, pumped or drained from such mine so as not to overflow said lands, and upon complying with the law in relation to the exercise of the right of public domain; but the owner operator or leasees of any mine shall not injure or destroy any growing crops, nor unnecessarily interfere with anything upon such lands.

Again, I say there ought to be a section in our mining law in reference to the duties of Inside Bosses. A mine boss should be compelled by law to visit the working faces in his mine once every day. This would prevent a large number of accidents. Miners as a rule become careless, and should be compelled to secure their working places, when there is danger. Mine bosses should keep a careful watch over their employes, the ventilating apparatus, air-ways, traveling-ways, and the timbering, to see, as the miners advance in their excavations, that all loose slate rock, soap stone, or coal is taken down or secured,

so that no danger can occur from this source. Miners have to do timbering daily, and have loose rock, slate, or coal daily. Then the visits of an Inside Boss should be daily, in order that he may keep a strict watch over employes, and warn them of the danger that they are often subjecting themselves to. The State of Pennsylvania has a section in its mining law defining the duties of bank bosses, which has a good effect, and is giving general satisfaction. The mines of Indiana are not as dangerous as those of Pennsylvania, but our mines are becoming more extensive every year, our miners are increasing in numbers. We are sinking deeper into the earth in search of coal, gases will be met with, consequently the necessity of competent and experienced men in charge of the mines acting in the capacity of mine foreman. Men who do not know the science or theory of mining should never be placed in charge of mines. They do not know the extent of the injury and danger to which they are subjecting their men every day. An incompetent mine foreman will have a worse ventilated mine, will produce less coal per day at greater cost, and will take one-third less aggregate tonnage from the lease, and lose more men by accident than a competent foreman will with the same capital invested, and under the same conditions. The want of educated mining engineers, practically educated, is beginning to be seriously felt, but not appreciated. Waste surrounds us on all sides; our coal beds are so magnificent, and our coal fields so extensive that the waste is not now noticed, though it can not fail to be felt in the future. If we could see the thousands of dollars annually wasted, instead of the tons of coal that is annually buried from view and past recovery, we should then appreciate the want of skill and improvement, and the value of experienced men in charge of our mines.

A man, or a company of men, for instance, will lease or buy a tract of land for the purpose of mining coal. Being men, probably, of no experience whatever, they will sink a shaft and open up a mine on the clap-trap system of working to produce cheap coal, and they will crowd a large number of men into their mine before they have driven the entries any considerable distance from the bottom of the shaft; the coal is worked out too close to the bottom of the shaft and the mine is practically ruined. They hire a man to take charge of the inside workings who knows nothing about the ventilation or system of working

a mine, and the consequence is they can not circulate air through the workings of a mine. The miners thus suffer in health, caused from working in impure air, and the land owners lose to a great extent financially from it. We have some competent and very practical men in charge of mines in our State, and again we have some others that ought to be mining coal.

Another very important matter that will come before the Governor and members of the Legislature is the appointing of a Mine Inspector. The Inspector should possess the technical knowledge of a civil or mining engineer, the practical experience of a mine superintendent. He should be a man who had followed mining coal for a number of years; he should also possess a thorough knowledge of mechanical laws and appliances, and the chemical constituents of dangerous gases, a familiarity with legal methods, and sufficient force and intelligence to give weight to his rulings and a value to his reports; he must also recognize and act upon complaints which may be made to him, involving violations of the law, and, in brief, constitute himself the guardian or advisor of the mining population, so as to reduce as much as possible the numerous perils of their occupation. In order to give entire satisfaction in this matter the miners must act in conjunction with the Inspector, and report to him all violations of the law during his absence, and also on his regular visits to the mines, after personal examination of the different mines; and failing to discover or have pointed out to him by the mine foreman any failure of the operators to comply with the law, if the miners refuse or neglect to notify the Inspector, they are to blame and no one else. There is no man acting in the capacity of Mine Inspector, no matter how qualified or familiar with his duties and the underground workings of the different mines, can discover all deficiencies in the ventilation and the general safety of the mines. Some of the miners contend that an Inspector should make a personal inspection of all rooms in the different mines of the State; This would be a physical impossibility; besides the law does not require him to do so; that is one of the duties of the mine foreman. If the Inspector traverses the entries and air-courses of the different mines of the State, he is doing his duty, except his attention is called by any one to any room or rooms in the mine; it is his duty to examine such places, and if any deficien-

cies are found therein, have such places safely secured immediately. He should be capable, ready and willing to give advice when called for, advance new ideas when necessary, and, in brief, be a general instructor for all who need advice in reference to mines and plans of mining, and in his dealings with mine operators and miners' committees he must not be too arbitrary or too conservative in his decisions; he must not attempt to please every one, but must act in compliance with the laws, and see as far as practicable that every one else does the same.

Section 16 of the Acts of 1879, provides for the examination of ropes by some competent person every morning before the men are allowed to descend into the shaft; is a very good amendment, but I think it should be further amended by an additional safeguard, viz: That safety catches (appliances for stopping and holding the cage in the event of a rope breaking); these appliances should be attached to every cage where persons are lowered and raised into and out of the mines. The General Assembly, in the year 1883, passed an act prohibiting the use of hempen or grass ropes at coal shafts, where persons are lowered and raised up and down coal shafts, which was a very wise amendment. Apart from the question of safety to the lives of persons employed, and considered only in a commercial view, the investment would be an economical one for the operators, for the cost of these catches would be very trifling in comparison to the destruction of property in case of the breaking of a rope. The Winnenour's patent safety appliance is the best and most reliable safety catch ever invented for coal shafts, cages, etc. It is an absolute safety for the prevention of life and the destruction of property in the event of a rope breaking. This invention was gotten up principally for coal hoisting, cages, elevators, etc. Its object is to produce a hoisting cage or elevator in which, should the rope or chain break, the car and cage will be instantly and certainly stopped in its descent in the shaft guides, by a system of gravity brakes or levers, as applied to the platform. The platform is supported in hangers connected to the arms of the bail, and are connected at the upper ends by a cross-brace. Standards or upright pieces called jaws, with spaces between them to form the grooves for the slides in the shaft, are secured at the lower ends to the platform and are connected to the vertical jaws by wrought iron stirrups. The outer edges of the standards are

metal-faced and provided with pulleys, four in number, two for each standard, on axles at right angles to the edge faces of the standards. Rods traverse the underside of the platform transversely and are secured to the platform. The end of these rods project beyond the sides of the platform and on these projecting ends and pivoted weighted levers or dogs (four, two for each guide). The ends of the rods pass through the dogs near the front ends which are beveled so that they will bite into the guides when in contact therewith and stop the descent of the cage. Guard stops are provided, one for each catch, and each catch is also provided with a spring which holds its catch in position with the guide rail. Chains are attached to the outer heavy ends of the catches, which pass under pulleys, thence over pulleys which are provided with guards, to keep the chains in position and ready for action. As the cages are operated by the hoisting rope, the catches are out of action with the slides and are inoperative; but should the hoisting rope break, the catches instantly spring into action with the guide rails and stop the cage. The beveled sides of the catches biting into the guides, the more weight that happens to be on the cage in case the rope breaks the sooner it will be stopped and the firmer it will hold. This appliance is cheap, simple and durable, and is positive in its action. There is nothing about it that can get out of order excepting the ropes, which when broken will permit of no other damage, and may be easily replaced.

#### VENTILATION

Has received considerable attention the past few years. A majority of our coal operators now realize the fact that good air in a mine is one of the most important considerations to be looked at in the economical working of a mine, and they are studying the different systems and appliances for producing effective ventilation. Natural ventilation can not be relied on, and steam jet ventilation of sufficient power to air an extensive mine is entirely too expensive, as the excavations are extended with entries and rooms branching out in every direction. Natural ventilation amounts to nothing, as the atmosphere is alike on shafts of the same area and of the same surface level; consequently there is no circulation of air, more especially in

the hot and sultry seasons of the year, as when the atmosphere and the warm air of the mine are alike in density. In the cold seasons of the year, when the atmosphere is dry, frosty and light, it don't offer the same resistance to the rarified air of the mine. In these seasons of the year there will be a slight circulation of air. If, for instance, there are two shafts of different surface elevation and connected under ground, and of the same sectional area, the one on the highest elevation will be drawing upcast in the summer season and downcast in the winter.

Steam jet ventilation is still in use at some few shafts, but it is of no avail. A strong exhaust from a mine pump running constantly, or a strong blower situated at the bottom of a dry shallow shaft, where a mine is of small interior dimensions, where there are not many mines at work, it will ventilate. In case of deep, wet shafts, the exhaust steam condenses before it reaches any distance up this shaft, and condenses and falls back in the form of spray, which retards the column of air and produces no circulation.

Furnace ventilation is still in use by a great many of our mine owners, but recently fans are receiving a good deal of attention and are becoming the favorite appliance. I do not recommend the furnace, except in case steam power is not used for hoisting coal. In that case the fan would be as much expense as the furnace, as it would require an extra engineer and boiler, etc., to produce steam, and as much would be used as with the furnace. In case a fan is used the regular hoisting engineer can attend to both, as all he has to do is to turn on steam in the morning and turn it off at night. If a furnace is used it should be situated at the bottom of the ventilating shaft. Deep shafts are better adapted to this mode than shallow ones, as the principle of hot air ventilation is, the more heated column of air there is the stronger will be the volume of air, and consequently the more effective will be the ventilation. A furnace should have a sectional area fully as large as the air courses of the mine (side chambers). Spaces left between the furnace walls and pillars of coal, are beneficial to the ventilating current. They also prevent pillars from taking fire. In building a furnace it adds to its efficiency to elevate the bars about one foot in six until the upcast shaft is reached. The quantity of air would be, in a properly constructed furnace, about 5,000 cubic feet per minute for every foot in width of fire. The depth of

shaft, its freedom from water, the size of air courses in the mine, and the temperature of the atmosphere, all combine in determining the amount of air that can be circulated through a mine by furnace ventilation, but the principal object is in the proper laying off of the mine. It is no trouble and requires no skill or ability to produce a large current of air in a mine, but to properly conduct it to the extremities of the workings is the principal point in view, and to accomplish this thoroughly the mine must be laid off on the double entry system. Air will take the shortest course to the return airway, and will never fail to escape when there is an opportunity offered. There is a great advantage in splitting air currents of a mine into numerous splits. A much larger quantity of air can be propelled by a given power through air passages than through a single air passage, owing to the decreased velocity, and larger aggregate area of the air courses, and large air courses are essential to good and efficient ventilation.

#### STEAM FANS FOR VENTILATING COAL MINES UPCASt OR DOWNCAST.

The latest and most improved fans, as well as the cheapest and most durable, are now being manufactured by William E. Cole, of Washington, Indiana. It has been clearly and satisfactorily demonstrated beyond a doubt that the most reliable and economical device yet obtained for ventilating coal mines is the fan driven by steam power. It is an established fact that the cost of a fan and engine combined, with the necessary casing, etc., exceeds but very little the first cost of a furnace to obtain the same amount of ventilation. The fan is driven by steam taken from the main boiler under charge of the hoisting engineer, and the cost of running is almost nothing, as the steam required is not missed, while the cost of keeping a furnace in operation will reach from \$300 to \$500 per year, or more than the entire cost of fan and engine complete. The ventilation by the fan can be varied to meet the requirements of the mine, which can not be done with a furnace; the fans are a great saving in case of shafts dripping water, as the volume of air can be reversed through the entire mine, no matter of what extent, in two minutes time; thus preventing hoisting shafts from freezing up and delaying the hoisting of coal, besides tearing out and destroying the guides in the shaft. By keeping the

fans blowing or forcing the air down, the air or fan shaft in extreme cold where shafts drip water, occasionally they will freeze up; then by reversing the air, and making the fan discharge the warm air of the mine will thaw the ice out in a few minutes; but not so with the furnace, it is a continual draw, and the main shaft is always the downcast, and the heavier the fire in the furnace the stronger will be the current of air down the main shaft. Say for instance, there is from twenty to thirty-five thousand cubic feet of frosty air per minute going down a shaft of from forty to sixty cubic feet of area makes it colder in the shaft, and consequently will freeze up sooner than it will in the open air on the surface.

#### 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 compositions 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 and the downcast being 32°, 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 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 guage in testing the power of ventilating apparatus? Give a rule for calculating the same.

If the water guage shows a depression of  $\frac{6}{16}$  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  $\frac{3}{8}$ -inch chain?

Describe some of the best forms of safety-catches, and their mode of action.

What kind of a 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 precaution 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 received certificates of competency.

As the mine 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 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 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 introduced to the working face of a mine in which are employed one hundred and fifty men and fifteen animals? What would 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 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 three 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  $60^{\circ}$ , and that of the up-cast shaft a temperature of  $160^{\circ}$ ?

If, by the expenditure of three-horse power you create a current of 40,000 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 down-cast and up-cast 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, over-casts 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 an hoisting engine do you consider best for a coal shaft, and what is the rule for finding the horse-power of an engine?

If you have an engine of sixty-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 incline plane with a grade of one inch in three?

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 one hundred feet, how much coal would you leave as a safe barrier between the two? and if you should tap it in a two-inch hole, what would be the number of cubic feet of water discharge per minute?

In case a mine were making fifty cubic feet of water per minute, and had a sump that would hold twenty hours' water, and a pump that would raise it in fifteen 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 experience 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, overcasts and directions 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 air-ways, 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 quantity 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 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 when 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 down cast, and, if so, which would you prefer?

20. How would you supply 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 instruments 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 outlets, 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.

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 when 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 timber for shaft, slope, and drift.

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## CHAPTER LXXXVI.

### 5460. MINES—MAPS.

3. At the request of the owner of any coal mines, the owner of the land, the miners working therein, or any other person interested in the working of such mine, the Mine Inspector shall cause to be made an accurate map or plan of the workings of such mine, on a scale of not less than one inch to the one hundred feet, showing the area mined and excavated, and the location and connection of the lines of all adjoining lands with such excavation of the mine, and the name of the owners of such lands, so far as known, marked on each tract of land. Such map shall show the complete working of the mine, which map, when completed, shall be sworn to by the Mine Inspector to be a correct map of the working of such mine, and shall be kept on file in the office of the Mine Inspector, for inspection at all times. The Mine Inspector shall be allowed a reasonable fee for making such survey, provided that he employs a surveyor to make the same, but he shall not be allowed anything for making the map of same. All expenses shall be paid by the party causing such survey and map to be made.

[1881, page 8. In force March 5, 1881.]

## 5473. MINE INSPECTOR—APPOINTMENT—OATH—BOND.

17. Within thirty days after this act shall take effect, the Governor, with the advice and consent of the Senate, shall appoint a Mine Inspector, who shall hold his office for two years, and until his successor shall be appointed and qualified. Such Inspector shall be a resident of the State of Indiana, and a practical miner in said State; and no person shall be eligible to hold the office of Mine Inspector who is or may be pecuniarily interested in any coal mine within this State, directly or indirectly. Said Mine Inspector, before entering upon the duties of his office, shall execute a bond, with sufficient surety, payable to the State of Indiana, in the sum of one thousand dollars, for the faithful discharge of the duties of his office, which bond shall be approved by and filed with the Secretary of State. He shall take an oath of office, which may be indorsed on the back of his bond.

## 5474. OFFICE—SALARY.

18. The Mine Inspector shall hold his office in some central part of the mining district, and for his services he shall receive the annual compensation of fifteen hundred dollars, to be paid on the first day of January, April, July, and October, of each year, out of any moneys in the State Treasury not otherwise appropriated.

[1881, p. 8. In force March 5, 1881.]

## 5479. TO WHAT MINES ACT DOES NOT APPLY.

3. Nothing in this act, or the act which this act amends, shall apply to any coal mine where there are less than ten men used in and about such mines.

## 5480. INSPECTION OF SCALES—NOTICE—PENALTY.

4. It shall be the duty of the Mine Inspector, in addition to his other duties, to examine all scales used at any coal mine in this State for the purpose of weighing coal taken out of said mine; and on inspection, if found incorrect; he shall notify the owner or agent of any such mine that the same is incorrect, and after such notice it shall be unlawful for any owner or agent

to use or suffer the same to be used, until the same is so fixed that the same will give the true and correct weight. Any person violating the provision of this section shall, upon conviction, be fined in any sum not less than ten dollars nor more than one hundred for each day or part of the day the same is so used.

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## CHAPTER X.

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An act regulating the working of coal mines, and declaring a lien upon works and machinery for work and labor in mining coal, and for royalty on coal, and providing penalty for the violation thereof, and providing for the appointment and qualification of Mine Inspector, and prescribing his duties, and declaring an emergency. Approved March 8, 1879.

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana,* That the term mine, as used in this act, includes every shaft, slope or drift which is used or has been used in the mining and removing of coal from and below the surface of the ground.

SEC. 2. Six months from and after the taking effect of this act, it shall not be lawful for the owner or agent of any coal mine operated, or which may be hereafter opened, worked by shaft, or slope or drift, within over fifteen thousand square yards have been excavated, to employ more than ten persons to work in such mine, unless there are, to every seam or strata of coal worked in such 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 or egress are always available to the persons employed in the mine; but it shall not be necessary for the two outlets to belong to the same mine; and to every mine opened, after the passage of this act, and after fifteen thousand square yards have been mined out, it shall be unlawful for the owner or agent to employ more than ten persons to work in said mine in every twenty-four hours, unless there is two distinct outlets; also, in all slopes, drifts and main entries, a sufficient number of refuge holes shall be established.

SEC. 5. Upon the payment of the fees the Mine Inspector shall, within a reasonable time, make and deliver to the party so demanding the same, an accurate copy of any map or plan of the workings of such mine, that may be on file in his office.

SEC. 6. The original map or plan of any coal mine, or the copy filed with the inspector, or a certified copy, issued under the hand and seal of such inspector, shall be evidence in any Court of Justice in this State.

SEC. 7. The term owner, as used in this act, is hereby defined to mean the immediate proprietor, lessee, or occupier of any coal mine, or any part thereof, and the term agent is hereby defined to mean any person, other than the owner thereof, having the care and management of any coal mine, or any part thereof; and in case the mine is owned or occupied by a corporation, then any of its officers shall be deemed its agent.

SEC. 8. The owner or agent of any coal mine shall, within six months from the time this act takes effect, provide and establish a circulation of sufficient amount of pure air to dilute and expel therefrom the noxious and poisonous gases, to such an extent that the entire mine shall be in a fit state, at all times, for men to work therein, and be free from danger to their health and lives from said gases and impure air; said ventilation to be produced by any suitable appliance that will produce and insure a constant supply of pure air throughout the entire mine, but in no case shall a furnace be used at the bottom of the shaft in the mine where the hoisting apparatus and buildings directly over the top of the shaft, for the purpose of producing a hot up-cast of air. Every such mine shall have ventilation affording one hundred cubic feet per minute for each and every person employed in such mine, and shall be circulated through the main headings and cross headings, to an extent that will dilute and render harmless the noxious gases generated therein.

SEC. 9. When a place is likely to contain a dangerous accumulation of water or gases, the working, approaching such place, shall not exceed eight feet in width, and there shall be constantly kept, at a sufficient distance, not less than three yards in advance, at one bore hole near the center of the workings, and sufficient flank bore holes on each side, and where two veins are worked in the same shaft, the upper shall be so protected that no danger will occur to the miners working in the lower vein.

SEC. 10. No owner or agent of any coal mine shall place in charge any engine used for conveying 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 six (6) men ride on any cage or cart at any one time, and no person shall ride upon a loaded car or cage when the same is being hoisted out of or being conveyed into the mine.

SEC. 11. The owner or agent of any coal mine operated by shaft or slope shall provide a sufficient cover overhead on all carriages or cages used for lowering or hoisting persons in and out of the mine, and on the top of every shaft an approved safety gate, also an approved safety spring on the top of every slope, and an adequate brake shall be attached to every drum or machine used for lowering or raising persons into or out of all shafts or slopes, and also a proper indicator (in addition to any mark on the rope) which shows to the person who works the machine the position of the cage or load in the shaft, 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 to the other without passing over or under the cage or other hoisting apparatus.

SEC. 12. The agent or owner of every coal mine, shaft or slope, at the end of six months from the time this act takes effect, shall keep the top of every shaft or slope, and the entrance thereof, securely fenced off by vertical or flat gates covering and protecting the mouth of such shaft or slope, and the entrance of abandoned shaft or slope be securely fenced off, so that no injury can arise therefrom. The owner or agent, or either of them, violating the provision of this section, shall be fined in any sum not exceeding one hundred dollars for each day or part of day the same is violated.

SEC. 13. Any miner, workman, or any other person, who shall knowingly injure or interfere with any safety lamp, air-course, or with any brattice, or obstruct or throw open doors, or disturb any part of the machinery, or ride upon a loaded car

or wagon in any shaft or slope, or do any act whereby the lives or health of the persons, or the security of the mines and machinery are endangered, every such person shall be deemed guilty of a misdemeanor, and, upon conviction, shall be fined in any sum not exceeding ten dollars.

SEC. 14. The Mine Inspector, miners employed and working in and about the mine, the owner of the land, or other persons interested in the royalty or rental of such mine, shall, at all proper times, have full right of access and examination of all scales, machinery, or apparatus used in or about said mine, including the bank book in which the weight of coal is kept, to determine the amount of coal mined, for the purpose of attesting the accuracy.

SEC. 15. In all coal mines in this State the miners, and other persons employed and working in and about the mine, the owners of the land, or other persons interested in the rental or royalty on the coal mined therein, shall have a lien on said mine, and all machinery and fixtures connected therewith, including scales, coal bank cars, and everything used in and about the mine for work and labor performed within two months, and the owner of the land, for royalty on coal taken out from under his land, for any length of time not exceeding two months; and such liens shall be paramount to, and have priority over all other liens, except liens of State for taxes, and such liens shall have priority, as against each other, in the order in which they accrued, and for labor over that for royalty on coal. Any person, to acquire such lien, shall file in the Recorder's office of the county (where) the coal mine is situated, within sixty days from the time the payment become due, his notice of his or their intention to hold a lien upon such property for the amount of his claim, stating in such notice the amount of his or their claim, and the name of the coal works, if known, or any description, describing the location of said mine; and the Recorder shall record the said notice, when presented, in a book used for recording mechanics' liens, for which the Recorder shall receive a fee of twenty-five cents. Suit brought to enforce any lien herein created, shall be brought within one year from the date of filing said lien in the Recorder's office, and all judgments rendered on the foreclosure of such liens shall include the amount of the claim found to be due, and with interest on the same from the time due, and with

a reasonable attorney's fee, the judgment to be collected without relief from valuation, appraisement or stay laws. For all wages due the miner, or other person working in or about the mine, shall be due and payable on the second Saturday, month after month, in which the work was done, and all payments to be made in bankable funds of the State of Indiana.

SEC. 16. The rope used for hoisting and lowering, in every coal mine, shall be examined by some competent person every morning before the men descend into the shaft; and when gas is known to exist, there shall be a competent fire-boss whose duty it shall be to examine each and every place in the mine before the men are permitted to enter and work; and the said fire boss shall be at the mouth or bottom of the mine each day to inform every man as to the state of his room or entry; said works to be carefully examined every morning with a safety lamp, by a competent person, before any workmen are allowed to enter.

SEC. 19. It shall be the duty of the Mine Inspector appointed under this act, to enter, examine and inspect any and all coal mines, and the works and machinery belonging thereto, at any reasonable time by day or by night, but so as not to hinder or obstruct the workings of such coal mines more than is reasonably necessary in the discharge of his duties, and the agent or owner of such coal mine is hereby required to furnish the necessary facilities for such entry, examination and inspection; and should the owner or agent fail or refuse to permit such inspection, or furnish such facilities, the owner or agent so failing shall be deemed to have committed a misdemeanor, and it is hereby made the duty of such Inspector to charge such owner or agent of such violation, under oath, in any Court of jurisdiction, and upon conviction the owner or agent, or either or both, shall, upon conviction, be fined in any sum not exceeding one hundred dollars for each offense.

SEC. 20. The Inspector, appointed under this act, shall devote his entire time and attention to the duties of his office; he shall make personal inspection, at least twice each year, of all coal mines in this State, and shall see that every precaution is taken to insure the health and safety of the workmen therein employed, and that the provisions and requirements of this act are faithfully carried out, and that the penalties of the law are enforced against all who willfully disobey its requirements;

he shall also collect and tabulate the following facts: The number and thickness of each vein or strata of coal, and their respective depths below the surface, which are now worked, or may be hereafter worked, the kind and quality of coal, how the same is mined, whether by shaft slope or drift, the number of mines in operation in each county, and the owner thereof, and the number of men employed in each mine, and the aggregate yearly production of tons from each mine, together with an estimate of the amount of capital employed at each mine, and any other information, relative to coal mining, that he may deem necessary, all of which facts, so tabulated, together with a statement of the condition of mines as to safety and ventilation, he shall freely set forth in an annual report to the Governor, together with his recommendation as to such other legislation on the subject of mining as he may think proper.

SEC. 21. No boy under fourteen years of age shall be employed to work in any of the mines in this State.

SEC. 22. Any person violating any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined in any sum not exceeding five hundred dollars for each offense.

SEC. 23. Whereas, there is no law now upon the subject of ventilation, and there is therefore an emergency for this act taking effect, therefore the same shall be in force from and after the 1st of May, 1879.

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## CHAPTER LIX.

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An act to amend section 16 of an act entitled "An act regulating the working of coal mines, and declaring a lien upon the works and machinery for work and labor in mining coal, and for the royalty on coal, and providing penalty for the violation thereof, and providing for the appointment and qualification of Mine Inspector, and prescribing his duties and declaring an emergency," approved March 8, 1879, and to amend section 4 of an act supplemental to said act, approved March 5, 1881, being sections 5472 and 5480 of the Revised Statutes of 1881, and adding a supplemental section thereto.

[Approved March 3, 1883.]

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana,* That section sixteen of the above entitled act, being section 5472 of the Revised Statutes of 1881, be so amended as to read as follows: Section 16. The rope used for hoisting and lowering in every coal mine shall be a wire rope, and shall be examined by some competent person every morning before the men descend into the shaft. When gas is known to exist there shall be a competent fire-boss, whose duty it shall be to examine each and every place in the mine before the men are permitted to enter for work; said fire-boss shall be at the bottom or mouth of the mine each day, to inform every man as to the state of his room or entry. Said work shall be carefully examined every morning with safety lamps, by a competent person, before any workmen are allowed to enter.

SEC. 2. That section four of the above entitled act, being 5480 of the Revised Statutes of 1881, be so amended as to read as follows: Section 4. It shall be the duty of the Mine Inspector, in addition to his other duties, to examine all scales used at any coal mine in this State for the purpose of weighing coal taken out of said mine, the same to be tested by sealed weights, to be furnished to said Mine Inspector by the Auditor of State, the cost of which is to be audited by the Auditor of State, and paid out of any money in the State treasury not otherwise appropriated. And, on inspection, if found incorrect, he shall notify the owner or agent of any such mine that the same is incorrect, and after such notice, it shall be unlawful for any person or agent to use, or suffer the same to be used, until the same is so adjusted and the same will give the true and correct weight.

Any person violating the provision of this section shall, on conviction, be fined in any sum not less than ten nor more than one hundred dollars for each day or part of a day the same may be used.

SEC. 3. Whenever the mining of coal is paid for by the weight, the persons employed in mining the same, shall have the right of selecting and keeping in the weigh office, or at the place of weighing the coal, a check-weighman, who shall have the right to inspect the weighing of coal so mined by such miners; the miners to select and pay their said check-weighman.

For the benefit of persons unacquainted with mines and mining terms, I have inserted the following:

## GLOSSARY OF TECHNICAL MINING TERMS.

**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.

**Air-way**—(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-stack**—The chimney on top of the upcast shaft.

**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.

**Black Band**—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 gun-powder 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.

**Brettice**—A partition made of plank to force air forward or prevent it from returning by the shortest route to the upcast.

**Brettice-cloth**—A trap door made of canvass 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

**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 an 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 under ground reaching up to the surface.
- Charge—(See Shot.)
- Davy Lamp—(See Safety Lamp.)
- Dead-work—The expense of operating a mine, less the cost of digging 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.
- Downdrop—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 parallel 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 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 in the upcast shaft for a return current of air.

Dip Heading—(See Dip Entry.)

Deputy—Under mine boss.

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.

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 fire-place 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).

Gases—The deleterious air of mines.

Gob—The rubbish left in a 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.

- Half-course—Working at half-angle across the slips of the coal.
- Half-pitch—Dipping or rising eighteen 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—The saddle-like roll which rises in the floor of the mines for two or three feet in height. This fault is now indiscriminately applied to every mining trouble or fault by American miners.
- 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.
- 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 with 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.

**Manager**—The officer having charge of the superintendence of mines outside and inside.

**Manway**—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 mines.

**Mine**—A subterraneous excavation from which coal or other minerals is extracted.

**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.

**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.

**Overman**—(See bank boss.)

**Overwind**—To pull the cage up to the pulley wheels of the head frame.

**Ostler**—The person who feeds the horses and 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.

**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 twelve to fifteen inches in length, sharpened at both ends, and has a handle twenty-eight to thirty inches long.

Pumper—A person employed to pump water in a mine by hand-power.

Pulley Wheels—The large wheels on top of the pit-head frame, over which the winding rope passes.

Powder—Blasting powder.

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 a 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 in the rib side or pillar of a room.

Range—A lift or square of workings.

Road—The mine track.

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 twenty-five or thirty degrees, having iron bars securely fixed in the frame, from three-eighths of an inch to two 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 days work when miners are working by the day.

Shot—A 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 tippie 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 Gate—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.

Tip—(See tippie.)

Tippie—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 room of miners.

Timbers—The wooden structures planted in a shaft, slope or drift until solid ground is reached.

Track—The road for hauling coal.

Tracklayer—One who lays track in a mine.

- Tunnel—An entry driven through rock in a mine.
- Trapper—A boy employed to open and shut a trap-door.
- Trap-door—A door to guide and direct the current of air in a mine.
- Trimmer—The person who sorts the coal in the railway cars after it is dumped into them.
- Tub—A box used for raising rock in sinking for coal or other minerals.
- Trough—(See swamp.)
- Ticket—The number which the miner puts on his loaded car to inform the weighmaster to whom the coal belongs.
- 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.
- 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.
- Water Guage—An instrument used by superintendents of mines for ascertaining the resistance or pressure that is spent in friction between two adjoining parts of an airway. 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.)
- Weighmaster—The person who weighs the coal.
- White Damp—Carbonic oxide gas.
- Waste—Abandoned workings.
- Water Lodgment—(See sump.)

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Gartsherre No. 1 . . . . .	.....	Indianap'lis, Ind	Shaft. . . .	Steam . .
Gartsherre No. 2 . . . . .	.....	Indianap'lis, Ind	Shaft. . . .	Steam . .
Crawford . . . . .	Crawford Coal Co. . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
*Litchfield . . . . .	Coal Bluff Mining Co . . . .	Carbon, Clay Co . .	Shaft. . . .	Steam . .
Briar Hill . . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Chicago. . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Number 5. . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Slope . . . .	Steam . .
Number 3. . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Morris . . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Campbell . . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Bartlett . . . . .	Brazil Block Coal Co . . . .	Brazil, Ind . . . .	Shaft. . . .	Steam . .
Hancock . . . . .	Brazil Block Coal Co . . . .	Brazil, Ind. . . . .	Shaft. . . .	Steam . .
Phoenix. . . . .	Peter Ehrlich . . . . .	Turner Postoffice, Clay county . . . .	Shaft. . . .	Steam . .
South Slope. . . . .	Peter Ehrlich . . . . .	Turner Postoffice, Clay county . . . .	Slope. . . .	Steam . .
Newburgh . . . . .	Peter Ehrlich . . . . .	Turner Postoffice, Clay county . . . .	Shaft. . . .	Steam . .
Buckeye . . . . .	Jackson Coal & Mining Co.	Brazil, Ind. . . . .	Shaft . . . .	Steam . .
Nickel-Plate . . . . .	Jackson Coal & Mining Co.	Brazil, Ind. . . . .	Shaft. . . .	Steam . .
Star. . . . .	Stephens Coal & Mining Co Brighton & Peter, H.	Greencastle . . . .	Shaft. . . .	Steam . .
Wheeler . . . . .	Wheeler, receiver. . . . .	Brazil, Ind. . . . .	Shaft. . . .	Steam . .
Church Hill. . . . .	Andrew Weaver & Co . . . .	Knightsville . . . .	Shaft. . . .	Steam . .
Markland. . . . .	Terre Haute & Southeast- ern Railway Co. . . . .	Terre Haute, Ind.	Shaft. . . .	Steam . .
Staunton . . . . .	Joseph Somers . . . . .	Staunton. . . . .	Shaft. . . .	Steam . .
Burtron. . . . .	{ Terre Haute and Southeastern R. W. Co. }	Terre Haute, Ind.	Drift . . . .	Mules . .
.....	Edgar Coal Co . . . . .	{ Coal Bluff, } { Vigo county }	Slope . . . .	Steam . .
Centennial . . . . .	Charles B. Reddie . . . . .	Brazil . . . . .	Shaft . . . .	Steam . .
Burgherville . . . . .	Samuel Pyrah . . . . .	Turner P. O. . . . .	Shaft . . . .	Steam . .
North Mine . . . . .	Benjamin Simpson . . . . .	Carbon, Clay Co.	Shaft . . . .	Steam . .
Abby Mine . . . . .	T. H. Watson . . . . .	Brazil . . . . .	Drift . . . .	Mules . .
Number of small mines . . . . .	.....	.....	4	.....

\*The two seams are worked at this shaft.

etc., in Clay County, for the Year 1884.

Quality of Coal.	Classes of Seam.	Seam Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Non-caking, or block . . . . .	I & J . . . . .	. . . . .	4	. . . . .	. . . . .	60	Fan . . . . .	8,012	Good.
Non-caking, or block . . . . .	I & J . . . . .	. . . . .	3	10 . . . . .	. . . . .	120	Fan . . . . .	13,612	Good.
Non-caking, or block . . . . .	I & J . . . . .	I & J . . . . .	3	10 . . . . .	. . . . .	137	Fan . . . . .	9,352	Fair.
Non-caking, or block . . . . .	I & J . . . . .	I & J . . . . .	3	9 . . . . .	. . . . .	126	Fan . . . . .	16,729	Good.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	3	7 . . . . .	. . . . .	32	Furnace . . . . .	22,800	Good.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	3	10 . . . . .	. . . . .	80	Fan . . . . .	14,952	Good.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	3	3 . . . . .	. . . . .	40	Fan . . . . .	10,815	Extra.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	3	7 . . . . .	. . . . .	95	Fan . . . . .	9,856	Average.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	3	8 . . . . .	. . . . .	125	Fan . . . . .	8,600	Fair.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	3	9 . . . . .	. . . . .	100	Fan . . . . .	14,650	Average.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	3	7 . . . . .	. . . . .	90	Fan . . . . .	7,975	Average.
Non-caking or block . . . . .	I & J . . . . .	I . . . . .	3	8 . . . . .	. . . . .	100	Fan . . . . .	14,725	Good.
Non-caking or block . . . . .	I & J . . . . .	. . . . .	3	7 . . . . .	. . . . .	36	Fan . . . . .	7,619	Fair.
Non-caking or block . . . . .	I & J . . . . .	I . . . . .	3	8 . . . . .	. . . . .	37	Fan . . . . .	1,972	Fair.
Non-caking or block . . . . .	M L & K . . . . .	L . . . . .	7	. . . . .	. . . . .	100	Fan . . . . .	21,000	Good.
Non-caking or block . . . . .	I & J . . . . .	J . . . . .	4	. . . . .	. . . . .	. . . . .	Fan . . . . .	. . . . .	Good.
Non-caking or block . . . . .	I & J . . . . .	I & J . . . . .	4	4 . . . . .	. . . . .	240	Fan . . . . .	44,904	Extra Good.
Non-caking or block . . . . .	I & J . . . . .	I . . . . .	3	7 . . . . .	. . . . .	43	Fan . . . . .	13,450	Average.
Bituminous or caking . . . . .	M L & K . . . . .	L . . . . .	6	6 65 . . . . .	. . . . .	40	Fan . . . . .	16,926	Good.
Non-caking or block . . . . .	I & J . . . . .	J . . . . .	3	7 . . . . .	. . . . .	35	Steam jet . . . . .	2,684	Not good.
Non-caking or block . . . . .	I & J . . . . .	I . . . . .	3	. . . . .	. . . . .	16	Furnace . . . . .	1,365	Not good.
Bituminous or caking . . . . .	M L & K . . . . .	L . . . . .	6	6 . . . . .	. . . . .	26	Furnace . . . . .	6,256	Average.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	4	4 . . . . .	. . . . .	10	Furnace . . . . .	1,820	Fair.
Non-caking, or block . . . . .	I & J . . . . .	I . . . . .	4	. . . . .	. . . . .	10	Furnace . . . . .	2,225	Fair.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	4	. . . . .	50 . . . . .	12	Furnace . . . . .	4,970	Good.
Bituminous, or caking . . . . .	M L & K . . . . .	L . . . . .	7	. . . . .	57 . . . . .	20	Fan . . . . .	11,640	Good.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	3	10 . . . . .	61 . . . . .	10	Furnace . . . . .	1,570	Good.
Non-caking, or block . . . . .	I & J . . . . .	J . . . . .	4	4 46 . . . . .	40 . . . . .	10	. . . . .	. . . . .	Good.

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Sulphur Springs . . . . .	Cabel, Wilson & Co . . . . .	Washington, Ind	Shaft . .	Steam . .
South Branch . . . . .	Cabel, Wilson & Co . . . . .	Washington, Ind	Slope . .	Steam . .
Maple Valley . . . . .	Wilson, Kauffman & Co . . . . .	Washington, Ind	Shaft . .	Steam . .
Eureka No. 2 . . . . .	Cabel & Wilson . . . . .	Washington, Ind	Slope . .	Horse . .
Number 5 . . . . .	Cabel, Wilson & Co . . . . .	Washington, Ind	Shaft . .	Steam . .
Number 4 . . . . .	Cabel, Wilson & Co . . . . .	Washington, Ind	Shaft . .	Steam . .
Buckeye . . . . .	Buckeye Cannel Coal Co	Washington, Ind	Shaft . .	Steam . .
Rhine No. 2 . . . . .	Sefrit & Braun . . . . .	Washington, Ind	Drift . .	Mules . .
*Union No. 1 . . . . .	Union Coal Co . . . . .	Cannelb'rg, Ind	Shaft . .	Horse . .
Union No. 2 . . . . .	Union Coal Co . . . . .	Cannelb'rg, Ind	Shaft . .	Steam . .
Black Diamond . . . . .	Samuel H. Price . . . . .	Washington . . . . .	Slope . .	Horse . .
Raymond . . . . .	John Raymond . . . . .	Washington . . . . .	Drift . .	Mules . .
Number of small mines . . . . .			5	

\* This Shaft was completed November, 1884.

Table Showing the Number of Mines,

NAME OF MINE.	OPERATOR.	Address.	Kinds of Mines.	Power.
Rosebank . . . . .	Rosebank Coal and Mining Company . . . . .	St. Louis, Mo . .	Drift . .	Mules . .
Friedman . . . . .	Friedman Bros . . . . .	Jasper, Ind . . . .	Slope . .	Horse . .
Cedar Garden . . . . .	Mrs. Mary Magner . . . . .	Jasper, Ind . . . .	Drift . .	Mules . .
Portersville . . . . .	John A. Krodel . . . . .	Portersville, Daviess Co., Ind . .	Drift . .	Mules . .
Number of small mines . . . . .			6	

*etc., in Daviess County, for the Year 1884.*

Quality of Coal.	Class of Seam.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Highly bituminous	M L & K	L . . .	4	8	60	125	Furnace & fan	61,000	Excellent.
Extra bituminous	M L & K	L . . .	4	6	60	113	Furnace . . . .	22,000	Good.
Highly bituminous	M L & K	L . . .	5	..	74	125	Furnace . . . .	19,000	Average.
Highly bituminous	L & K . .	L . . .	3	4	48	48	Furnace . . . .	14,775	Excellent.
Highly bituminous	M L & K	L . . .	4	4	50	70	Furnace . . . .	8,050	Fair.
Highly bituminous	L & K . .	L . . .	4	..	70	10	Furnace . . . .	4,600	Good.
Cannel and bituminous	J I H & G	I . . .	5	..	95	100	Fan . . . . .	24,000	Excellent.
Highly bituminous	L & K . .	L . . .	2	3	48	10	Furnace . . . .	2,100	Average.
Bituminous or caking	J I H & G	I . . .	3	9	37	15	Natural draft .	1,600	Fair.
Bituminous or caking	J I H & G	I . . .	5	..	96	..	Steam jet . . .	1,840	Fair.
Highly bituminous	L & K . .	L . . .	3	..	50	10	Natural draft .	.. . . .	Fair.
Highly bituminous	L & K . .	L . . .	2	6	50	10	Natural draft .	.. . . .	Fair.
.. . . .	.. . . .	.. . . .	..	..	..	28	.. . . .	.. . . .	.. . . .

*etc., in Dubois County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average No. of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Highly bituminous	L & K . .	L . . .	4	4	50	35	Furnace . . . .	4,150	Good.
Bituminous or caking	L & K . .	L . . .	3	4	40	10	Natural draft .	957	Fair.
Bituminous or caking	L & K . .	L . . .	3	6	45	10	Furnace . . . .	1,280	Fair.
Bituminous or caking	L & K . .	L . . .	3	6	45	10	Natural draft .	1,065	Fair.
.. . . .	.. . . .	.. . . .	..	..	..	20	.. . . .	.. . . .	.. . . .

Table Showing the Number of Mines,

NAME OF MINE.	OPERATOR.	Address.	Kind of Mines.	Power.
Number 2. . . . .	Woodruff & Trunkey Bros.	No. 58 Dearborn street, Chicago.	Shaft. . .	Steam . .
Number 3. . . . .	Woodruff & Trunkey Bros.	No. 58 Dearborn street, Chicago.	Shaft. . .	Steam . .
Yeddo . . . . .	Union Coal Co . . . . .	Yeddo, Ind . . .	Shaft. . .	Steam . .
Bluff . . . . .	Woodruff & Trunkey Bros.	No. 58 Dearborn street, Chicago.	Drift. . .	Mules . .
Ogdons . . . . .	Ogdons Bros . . . . .	Shosbys Mills, Ind . . . . .	Drift. . .	Mules . .
Bunker No. 2. . . . .	Wm. Patterson & Sons . . . . .	Shosbys Mills, Ind . . . . .	Shaft. . .	Steam . .
. . . . .	Habberman & Perry . . . . .	Shosbys Mills, Ind . . . . .	Drift. . .	Mules . .
Lucas. . . . .	L. A. Lucas. . . . .	Vanderburgh . .	Drift. . .	Mules . .
Number of small mines . . . . .			9	

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Linton . . . . .	A. B. Tharp & Co. . . . .	Linton Ind. . . .	Shaft. . .	Horse. . .
Island City. . . . .	Island Coal Co . . . . .	Dixon's Station .	Shaft. . .	Steam . .

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Indian Creek. . . . .	Indian Creek Coal Co . .	Bicknell. . . . .	Shaft . .	Steam . .
White River . . . . .	Michael Adkins & Co. . .	Edwardsport . .	Drift. . .	Mules . .
Number of small mines . . . . .			3	

*etc., in Fountain County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous, or caking. . . . .	M L & K.	L. . .	6	6	106	70	Fan . . . . .	22,000	Good.
Bituminous, or caking. . . . .	M L & K.	L. . .	6	6	93	101	Fan . . . . .	17,901	Excellent.
Highly bit'in's, semi-block . . . . .	J I H & G	J. . .	4	6	50	95	Fan . . . . .	7,500	Good.
Bituminous, or caking. . . . .	M L & K.	L. . .	5	6	50	12	Furnace. . . . .	684	Bad.
Bituminous, or caking. . . . .	M L & K.	L. . .	5	6	50	36	Fan . . . . .	5,376	Good.
Bituminous, or caking. . . . .	M L & K.	L. . .	5	..	86	21	Fan . . . . .	2,350	Average.
Bituminous, or caking. . . . .	M L & K.	M . .	4	..	38	10	Natural draft. . . . .	..	Fair.
Semi-block . . . . .	J I H & G	J. . .	3	5	48	10	Natural draft. . . . .	..	Average.
.....	.....	.....	..	..	..	17	.....	.....	.....

*etc., in Greene County, for the Year 1884.*

Quality of coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous, or caking. . . . .	M. L. & K	L. . .	6	..	45	10	Furnace. . . . .	1,700	Average.
Bituminous, or caking. . . . .	L. & K . .	L. . .	5	4	55	25	Natural Draft. . . . .	.....	.....

Number of small mines six ; number of miners fifteen.

*etc., in Knox County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam worked.	THICKNESS.		Depth from Surface in feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous, partial caking	K & J . .	K . .	4	4	95	60	Fan . . . . .	9,150	Excellent.
Bituminous or caking . . . . .	L, K & J.	L . .	5	4	45	29	Natural Draft. . . . .	3,500	Good.
.....	.....	.....	..	..	..	6	.....	.....	.....

*Table Showing the Number of Mines,*

NAME OF MINES.	OPERATOR.	Address.	Kind of Mine.	Power.
..... Number of small	John D. Montgomery .. mines. ....	Loogootee, Ind . .....	Drift .. 4	Mules .. .....

*Table Showing the Number of Mines,*

NAME OF MINES.	OPERATOR.	Address.	Kind of Mine.	Power.
Lancaster ..... Number of small	Lancaster Block Coal Co. mines. ....	Clay City, Ind. . .....	Shaft. . . 4	Steam . . .....

*Table Showing the Number of Mines,*

NAME OF MINES	OPERATOR.	ADDRESS.	Kind of Mines.	Power.
No. 1 . . . . .	American Cannel Coal Co	Cannelton. . . . .	Drift. . . . .	Mules . . . . .
Sioux No. 2. . . . .	American Cannel Coal Co	Cannelton. . . . .	Drift. . . . .	Mules . . . . .
Windy Creek. . . . .	Bergenroth Bros . . . . .	Troy. . . . .	Shaft. . . . .	Steam . . . . .
Dicks. . . . .	Richard Windsfennig . . . . .	Tell City. . . . .	Drift. . . . .	Mules . . . . .
Number of small	mines . . . . .	.....	4	.....

*etc., in Martin County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous, or caking . . . .	M, L & K	L	4	..	40	10	Natural draft.	.. . . .	.. . . .
.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	24	.. . . .	.. . . .	.. . . .

*etc., in Owen County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seams Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Semi-block, partial caking . .	I	I	4	8	50	82	Fan . . . . .	14,780	Good.
.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	4	.. . . .	.. . . .	.. . . .

*etc., in Perry County, for the Year 1884.*

Quality of Coal.	Classes of Seam.	Seam worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Split, or semi-block . . . . .	E, F, G & H	F. .	3	3	150	36	Natural draft .	1,975	Good.
Split, or semi-block . . . . .	E, F, G & H	F. . .	3	5	150	69	Natural draft .	3,980	Bad.
Highly Bituminous . . . . .	G, F & E .	G. . .	3	3	140	42	Furnace . . . .	4,510	Extra good.
Highly Bituminous . . . . .	H, G, F & E	F. . .	3	4	65	10	Natural draft .	950	Fair.
.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	.. . . .	18	.. . . .	.. . . .	.. . . .

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
No. 2 . . . . .	Parke County Coal Co . .	Rosedale . . . . .	Shaft . .	Steam . .
No. 3 . . . . .	Parke County Coal Co . .	Rosedale. . . . .	Shaft . .	Steam . .
No. 4 . . . . .	Parke County Coal Co . .	Rosedale. . . . .	Shaft . .	Steam . .
Walker's . . . . .	F. A. Bowen . . . . .	Clinton, Vermil- lion county . .	Drift. . .	Mules . .
†Carbon Hill . . . . .	Carbon Hill Block Coal Co.	Carbon, Clay Co.	Shaft . .	Steam . .
No. 2 . . . . .	Sand Creek Coal Co . . .	Nysville . . . . .	Drift . . .	Mules . .
Harrison . . . . .	Harrison, Caldwell & Co.	Nysville . . . . .	Drift . . .	Mules . .
Batty's . . . . .	John Batty . . . . .	Nysville . . . . .	Drift . . .	Mules . .
No name . . . . .	David Bosley . . . . .	Nysville . . . . .	Drift . . .	Mules . .
Black Diamond . . . . .	Stephens Coal & Min'g Co.	Greencaster, Hen- dricks county .	Slope . .	Steam . .
*Blaino . . . . .	Brazil Block Coal Co . . .	Brazil, Clay Co..	Shaft . .	Steam . .
*No name . . . . .	Brazil Block Coal Co . . .	Brazil, Ind . . . .	Drift . . .	Mules . .
*No name . . . . .	Brazil Block Coal Co . . .	Brazil, Ind . . . .	Drift . . .	Mules . .
Number of small mines . . . . .			7	

Table Showing the Number of Mines,

NAME OF MINE.	OPERATOR.	Address.	Kind of Mines.	Power.
*Ingleton . . . . .	D. E. Ingle . . . . .	Oakland City, Gibson Co . . . .	Slope . .	Steam . .
Ayrshire . . . . .	D. E. Ingle . . . . .	Oakland City, Gibson Co . . . .	Slope. . .	Steam . .
Whitman . . . . .	Whitman Coal Co. . . . .	St. Louis, Mo . . .	Slope . .	Steam . .
Carbon Drift . . . . .	Whitman Coal Co. . . . .	St. Louis, Mo . . .	Drift. . .	Mules . .
Hazeldell . . . . .	Posey and Montgomery .	Petersburgh . . . .	Shaft. . .	Steam . .
Rogers . . . . .	Rogers & Bros . . . . .	Manchester, Davies Co, . . . .	Drift. . .	Mules . .
Alexander . . . . .	H. W. Alexander . . . . .	Petersburgh. . . . .	Drift. . .	Mules . .
Smith's . . . . .	Elijah Smith . . . . .	Petersburgh. . . . .	Drift. . .	Mules . .
Number of small mines . . . . .			10	

\*This mine was shut down in March, 1884.

etc., in Parke County, for the Year 1884.

Quality of Coal.	Classes of Seam.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous, or caking . . . .	M L & K .	L . . .	5	6	65	1.20	Fan . . . . .	17,900	Excellent
Semi-block . . .	J & I . . .	I . . .	4	..	65	1.60	Fan . . . . .	10,946	Excellent
Semi-block . . .	J & I . . .	I . . .	4	..	80	1.45	Fan . . . . .	12,394	Excellent
Bituminous, or caking . . . .	M L & K .	L . . .	5	3	75	45	Furnace . . . .	3,950	Good.
Non-caking, or block . . . . .	J & I . . .	J & I .	4	6	1,45 2,70	..	Furnace . . . . .	..	..
Semi-block . . .	J & I . . .	J . . .	4	..	45	..	Furnace . . . . .	1,915	Fair.
Semi-block . . .	J & I . . .	J . . .	4	..	51	10	Furnace . . . . .	1,710	Fair.
Semi-block . . .	J & I . . .	J . . .	4	..	41	20	Furnace . . . . .	3,000	Good.
Semi-block . . .	J & I . . .	J . . .	4	..	40	15	Furnace . . . . .	1,110	Fair.
Non-caking, or block . . . . .	J & I . . .	J . . .	3	10	38	35	Steam jet . . . .	3,000	Fair.
Non-caking, or block . . . . .	J & I . . .	J . . .	3	11	55	14	Natural draft . .	..	..
Non-caking, or block . . . . .	J & I . . .	J . . .	3	10	38	13	Natural draft . .	..	..
Non-caking, or block . . . . .	J & I . . .	J . . .	3	10	38	12	Natural draft . .	..	..
..	..	..	..	..	..	20	..	..	..

† This mine was shut down July, 1883.  
 \* Mines marked \* were opened in November, 1883.

etc., in Pike County, for the Year 1884.

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average No. of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mines.
			Feet.	Inches.					
Bituminous or caking . . . .	M L & K .	L . . .	7	..	42	..	Furnace . . . . .	10,080	Good.
Bituminous or caking . . . .	M L & K .	M . . .	5	..	65	140	Fan . . . . .	15,092	Good.
Bituminous or caking . . . .	M L & K .	K . . .	4	..	50	88	Fan . . . . .	19,915	Good.
Bituminous or caking . . . .	M L & K .	K . . .	4	..	37	10	Natural draft . .	..	..
Bituminous or caking . . . .	M L & K .	L . . .	7	6	85	30	Steam jet . . . .	1,055	Fair.
Bituminous or caking . . . .	L & K . .	L . . .	6	..	55	50	Furnace . . . . .	4,375	Fair.
Bituminous or caking . . . .	M L & K .	L . . .	8	..	45	10	Natural draft . .	1,360	Fair.
Bituminous or caking . . . .	M L & K .	L . . .	8	..	45	10	Natural draft . .	1,030	..
..	..	..	..	..	..	35	..	..	..

Table Showing the Number of Mines,

NAME OF MINE.	OPERATOR.	Address.	Kind of Mines.	Power.
Pioneer . . . . .	Carriessville Coal Co . . . . .	Shelburn . . . . .	Shaft. . . . .	Steam . . . . .
Shelburn No. 2 . . . . .	Shelburn Coal Co . . . . .	Shelburn . . . . .	Shaft. . . . .	Steam . . . . .
Sullivan . . . . .	Shelburn Coal Co . . . . .	Shelburn . . . . .	Shaft. . . . .	Steam . . . . .
Dugger . . . . .	Dugger & Neil . . . . .	Dugger Station . . . . .	Shaft. . . . .	Steam . . . . .
Lyonton . . . . .	Lyonton Coal & Coke Co . . . . .	Sullivan . . . . .	Shaft. . . . .	Steam . . . . .
Brook Branch . . . . .	Fremont Coal Co . . . . .	Shelburn . . . . .	Shaft. . . . .	Horse . . . . .
Busseron . . . . .	David Sharp . . . . .	Farmerburgh . . . . .	Drift. . . . .	Mules . . . . .
Bunker Hill . . . . .	Hancock & Cauckle . . . . .	Sullivan . . . . .	Shaft. . . . .	Steam . . . . .
Number of small mines . . . . .			4	

Table Showing the Number of Mines,

NAME OF MINE.	OPERATOR.	Address.	Kind of Mines.	Power.
Centerville . . . . .	Robt. L. Fisher & Co . . . . .	Rockport . . . . .	Drift . . . . .	Mules . . . . .
Number of small mines . . . . .			11	

Table Showing the Number of Mines, etc.,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Briar Hill . . . . .	Indiana Coal Association	Clinton . . . . .	Drift . . . . .	Mules . . . . .
Hazel Bluff. . . . .	Brown & Hydenshaw. . . . .	Clinton . . . . .	Drift . . . . .	Mules . . . . .
Number of small mines . . . . .			2	

*etc., in Sullivan County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating, in Cubic Feet, per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous or caking . . . .	M L & K.	L . . .	5	6	248	40	Fan . . . . .	8,804	Good.
Bituminous or caking . . . .	M L & K.	L . . .	5	6	248	40	Fan . . . . .	10,060	Good.
Bituminous or caking . . . .	M L & K.	L . . .	4	..	250	15	Furnace . . . .	2,016	Average.
Bituminous or caking . . . .	M L & K.	L . . .	5	4	100	70	Furnace . . . .	16,406	Good.
Bituminous or caking . . . .	M L & K.	L . . .	6	..	70	35	Furnace . . . .	7,700	Good.
Bituminous or caking . . . .	M L & K.	L . . .	6	..	125	10	Furnace . . . .	1,250	Good.
Bituminous or caking . . . .	L & K . .	L . . .	4	..	50	10	Natural draft .	900	Fair.
Bituminous or caking . . . .	M L & K.	L . . .	5	..	63	15	Natural draft .	1,275	Good.
.....	.....	.....	.....	.....	.....	15	.....	.....	.....

*etc., in Spencer County, for the Year 1884.*

Quality of Coal.	Classes of Seam.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Highly bituminous . . . . .	M L K & I	L . . .	4	..	45	20	Furnace . . . .	1,610	Good.
.....	.....	.....	.....	.....	.....	29	.....	.....	.....

*in Vermillion County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous . . . .	M, L & K	L	5	4	75	35	Furnace . . . .	4,224	Fair.
Bituminous . . . .	M, L & K	L	5	4	65	35	Furnace . . . .	2,299	Bad.
.....	.....	.....	.....	.....	.....	8	.....	.....	.....

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Fountain . . . . .	Coal Bluff Mining Co . .	Fontinett, Vigo county . . . . .	Shaft . .	Steam . .
Grant . . . . .	Edgar Coal Co . . . . .	Coal Bluff . . . . .	Drift . .	Mules . .
South Mine . . . . .	Edgar Coal Co . . . . .	Coal Bluff . . . . .	Shaft . .	Steam . .
Seeleyville . . . . .	Peter Ehrelicht Co . . . . .	Turner Postoffice	Shaft . .	Steam . .
. . . . .	Kay, Lang & Co . . . . .	Coal Bluff . . . . .	Slope . .	Steam . .
Somerset . . . . .	N. S. Wheat . . . . .	Terre Haute . . . . .	Shaft . .	Steam . .
Eppert . . . . .	W. Eppert . . . . .	Coal Bluff . . . . .	Drift . .	Mules . .
Number of small mines . . . . .			6	

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Sunnyside . . . . .	Evansville Coal & Mining Co . . . . .	Evansville . . . . .	Shaft . .	Steam . .
Ingleside . . . . .	John Ingle & Co . . . . .	Evansville . . . . .	Shaft . .	Steam . .
Diamond . . . . .	Evansville Coal Operative Company Association . .	Evansville . . . . .	Shaft . .	Steam . .
First Avenue . . . . .	First Avenue Coal Mining Co . . . . .	Evansville . . . . .	Shaft . .	Steam . .
Echo . . . . .	Evansville Coal Co . . . . .	Evansville . . . . .	Shaft . .	Steam . .

*etc., in Vigo County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seams Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Bituminous . . .	M, L & K	L. . .	6	..	62	157	Fan . . . . .	10,710	Average.
Bituminous . . .	M, L & K	M . .	3	8	37	20	Furnace . . . .	1,720	Fair.
Bituminous . . .	M, L & K	L. . .	5	6	60	129	Fan . . . . .	44,000	Excellent
Bituminous . . .	L & K . .	L. . .	7	..	96	55	Fan . . . . .	19,000	Excellent
Bituminous . . .	M, L & K	L. . .	6	..	45	65	Fan . . . . .	3,975	Good.
Bituminous . . .	M, L & K	L. . .	5	..	65	45	Furnace . . . .	2,852	Fair.
Bituminous . . .	M, L & K	L. . .	5	..	40	17	Natural draft.	858	Fair.
.....	.....	.....	..	..	..	36	.....	.....	.....

*etc., in Vanderburgh County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface, in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Hard bituminous . . . . .	N, K & J	K. . .	4	..	263	60	Fan . . . . .	14,067	Good.
Hard bituminous . . . . .	N, K & J	K. . .	4	..	266	101	Fan . . . . .	15,109	Good.
Hard bituminous . . . . .	N, K & J	J. . .	4	..	257	25	Steam jet . . . .	.....	.....
Hard bituminous . . . . .	N, K & J	K. . .	4	..	260	43	Fan . . . . .	12,075	Good.
Hard bituminous . . . . .	N, K & J	K. . .	4	..	257	45	Fan . . . . .	3,442	Bad.

Table Showing the Number of Mines,

NAME OF MINES.	OPERATOR.	Address.	Kind of Mines.	Power.
Star No. 2 . . . . .	Love & Angel . . . . .	Newburgh . . . . .	Shaft. . . . .	Steam . . . . .
Locust Grove . . . . .	Albert M. Hazen . . . . .	Newburgh . . . . .	Shaft. . . . .	Steam . . . . .
Sargent . . . . .	Robertson & Cash. . . . .	Newburgh . . . . .	Shaft. . . . .	Steam . . . . .
Chandler . . . . .	M. M. Freed (formerly E & W. Con'd. Coal Co.) . . . . .	Evansville. . . . .	Shaft. . . . .	Steam . . . . .
* No. 3 . . . . .	M. M. Freed . . . . .	Evansville. . . . .	Shaft. . . . .	Steam . . . . .
DeForest . . . . .	Betram Menden. . . . .	Evansville. . . . .	Shaft. . . . .	Steam . . . . .
Booneville . . . . .	Robert Gough. . . . .	Booneville. . . . .	Shaft. . . . .	Steam . . . . .
Elkhorn. . . . .	Elkhorn Mill Co . . . . .	Booneville. . . . .	Slope. . . . .	Steam . . . . .
* Union . . . . .	Union Coal Co. . . . .	Booneville. . . . .	Shaft. . . . .	Horse . . . . .
Wilkinson . . . . .	E & W. Con'd. Coal Co. . . . .	Evansville. . . . .	Slope. . . . .	Steam . . . . .

*etc., in Warrick County, for the Year 1884.*

Quality of Coal.	Classes of Seams.	Seam Worked.	THICKNESS.		Depth from Surface in Feet.	Average Number of Persons Employed.	Ventilated by.	Volume of Air Circulating in Cubic Feet per Minute.	General Condition of Mine.
			Feet.	Inches.					
Hard bituminous	M, K & I	K. . .	4	. .	104	25	Furnace . . . .	750	Bad.
Hard bituminous	M, K & I	K. . .	4	. .	112	20	Furnace . . . .	1,000	Bad.
Hard bituminous	M, K & I	K. . .	4	. .	85	12	Steam jet . . . .	1,800	Good.
Hard bituminous	M, K & I	K. . .	4	. .	85	50	Furnace . . . .	5,814	Good.
Hard bituminous	M, K & I	K. . .	5	6	85	. . .	Furnace . . . .	1,475	Good.
Hard bituminous	M, K & I	K. . .	6	6	95	. . .	Furnace . . . .	2,780	Good.
Hard bituminous	M, K & I	K. . .	6	6	45	35	Furnace . . . .	3,300	Good.
Hard bituminous	M, K & I	K. . .	4	5	46	10	Furnace . . . .	900	Fair.
Hard bituminous	M, K & I	K. . .	4	6	40	. . .	Furnace . . . .	. . . .	Fair.
Hard bituminous	M, K & I	K. . .	4	6	40	15	Furnace . . . .	. . . .	. . . . .

Number of small mines, six; Number of miners employed, twenty-seven:

\*Mines marked thus \* were shut down in November, 1884.

## FATAL ACCIDENTS IN CLAY COUNTY.

July 15, 1884, Nathan Morris was killed instantly, in the Seelyville shaft. He was riding in with the mule driver, in a trip of empty cars, when a large piece of slate fell on him. The mule driver escaped with a slight bruise.

Sept. 12, 1884, John F. Osborn was instantly killed by a large piece of slate falling on him while at work in a room in the Campbell shaft, owned and operated by the Brazil Block Coal Company.

Sept. —, 1884, Amos Wright died from injuries received by slate falling on him while at work in a room in the Campbell shaft, owned and operated by the Brazil Block Coal Company. He lived about twenty-one days after receiving the injuries.

## FATAL ACCIDENTS IN DAVIESS COUNTY FOR THE YEAR 1884.

Nov. 28, 1884, William S. Allen, aged 28 years, was instantly killed by a large piece of slate falling on him while at work in the mines of Thomas Critchlow, near Epson. The piece of slate that fell on him was ten inches in thickness by ten feet square.

May, 1884, George Nail died from the effects of a burn from an explosion of powder. Deceased was a miner, and was employed in the Buckeye Mines of the Buckeye Cannel Coal Company. Mr. Nail was preparing a blast and was carrying the powder in an open dinner pail, when a spark from his light ignited the powder which burned him so that he died the next day.

## FATAL ACCIDENT IN DUBOIS COUNTY.

November — Henry Dull was instantly killed by falling slate in the Rose Bank mines, near Jasper. Deceased had gone into the room after a heavy blast had been fired, and while standing close to the face of the room, while the smoke was very dense, a large piece of slate, loosened by the effects of the blasts, fell on him.

## FATAL ACCIDENT IN SULLIVAN COUNTY.

August 20, 1884, Isaiah Davis was instantly killed at the face of his own entry, by a large piece of slate falling on him while at work in the mines of the Lyonton Coal and Coke Company, at Buel City.

## FATAL ACCIDENT IN PARKE COUNTY—PREMATURE BLAST.

Nov. 22, 1884, No. 3 shaft of Parke County Coal Company. John Towers died from the effects of injuries received from a premature blast. He was charging a hole with powder and was pushing it to the back part of the hole with a drill, when striking sulphur, it ignited the powder. Being struck with flying coal and from the effects of powder burns, he died two weeks afterward.

## FATAL ACCIDENT IN PIKE COUNTY.

Sept. 21, 1884, Joseph Creiger, aged 17 years, was instantly killed by falling down the Whitman shaft of the Whitman Coal Company, on Sunday. The young man had been sent up on the tippie to switch some bank cars around the top of the shaft. He pushed one a little too far, and there being no safety-gates on top of the shaft, the car became overbalanced, and in trying to hold the car, it pulled him into the shaft and he fell a distance of sixty-five feet.

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 AFFIDAVIT OF MICHAEL COCHRAN.

WASHINGTON, IND., Jan. 5, 1885.

I, Michael Cochran, do solemnly swear that my son, John D. Cochran, was born March 4, 1870, to the best of my knowledge and belief, so help me God.

MICHAEL COCHRAN.

Subscribed and sworn to before me, this 5th day of January, 1885.

EUGENE O'BRIEN,  
Notary Public.

## AFFIDAVIT OF ANTHONY KOCHER.

WASHINGTON, IND., Jan. 6, 1885.

I, Anthony Kocher, do solemnly swear that my son, Henry Kocher, was born September 11, 1870, to the best of my knowledge and belief, so help me God.

ANTHONY KOCHER.

Subscribed and sworn to before me this 6th day of January, A. D. 1885.

EUGENE O'BRIEN,  
*Notary Public.*

## AFFIDAVIT OF FRANK GIRARD.

WASHINGTON, IND., January 6, 1885.

TO WHOM IT MAY CONCERN:

I, Frank Girard, do solemnly swear that my son, Edmond J. Girard, was born July 29, 1869, to the best of my knowledge and belief, so help me God.

FRANK <sup>His</sup>(X) GIRARD.  
mark.

Subscribed and sworn to before me, a Notary Public. Witness my hand and seal this 6th day of January, A. D. 1885.

EUGENE O'BRIEN,  
*Notary Public.*

## AFFIDAVIT OF ELLEN O'BRIEN.

STATE OF INDIANA, DAVIESS COUNTY:

This day personally appeared before me Ellen O'Brien, who being duly sworn, on her oath, says that she knows that Charles Dant was fourteen years old on the 8th or 10th of January, 1884.

ELLEN <sup>Her</sup>(X) O'BRIEN.  
mark.

Subscribed and sworn to before me this 6th day of January, 1885.

B. T. MEREDITH,  
*Justice of the Peace. (SEAL.)*

The following affidavits, taken and sworn to before a Justice of Peace, was ordered by the firm of Cabel, Wilson & Co. before a boy was allowed to enter the mines of this company:

STATE OF INDIANA, DAVIESS COUNTY, ss:

This day personally appeared before me, B. T. Meredith, a Justice of the Peace in and for Washington Township, Daviess County, Indiana, George M. Trowbridge, who, being duly sworn, on his oath says that Joseph L. Trowbridge was born February 24, 1868, and George P. Trowbridge was born April 16, 1871.

GEORGE M. TROWBRIDGE.

Subscribed and sworn to before me this the 5th day of January, 1885.

B. T. MEREDITH, *J. P.* (SEAL.)

ELIZABETH <sup>Her</sup>(X) CARR.  
mark.

Subscribed and sworn to before me this the 6th day of January, 1885.

B. T. MEREDITH, *J. P.* (SEAL.)

#### AFFIDAVIT OF WILLIAM ROBINSON.

STATE OF INDIANA, DAVIESS COUNTY, CITY OF WASHINGTON:

To whom it may concern: I, William Robinson, do solemnly swear that my son, Charles Robinson, was born November 20, 1870, to the best of my knowledge and belief, so help me God.

WILLIAM <sup>His</sup>(X) ROBINSON.  
mark.

Subscribed and sworn to before me this 8th day of January, 1885.

EUGENE O'BRIEN,  
*Notary Public.*

#### AFFIDAVIT OF CATHERINE HALEY.

STATE OF INDIANA, DAVIESS COUNTY:

Catherine Haley, being duly sworn, on her oath says that Daniel Haley was fifteen years old December 10, 1884.

CATHERINE <sup>Her</sup>(X) HALEY.  
mark.

Subscribed and sworn to before me this 7th day of January, 1885.

B. T. MEREDITH, *J. P.* (SEAL.)

## AFFIDAVIT OF JANE WATSON.

STATE OF INDIANA, DAVIESS COUNTY:

This day personally appeared before me Jane Watson, who being duly sworn on her oath says: That Frank Watson, her son, will be fifteen years of age January 7, 1885.

JANE WATSON.

Subscribed and sworn to before me this 6th day of January, 1885. B. T. MEREDITH, J. P. (SEAL.)

## AFFIDAVIT OF MAHALA ABBOTT.

STATE OF INDIANA, DAVIESS COUNTY:

This day personally appeared before me Mahala Abbott, who being duly sworn on her oath says: That Alexander Abbott was fourteen years of age August 17, 1884.

MAHALA ABBOTT.

Subscribed and sworn to before me this 6th day of January, 1885. B. T. MEREDITH, J. P. (SEAL.)

## AFFIDAVIT OF ELIZABETH CARR.

STATE OF INDIANA, COUNTY OF DAVIESS:

This day personally appeared before me Elizabeth Carr, who being duly sworn on her oath says that Mayfield Carr is fifteen years of age January 10, 1885.

## AFFIDAVIT OF ISAAC WHEELER.

*To whom it may concern:*

STATE OF INDIANA, DAVIESS COUNTY, CITY OF WASHINGTON:

I, Isaac Wheeler, do solemnly swear that my cousin, Charles Mason Boyles, was born February 10, A. D. 1869, to the best of my knowledge and belief, so help me God.

ISAAC <sup>his</sup>(X) WHEELER.  
mark.

Subscribed and sworn to before me this the 6th day of January, 1885. Witness my hand and notarial seal.

EUGENE O'BRIEN,  
*Notary Public.*

## AFFIDAVIT OF CONRAD DAZIER.

STATE OF INDIANA, DAVIESS COUNTY:

This day personally appeared before me Conrad Dazier, who being duly sworn on his oath says that Clinton Dazier was born January 3, 1871.

CONRAD DAZIER

Subscribed and sworn to before me this 5th day of January, 1885.

B. T. MEREDITH, J. P. (SEAL.)

## AFFIDAVIT OF JOHN KELLER.

WASHINGTON, INDIANA, January 6, 1885.

TO WHOM IT MAY CONCERN:

I, John Keller, do solemnly swear that my son, Peter Keller, was born the 29th day of June, A. D. 1870, to the best of my knowledge and belief. So help me God.

JOHN KELLER.

Subscribed and sworn to before me this 6th day of January, 1885. Witness my hand and notarial seal this 6th day of January, 1885.

EUGENE O'BRIEN,  
*Notary Public.*

## AFFIDAVIT OF WILLIAM CAIN.

WASHINGTON, INDIANA, January 6, 1885.

TO WHOM IT MAY CONCERN:

I, William Cain, do solemnly swear that my son, James Cain, was born the 6th day of November, 1870, to the best of my knowledge and belief. So help me God.

WILLIAM CAIN.

Subscribed and sworn to before me this 6th day of January, 1885.

EUGENE O'BRIEN,  
*Notary Public.*

## NEW COAL FIELDS OF GREEN COUNTY.

The Indianapolis & Vincennes Railway Company, during the month of November, 1884, completed the switch to the coal mines of the Yeoman or Island Coal Company. The switch is about six miles in length. It leads off from the main line between Dixon's Station and Switz City. The Coal Company have sunk a shaft to an excellent seam of bituminous coal, five and one-half feet in thickness. They have erected powerful machinery to handle the coal. They have also laid off a town and built a number of houses for the accommodation of their employes. They are making extensive preparations to mine and handle a vast amount of coal during the year 1885. There is an excellent roof over the coal seam, and the mines are reasonably dry, as the shaft is sunk on a rise of the seam, it being only sixty feet from the surface. The seam dips or inclines downward as it extends southwest, attaining a greater depth from the surface, and consequently will get into the main body of the seam, which will drain a large territory, and they will have a great amount of water to handle.

## NEW COAL FIELDS OF VERMILLION COUNTY.

The firm of F. A. Bowen & Co., have opened a drift and commenced operations in the largest body of unbroken coal territory two miles northwest of Clinton. This company have leased four hundred acres of this territory: a side track has been built from the C. & E. I. Railway a distance of two miles reaching the mines. They are making preparations for a capacity of 1,500 tons of coal per day. The coal seam has an average thickness of five and one-half feet and is far superior in quality to any ever before mined in the county. There is an excellent roof over the seam, mines are dry and can be worked economical, as they are drift openings, easy of access; no machinery necessary as the coal seam crops out in the Bluff' about twenty-six feet from the water level in the ravine. This will afford abundant drainage for the mines, thus saving the great expense of handling the water by machinery, and again in affording height for screening coal.

## NEW COAL SHAFTS SUNK DURING THE YEAR.

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### CLAY COUNTY.

Church Hill extended to third seam during the year 1884. Owners and operators, Church Hill Coal Company.

Old Clay Coal Drift reopened. Lessee and operator, Thomas Watson. New shaft (Abby Mine) sunk on the same territory.

Shaft sunk two miles west of Carbon, on the Indianapolis and St. Louis Railway. Lessee and operator, Benjamin Simpson.

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## AIR AND ESCAPEMENT SHAFTS SUNK DURING THE YEAR 1884.

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### CLAY COUNTY.

Air shaft, accessible to the No. 3 shaft of the Brazil Block Coal Company.

Air and escapement shaft accessible to the Nickel-Plate Shaft of the Jackson Coal and Mining Company.

Air shaft to the Morris shaft sunk by the Brazil Block Coal Company.

### PIKE COUNTY.

Drift opened by the Whitman Coal Company on the Air Line Railway.

### FOUNTAIN COUNTY.

Air and escapement shaft sunk by the Union Coal Company of Yeddo.

### KNOX COUNTY.

Coal drift opened by Mr. Job Freeman in the town of Edwardsport.

## PARKE COUNTY.

Shaft sunk by the Brazil Block Coal Company, and also a drift opened by the Brazil Block Coal Company.

## VANDERBURGH COUNTY.

Shaft sunk by the Evansville Coal Association.

## VERMILLION COUNTY.

New Coal drift opened by F. A. Bowen & Co., three miles north of Clinton.

## NEW COAL SHAFTS SUNK DURING THE YEAR 1884 IN DAVIESS COUNTY.

Shaft Union No. 2, sunk by the Union Coal Company, three-fourths of a mile south of Cannelburg, Indiana.

*Traveling Ways.*

Escapement and traveling way sunk by the Buckeye Cannel Coal Company, accessible to their Buckeye shaft at Cannelburg, Ind.

## FOUNTAIN COUNTY.

New drift, opened by Habberman & Perry on Coal creek.

Bunker Hill No. 2, reopened by William Patterson & Sons on the Coal creek branch of the Chicago & Eastern Illinois railway.

## GREEN COUNTY.

New coal shaft sunk by the Island coal Company, two and one-half miles south of Linton, Indiana.

## KNOX COUNTY.

Air shaft, accessible to the White River drift, operated by Michael Adkins & Co.

## PIKE COUNTY.

Air and escape shaft, sunk by Rogers Brothers, accessible to the Sandy Hook drift.

*Table Showing the Number of Mines, etc., in each County.*

COUNTIES.	Number of Mines.	Number of Persons.	Coal in Tons.	Capital in Dollars.
Clay . . . . .	31	1880	. . . . .	. . . . .
Daviess . . . . .	17	664	. . . . .	. . . . .
Dubois . . . . .	10	85	. . . . .	. . . . .
Fountain . . . . .	17	372	. . . . .	. . . . .
Green . . . . .	8	50	. . . . .	. . . . .
Knox . . . . .	5	95	. . . . .	. . . . .
Martin . . . . .	5	34	. . . . .	. . . . .
Owen . . . . .	5	86	. . . . .	. . . . .
Parke . . . . .	19	518	. . . . .	. . . . .
Pike . . . . .	18	373	. . . . .	. . . . .
Perry . . . . .	8	175	. . . . .	. . . . .
Sullivan . . . . .	12	250	. . . . .	. . . . .
Spencer . . . . .	12	49	. . . . .	. . . . .
Vanderburgh . . . . .	5	274	. . . . .	. . . . .
Vermillion . . . . .	4	78	. . . . .	. . . . .
Vigo . . . . .	13	529	. . . . .	. . . . .
Warrick . . . . .	16	194	. . . . .	. . . . .
Warren . . . . .	2	10	. . . . .	. . . . .
Totals estimated. . . . .	207	5,716	2,260,000	1,750,000