SECOND

BIENNIAL REPORT

OF THE

State Inspector of Mines

OF THE

STATE OF COLORADO,

FOR THE YEARS ENDING

DECEMBER 31, 1885, AND DECEMBER 31, 1886.

TO THE GOVERNOR.

DENVER, COLO.:
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1887.

To His Excellency,

B. H. EATON,

Governor of Colorado:

HONORABLE SIR:

In accordance with the requirements of "An act to regulate the working and inspection of coal mines in Colorado," I have the honor of submitting to you my report of the transactions of this department, beginning August 1, 1884, and ending December, 1886.

It affords me great pleasure to be able to state that, during the last two years, many valuable improvements have been made at the various mines throughout the State, having the object in view of better securing the health and safety of persons employed in and around the mines.

The mine owners and superintendents in general have shown good spirit, and a marked desire to comply with the requirements of the laws. Some owners and managers of collieries have been frank enough to state that the existing law to regulate coal mines has been of mutual benefit to operators and miners.

It has not been necessary for the Inspector to resort to the courts to enforce the requirements of the act. It has been necessary for me, however, to hand several cases over to the Hon. T. H. Thomas, Attorney General of the State, who was at all times willing to give his valuble time and services to assist me in amicably compromising any controversy that did arise between mine owners and the Inspector, which I am glad to say was successfully and harmoniously accomplished in every case. I beg leave here to extend to him my grateful acknowledgments for such official courtesy.

Quite a number of ventilating fans have been erected, and escape shafts put down, thus giving distinct and *available* means of ingress and egress to the workmen.

The practical operator is ready to realize that good ventilation, good drainage, sufficient timbering, and all other safeguards thrown around the existence of the miner, are to his interest, financially and otherwise, as well as to the comfort and safety of his workmen, for it has been demonstrated beyond a doubt that the most economical method of operating coal mines is that which guarantees the fullest measure of health and safety to the operatives.

I have vigorously endeavored to get accurate statements of the total coal production, the number of persons employed, accidents and other matters of interest to the State. The majority of the operators have cheerfully complied with my requests, and promptly sent to me, in detail, all information asked for. Others, it seems, could not be moved to report, and have thereby given me much unnecessary work and annoyance in collecting statistics, some of which must be here given approximately.

I regret to say that much useful information, which I have in notes, taken from actual observation when visiting coal fields, must necessarily be left out of this report for want of clerical help. It is hoped that such help will be granted to the office by our next Legislature.

Sincerely thanking you for the marked attention and the many official courtesies extended to me during my incumbency, hoping this report will meet with the approval of your Excellency,

I have the honor to be, sir,

Yours, faithfully,

JOHN McNEIL,

State Inspector of Coal Mines.

SYSTEM OF BUILDING OFF GOB FIRES

RECOMMENDATIONS.

FOR FURTHER LEGISLATION ON THE ACT TO REGULATE THE WORING AND INSPECTION OF COAL MINES.

I will here advance respectfully a few recommendations to the careful consideration of the next General Assembly of the State, to be drafted into the act book.

During my term in this office there have been five lives lost and many persons injured on hoisting slopes, by cars breaking loose from the coupling and draw bars of the cars. To mitigate this, and prevent the re-occurrence of such calamities, I will urgently recommend that double draw bars be attached to the bottom or other parts of the cars, so that two separate couplings may be used to connect each and every car lowered or hoisted on any slope coming under this act, and that the hooks which connect with the draw bar of the car shall be constructed with a clevice or other contrivance, so as to prevent them from becoming detached while the cars are in motion on the slope; also, that double chains, with approved safety hooks, shall be attached to the socket of the hoisting rope. (See accompanying diagrams. Figure 1 is the system now in use; figure 2, system recommended.

I believe that the introduction of the above into the Statute book will arrest a source of danger imminent in several of our coal mining districts. The breaking strain of a chain, figured from a given formula, may be, say thirty tons; yet in one weak link death may lurk in a flaw that we could not detect; thus, truly speaking, a chain's breaking strain is its weakest link, which has often, and may again, prove to be far below its registered strength.

I find that danger is also becoming imminent in some of our mines in the northern districts, originating from

spontaneous combustion in the gobs of abandoned workings, and, if allowed to go on, may be the cause of a disaster. One of these fires exists in the Louisville mine, Boulder county, which has been burning for some years. On my first visit to this mine, I advised with the management repeatedly to build suitable walls of stone, lime and cement, so as to completely isolate the fires from air. But as the law does not give me ample powers to enforce stoppings of such a nature to be built, it was not done. The result there was that the gas generated by these fires exploded during one night with such force as to dislodge from their places trap-doors and stoppings, thus cutting off the air current, and filling the workings with dense smoke. There were eleven mules in the mine at the time, and they were all suffocated. It was providential that the miners were not at work.

Mine fires will take place under the most careful management, yet with proper care and precaution on the part of the Mine Superintendent they can be extinguished before they attain serious dimensions.

I am, therefore, led here to recommend strongly that, in all coal mines coming under the act, where gob fires are known or even suspected to exist, a careful inspection shall be made daily of the workings, and if an increase of temperature be localized in any part of the gobs, prompt action shall be taken to remove the heated gob or debris, or extinguish the fire by water or other contrivance. But if the fire has already reached such proportions that it is impossible to extinguish it in that way, then it shall be the duty of the Superintendent, or of the Mine Boss, in the absence of the Superintendent, to at once flood with water the site of the fire, or build suitable stoppings of double walls of a concave shape and one foot apart, with ends put back in cuttings made in the coal or rock, and the center to be filled with sand closely tamped, so as to fill up all cracks and crevices; the outside walls to be carefully plastered with lime and cement, so as to completely isolate the fire from the air. (See diagram.)

The introduction of the above, as an additional section to the act, would be esteemed by mine owners and workmen alike, for such would without doubt be in time acknowledged as existing for their mutual benefit. There is one of our coal companies which has expended ten thousand dollars ($10,000) in fighting neglected gob fires, which, if taken in time, could have been extinguished for comparatively nothing.

I find that section 17 of the act does not authorize the Inspector to have his biennial report printed for distribution, but only to be embodied in the Secretary of State's report. This is a point to which I should like to call attention. It is customary in all other States for the Coal Mine Inspector's report to be printed in separate form for distribution among superintendents, mine bosses and others interested in coal mining. A Mine Inspector's report is supposed to contain comments on defective systems and advice on the best methods to be adopted. It is, therefore, essential that his report should be given to every intelligent miner, on being asked for. I therefore recommend that the Inspector be authorized to have printed at least five hundred copies of his biennial report for distribution.

I find, from experience, that it is almost an impossibility for an Inspector to accomplish the multifarious duties of his office without an appropriation for assistance. The correspondence, official reports, etc., in connection with the office are greatly increasing. The law prescribes that "it shall be the duty of the Inspector to enter into and thoroughly examine all coal mines in the State coming under the act, at least once in three months, and see that all the provisions of the act are observed and strictly carried out." Now, that part of the duties of the office, in itself, is *very* laborious, and necesitates a good deal of traveling to get around the State, the mines lying so far apart, the round trip involved to some of them being from 600 to 900 miles. Thus, a greater part of my time, when from the office, is spent in railroad cars.

I sincerely trust that the honorable members of the next Legislature will give their careful attention to what I have above suggested respecting the very important requirements of this office.

COAL PRODUCTION.

The following is a summary of the coal statistics of the State for a number of years:

Years.	*Tons.*
1873	69,977
1874	87,372
1875	98,838
1876	117,666
1877	160,000
1878	200,630
1879	322,732
1880	375,000
1881	706,744
1882	1,061,479
1883	1,220,593
1884	1,130,024
1885	1,398,796
1886	1,436,211

The production for 1884 was greatly lessened by a strike of large proportions, existing in all the collieries of the southern part of the State. It took place about the first of August, and continued until about the twentieth of December. I estimate that the annual production was reduced by this strike at least 230,000 tons, which would be worth on the car at the mines $2.35 per ton; thus the loss experienced by the miners, laborers, mechanics, operators and others aggregate a total of ($540,500) five hundred and forty thousand five hundred dollars. The Colorado Coal and Iron Company, Cañon City Coal Company, and the Trinidad Coal and Coking Company suffered heavy losses. The D. & R. G. and A., T. & S. F. railroads also lost heavily by the loss of such a large amount of freight to their roads.

The entire coal production of the State, from August 1 to December 31, 1884, was but 386,000 tons. During these months a great deal of coal was shipped into the State from adjoining States and Territories.

For the year ending December 31, 1885, the returns made to this office are 1,398,796 tons of 2,000 pounds. By counties as follows:

Counties.	*Tons.*
Gunnison (including coal made into coke)	120,358
Boulder	187,661
Fremont	328,638

Counties.	*Tons.*
Weld	39,043
El Paso	42,083
Las Animas (including coal made into coke)	500,560
Huerfano	89,566
Jefferson	22,748
Park	43,752
La Plata	14,847
Douglas	1,500
Dolores	3,240
Garfield	4,800
Total	1,398,796

The average value of the coal on the cars at the mines is two dollars and thirty-five cents ($2.35) per ton of 2,000 pounds; thus, the production of 1885 is valued there at three million two hundred and eighty-seven thousand one hundred and seventy dollars and sixty cents ($3,287,170.60).

During the year there were produced 126,279 tons of coke. Of this amount, the Colorado Coal and Iron Company produced 86,000 tons, and the Trinidad Coal and Coking Company 36,829, and 3,450 tons were produced in Dolores and La Plata counties.

For year ending December 31, 1886, the returns of the coal production made to this office are by counties as follows:

Counties.	*Tons.*
Las Animas (including coal made into coke)	471,129
Fremont	334,104
Boulder	222,397
Gunnison (including coal made into coke)	160,500
El Paso	53,600
Huerfano	89,913
Weld	24,027
Park	23,823
La Plata	20,000
Jefferson	12,518
Arapahoe	11,000
Garfield (estimated)	5,000
Douglas (estimated)	4,000
Dolores (estimated)	4,800
Total	1,436,211

The average value of the coal on the cars at the mines is two dollars and thirty-five cents ($2.35) per ton of 2,000 pounds; thus, the coal production of 1886 is valued there at three millions three hundred and seventy-five thou-

sand no hundred and ninety-five dollars and eighty-five cents ($3,375,095.85).

Average number of persons employed in and around the mines during the year, including mechanics, etc., is estimated at 3,500. The average thickness of the coal seams worked throughout the State is five feet three and seven-eighths inches (5 feet 3⅞ inches); the thickest is nine feet, and thinnest two feet. The average digging price paid to miners for digging and loading the coal and timbering their working places, is eighty-nine and one-sixth cents (89 1-6 cents) per ton of 2,000 pounds of screened coal. The average cost of producing the coal on the car at the mines is one dollar and seventy-four cents ($1.74) per ton.

Some of the above figures are estimated, yet I believe them to be nearly accurate.

During the year there were produced 145,162 tons of coke. Of this amount, the Colorado Coal and Iron Company produced, in Las Animas county, 82,845 tons; in Gunnison county, 29,003. The Trinidad Coal and Coking Company produced, in Las Animas county, 28,314 tons. Returns from La Plata and Dolores counties have not reached this office. A fair estimate of their production would not exceed 5,000 tons.

FATAL ACCIDENTS—1884.

September 4—Gustave Koehler, miner, was instantly killed by a fall of rock at the face of his working place in the Crested Butte mine, Gunnison county.

November 10—Charles Wright, mule driver at the Colorado Fuel Company's mine, Anthracite, Gunnison county, was killed by a loaded trip of cars, which ran over him. There was no person near him when the accident occurred. It is supposed that he was riding on the front of the first car on the trip, and had fallen off before the cars while coming down a grade.

December 26—Mike and Casino Dominico, rope runners at Como Slope No. 1, Park county, were killed. The two men were riding up the slope on a trip of four loaded cars, when the coupling between the first and second cars broke. Thus, the cars upon which the unfortunate men were, instantly reversing their motion, were hurled to destruction. The angle of incline is forty-five degrees. Mike was instantly killed and Casino lived but three honrs.

NON-FATAL ACCIDENTS—1884.

August 4—Grojor Messaro, miner at Como mine, Park county, received scalp wound by fall of slate.

September 2—David Maxwell, miner at Walsenburg mine, had his foot injured by a fall of slate.

September 13—John Brasson, miner at Starkville, Las Animas county, left leg fractured by a fall of top coal.

September 15—Sobi Domico, miner at Como mines, Park county, back, left knee and foot injured by rock falling from roof of his room.

September 26—Como mine, Park county, Silver Powell, rope runner, ruptured by being thrown down while running the rope.

September 4—A. S. Purdy had his left foot injured between cars; rope broke on loaded trip, while he was riding up on the cars, at Como mine, Park county.

September 29—Ernest Painer, miner at Crested Butte mine, Gunnison county, had his foot bruised by a fall of coal.

September --—Thomas Connelly, driver at Louisville mine, Boulder county, thumb smashed while falling off a loaded car while in motion.

October 24—John R. McNeil had his hand badly bruised by a loaded car running off the track, in the Crested Butte mine, Gunnison county.

October 29—John McGovern, miner at Crested Butte mine, seriously injured by a fall of coal.

November 8—James Guninic, miner at Louisville mine, Boulder county, scalp wound (cut to skull) by accidentally falling six feet on to track in mine.

December 29—Rockvale mine, Fremont county, George Furgeson, foot bruised by a piece of rock falling from roof.

LIST OF FATAL ACCIDENTS—1885.

January 12—Michael Graham, roadman at Coal Creek mine, Fremont county, was burned and otherwise injured by an explosion of carburetted hydrogen, and died ten days after the accident. (See remarks on first page of non-fatal accidents for 1885.

February 18—A. S. Purdy, machinist at Como mines, Park county, killed in slope No. 1. He was riding up the slope on a trip of loaded cars, when the link attached to the draw bar of the car next to the hoisting rope, broke; thus, the cars, instantly reversing their motion, took Purdy down the incline, and were hurled to destruction. The angle of the slope is forty-five degrees.

February 26—Thomas Lewis, miner at Canfield mine, Fremont county, injured by being thrown from a runaway car, resulting in death March 2. It appears that Lewis was riding down the slope on an empty trip of cars, when the draw bar of one of the cars broke. Part of the trip in which Lewis was, started down the grade with a great and accelerating velocity, and on reaching the switch at first level jumped from the track, throwing the unfortunate man against the side of the slope with great force.

March 3—Salvador Cruze, miner at Walsen mine, at Walsenberg, Huerfano county, killed by a fall of slate from the roof of his working place. On inspecting the place of accident, I found that Cruze had neglected to properly timber his room. I frequently find such carelessness practiced in this respect by Italian miners.

March 13—Albert Thomas, miner at Boulder Valley mine, Weld county, back dislocated by a fall of slate, while wedging down coal, causing death October 2, 1885.

July 7—J. McCormick, miner, Cameron mine, Colorado Coal and Iron Company, Huerfano county, killed instantaneously by the falling of a large rock, at the face of his working place.

August 15—James Ferreon, miner, Walsenburg mines, Huerfano county, injured in bowels and legs, by a fall of slate from the roof of his working place, and died ten days after the accident.

November 13—Gracomo Politono, miner, at Rockvale colliery, shaft No. 4, Fremont county, received injuries from which he died a few hours after the accident. From examination of the case I found that deceased was caught between the hoisting cage and the "door heads" at the shaft bottom. It appears that the wire of the signal bell had been broken during the night before the accident occurred, and on the morning in question the foreman gave orders that the workmen should be lowered without the use of the signal bell, and that the fire boss should give sounds to the engineer through a metal tube. Three cages of the workmen were lowered in this reckless manner when the accident occurred. The cage load in question reached the bottom of the shaft, when the fire boss gave a sound through the tube to the engineer just as the men were stepping off; the engineer then raised the cage, which caught Politono, one of the number who had been lowered, with the result as stated. The fire boss said he did not give the sound with the intention that the engineer should hoist, but gave the whistle through the tube to call the engineer's attention to something he (the fire boss) wished to say to him, thus indicating that they had not even arranged in concert beforehand any system of signals to be given through the tube.

The Superintendent and Manager of this colliery are experienced men in the conduct of coal mines. They had taken every precaution to insure the safety of their workmen, and had posted up at all their mines special rules and regulations relating to signals, etc. Yet, here we have a case of inexcusable carelessness, in which their foreman takes upon himself the responsibility of violating rules and ordinances which he ought to have carried out with integrity.

December 14—Athlez Gulick, repairman at Thorton

mine, Fremont county, injured, and died on the morning of the fifteenth, caused by being struck by a runaway car. Gulick, at the time of the accident occurring, was engaged in fixing timber in the main slope (which pitches at an angle of twenty-six degrees), when a car broke loose from an empty trip of cars above him, and struck the unfortunate man before he could get out of its way.

LIST OF NON-FATAL ACCIDENTS—1885.

January 12—Nodory Borolmo, John Stein, John Bastine, Otto Morgestern and Michael Graham, roadmen, at Coal Creek mine, Fremont county, were burned and otherwise injured, by an explosion of carburetted hydrogen gas—C. H.[4] It appears that these men were engaged taking out rails from an abandoned part of the mine. The fire-boss, on his round of inspection, had discovered a quantity of gas lodged in where a fall of roof had come down at the face of the entry of the abandoned works in question. He placed a "fire-board" up at the outside of the fall, and marked on it the word "*gas.*" The roadmen in question were informed of this, and warned not to go near that particular point. They went there, however, with the result above stated. The unfortunate men, with the exception of Michael Graham, were at once taken to the company's hospital, where they soon recovered. Michael Graham preferred to be taken to his home, where he died ten days after the accident.

I would state that while the placing up of a "fire-board" is a precaution that is necessary to be taken when gas is discovered, *if* the fire-boss be not prepared to have the gas removed, yet experience teaches us that a "fire-board" is not at all times a preventive to such accidents, and it is wrong to put any dependence on such for any period of time. The only safe-guard is for the mining or fire-boss to secure material and assistance, and have the gas eradicated with all possible dispatch, and see that no naked lights are in that particular district. Some controversy arose between the company and the injured parties, which I understand was amicably settled.

January 14—Charles Cowan, driver, at Coal Creek mine, Fremont county, was serioulsy injured by a fall of slate. The cars left the track and knocked out a prop, which let down some roof upon him.

January 23—William Close, driver, at Coal Creek mine, Fremont county, hand crushed by being caught between cars.

January 15—Richard Kissel, roadman, at Coal Creek mine, Fremont county, leg bruised between pit cars.

January 12—Blozius Nado, miner, at No. 1 shaft, Rockvale, Fremont county, back hurt by a fall of rock at face of room.

January 19—Thomas Allen, miner, at No. 4 shaft, Rockvale, Fremont county, arm broken by coal falling on him, while undermining.

January 21—Theophilus Crouther, miner, at No. 3 shaft, Rockvale, Fremont county, head and arms injured. Shot blew through the pillar from room next to him and coal struck him.

January 26—Frank Abendrop, miner, injured by slate falling from roof in the Mitchell mine, Weld county.

February 4—William Golightly, miner, at Crested Butte mine, Gunnison county, back injured by a fall of top coal.

February 5—William Whitchurch, miner, Franceville mine, El Paso county, bruised about the neck and shoulders by a fall of coal.

February 6—M. V. Thompson, outside laborer at Coal Creek mine, Fremont county, bruised on neck by falling coal from shutes.

February 6—Necitio Martine, miner, at Starkville mine, Las Animas county, seriously bruised by a fall of slate.

February 13—Richard Williams, outside laborer at Coal Creek mine, Fremont county, foot bruised; run over by a loaded car.

February 15—John EcIlwee, miner, at Crested Butte mine, fingers crushed between car and wall side, when car jumped track.

February 18—Robert Kimbly, miner, at Coal Creek mine, Fremont county, knee bruised by a fall of slate.

March 3—Joseph Oberoshler, miner, at Starkville mine, Las Animas county, bruised about the hips by fall of coal.

March 13—John Graham, miner, at Coal Creek mine, Fremont county, leg and foot badly bruised by fall of top coal.

March 13—Walter Stocks, miner, at Coal Creek mine, Fremont county, received scalp wounds by a fall of slate from between top and bottom coal.

March 12—John Hardy, miner at Coal Creek mine, Fremont county, hand injured by lifting car on track.

March 16—James Buckley, miner at Boulder Valley mine, Weld county, back and breast injured by a fall of slate.

March --—John Brown, miner at Louisville mine, Boulder county, leg injured by a fall of slate.

March 23—Edwin Champion, miner at No. 1 shaft, Rockvale, Fremont county, injured by premature blast.

March 26—James Coady, driver at Coal Creek mine, Fremont county, leg crushed between cars.

March 26—Thomas Turner, miner at Coal Creek mine, Fremont county, arm and head cut by fall of slate.

April 15—Felix Treyillo, miner at El Moro mine, Las Animas county, thigh bone broken while undermining coal. Had no sprags under coal to prevent it from falling.

April 18—Tim Carney, driver at El Moro mine, Las Animas county, hand crushed between cars.

April 29—John Swanson, miner at Crested Butte mine, Gunnison county, thigh bone broken by fall of coal.

May 15—James Roe, miner at Coal Creek mine, Fremont county, leg injured by fall of slate.

May --—John T. Mould, at Garfield mine, Boulder county, hand mashed by piece of coal falling down shaft from loaded car, while taking off empty car.

June 18—Willis Phillips, driver at Franceville mine, El Paso county, injured by kick from mule.

June 25—George Gruger, driver at Coal Creek mine, Fremont county, injured on small of back by kick from a mule.

July 5—Edward Saunders, miner at No. 4 mine, Como, Park county, ankle hurt.

July 22—Alexander Bell, miner at Starkville mine, Las Animas county, bruised on shoulder by a fall of coal.

July 22—Joseph Gillon, at Starkville mine, Las Animas county, injured by being caught between a car and prop.

August 10—John Johnson, timberman at Starkville mine, Las Animas county, ankle bruised by falling prop.

August 10—William Sniell, miner at Coal Creek mine, Fremont county, injured on back and legs by a fall of slate.

August 10—John Gillespie, outside laborer at Coal Creek mine, Fremont county, leg bruised between cars.

August 11—William M. Davis, miner at Coal Creek mine, Fremont county, back injured by a fall of slate.

August 11—John Massard, miner at No. 3 shaft, Rockvale, Fremont county, foot injured by fall of slate.

September 7—Peter Mestes, driver at Starkville mine, Las Animas county, leg broken; caused by car jumping track.

September 21—Fred Umnity, miner at shaft No. 1, Rockvale, Fremont county, cut on head and leg, caused by premature blast.

September 25—James Politano, miner at El Moro mine, Las Animas county, foot crushed by fall of coal.

September 28—Peter Frank, miner at El Moro mine, Las Animas county, leg and arm broken by a fall of coal.

September 30—Edward Robson, miner at Louisville mine, Boulder county, injured on right hip by a fall of slate.

October 12—Richard Kissel, timberman, at Coal Creek mine, Fremont county, small bone of leg broken by a runaway car.

November 10—Samuel Dunford, miner at No. 1 shaft, Rockvale, Fremont county, hand crushed while lifting car on the track.

November 10—John Dallas, miner, at Oak Creek mine, Fremont county, hip joint dislocated by fall of slate falling on him while undermining.

November 17—Robert Denoon, a mule driver at Oak Creek mine, Fremont county, fingers crushed while spragging a car.

November 20—Charles Nelson, Starkville mine, Las Animas county, arm broken by fall of coal.

November 23—Rappa Sebastian, cager at No. 1, Rockvale, Fremont county, foot bruised. Cage started up shaft before car was set, and tilted bumper of car on his foot.

November 24—Daniel McDonald, miner, at Oak Creek mine, Fremont county, ribs broke and head cut, by a fall of slate.

November 27—El Moro mine, Colorado Coal and Iron Company, Deiderio Lucero, received personal injuries from a fall of coal. He was undermining the coal, when it suddenly gave way, falling on his body.

December 9—James Vowell, miner, at No. 1 shaft, Rockvale, Fremont county, leg injured by fall of rock.

December 9—John Hilliar, at Oak Creek mine, Fremont county, leg injured by pit car.

December 12—Jonathan Coslett, miner, at No. 1 shaft, Rockvale, Fremont county, arm and back injured by debris from a premature blast.

December 14—William Lahay, miner, at Oak Creek Mine, Fremont county, foot bruised by fall of slate.

December 29—J. B. Williams, miner, at No. 1 shaft, Rockvale, Fremont county, leg bruised by fall of coal while undermining.

December 30—Joseph Sovern, miner, at No. 4 shaft, Rockvale, Fremont county, leg broken by fall of coal while undermining.

FATAL ACCIDENTS—1886.

January 5—John Schmidt, miner, at the Walson mine, Walsenburg, Huerfano county, killed by a falling rock in his working place. The accident was one of those unavoidable ones, as the room to all appearances, was well timbered; but the rock in question was of boulder shape, and the "slip" around it, which separated all binding force from other parts of the roof, and probably could not have been foreseen by the unfortunate man.

March 25—Maurice Bertasa, miner in Cameron mine, Huerfano county, killed by a falling rock from the roof of his working place. The rock was suddenly freed by a "slip" which run parallel with the face of the coal, and broke loose on the coal being mined from under it.

July 7—Thomas Quealy, superintendent of the Como mines, Park county, was instantly killed by being thrown from the top of a box car. It appears that Quealy was taking a car down a grade, and was standing on top of the car, leaning on the brake, and while crossing a switch, the rear trucks of the car jumped the track, pitching him from the top of the car at the front end, on the ground, he falling on his head and shoulders. The car ran on him and caught his body under the front trucks. His neck was broken. This, it is thought, was caused by the fall from the top of the car.

September 29—Alphonso Nast, miner, engaged on the night shift at the San Juan Coal Company's mine,

Durango, La Plata county, was killed by a falling rock weighing fully two tons. The rock was shaped like a large bell, its base being four feet in diameter, and run to a point at the top; its sides were smooth and showed that a "slip" extended around the entire circumference of the boulder; then, when Nast mined the coal from under it, it fell suddenly on him. He was working alone, and no one was near him at the time the accident occurred. When found, his body was bent double under the rock. He was said to be a careful miner. His working place was well timbered. The accident was one of those unexpected ones, that could not have been foreseen or avoided.

October 8—William Powell, miner, engaged on night shift in the new tunnel of the Porter Coal mine, Durango, La Plata county, was burned and had his skull fractured by an explosion of forty pounds of giant powder. The box in which the powder was contained was kept on the side of the tunnel, and had in some way taken fire. Powell looked back from the face and saw the box burning, and at once ran to get out at the entrance of the tunnel, but unfortunately only got past the box about twenty yards, when the explosion took place. He lived but two days after the accident.

November 25—Angus McPherson, miner, No. 2 mine, Coal Creek, Fremont county, was killed by a quantity of coal thrown on him by a shot which had been fired off from an adjoining place, and which blew through a coal pillar while the unfortunate man was in close proximity and directly in front of the deadly blast, thus the flying pieces of coal struck him with great force, causing instantaneous death. On inspecting the place where the accident occurred, I found that McPherson's working place consisted of an airway which ran parallel to an entry. Between this air-way and entry a pillar of coal fifteen feet in thickness had been left, with the intention that such thickness would be maintained throughout, as the entry and air-way advanced. A cross-cut had been put through this pillar about sixty-five feet back from the face of the entry, which showed the pillar to be the required thickness; but from this point, or near to it, the entry commenced to widen out a little,

thus robbing the pillar a few feet of its thickness. The air-way, which was in advance of the entry thirty feet, had also widened out a little, thus the pillar became only six feet thick, where the shot blew through. It appears that McPherson kept his powder keg back on the "rib" side, and had been there engaged in preparing a cartridge for a shot which he intended to fire, when the shot blew through and killed him.

NON-FATAL ACCIDENTS—1886.

January 8—John Hendrickson, miner at Starkville mine, Las Animas county, received bodily injury by a fall of coal.

January 9—James K. Mullen, miner at Oak Creek mine, Fremont county, back injured by falling slate.

January 11—John McCullum, driver, at Oak Creek mine, Fremont county, finger broke while spragging cars.

February 6—James Charnock, miner, at Coal Creek mine, Fremont county, leg and foot bruised by a fall of slate from between top and bottom coal.

February 13—John Patterson, miner, at No. 1 shaft, Rockvale, Fremont county, back severely injured by a fall of slate.

February 22—John Frankline, driver, and Richard Williams, spragger, at No. 4 shaft, Rockvale, Fremont county, received injuries by a fall of rock, while taking in a trip of cars on entry. Frankline's injuries consisted of severe bruises across the back in the region of the kidneys and shoulders. Williams was injured about the head and ankle.

February 23—T. E. Edwards, mule driver, at Coal Creek mine, Fremont county, leg and hand bruised by fall of slate and coal, at face of a room.

February 24—James Bain, miner, at Coal Creek mine, Fremont county, bruised between cars.

March 8—Harry Richards, driver, at Starkville mine, Las Animas county, right thigh bone fractured at upper

third, caused by falling in before a trip of loaded cars while in motion. When found, he was under first car on trip.

March 10—Evan T. Jenkins, timberman at No. 1 shaft, Rockville, Fremont county, neck, arms and face burned by an explosion of carburreted hydrogen gas—C. H.[4]

March 18—Craber Rafael, at Starkville mine, Las Animas county, thigh bone fractured.

March 19—Joseph Hard, miner at Stewart mine, Boulder county, injured by a fall of coal.

April 8—Daniel Deeney, miner at Marshall mine, Boulder county, right leg broken below the knee, caused by a quantity of loose coal rolling over on his leg while he was breaking up the coal.

May 7—Victor Devivier, miner at No. 4 shaft, Rockvale, Fremont county, right hip injured by a fall of rock.

May 6—Peter Sproats, miner at Starkville mine, Las Animas county, shoulder slightly injured by a fall of slate.

May 6—Pasquel Potato, miner at Starkville mine, Las Animas county, hand hurt by piece of falling "bone."

May 14—William Gillard, miner at Coal Creek mine, Fremont county, foot bruised by a fall of top coal.

May 20—B. McGengan, driver at El Moro mine, Las Animas county, two ribs broken and otherwise injured about the body, caused by falling in before loaded trip while in motion.

May 22—Thomas Wilcox, driver at Starkville mine, Las Animas county, kicked by mule on the mouth; lost two teeth and otherwise injured.

May 24—John Obershler, miner at Starkville mine, Las Animas county, foot injured by slide of slate.

June 2—Jacob Kocewor, at Crested Butte mine, Gunnison county, finger fractured.

June 5—J. P. Herera, miner at El Moro mine, Las Animas county, bruised about the body by a fall of slate, while undermining.

June 8—Peter Valerio, miner at Starkville mine, Las Animas county, broken ankle, caused by fall of coal.

June 10—William Cowan, timberman at No. 2 mine, Colorado Coal and Iron Company, Fremont county, back injured by fall of rock.

June 15—Joseph P. Williams, miner at Coal Creek mine, Fremont county, bruised on head and back. He was riding in an empty car, which jumped the track.

June 16—J. J. Davis, at Baker mine, Boulder county, back injured by being caught on entry with loaded car.

June 17—August Shupp, miner at Crested Butte mine, Gunnison county, bruised by fall of coal.

June 18—W. Watson, miner at Baldwin mine, Gunnison county, sprained knee.

June 10—John Bamerick, cager at No. 1 mine, Rockvale, Fremont county, cut on left shoulder by a piece of coal falling from an ascending car when near top of shaft, while he was taking a car off the cage that had just descended.

June 14—William Ritzt, machine runner at Marshall mine, Boulder county, three fingers taken off by being caught in the driving chain of a mining machine.

June 24—J. B. Hart, miner at Marshall mine, Boulder county, hand crushed between a car and a prop.

June 24—Lervy House, miner at No. 3 mine of the Rockvale colliery, Fremont county, back and side bruised by a fall of rock.

July 30—Joseph Bowden, miner, at Coal Creek No. 2 mine, leg bruised by a fall of coal while undermining.

July 30—Peter Timmins, miner, at Coal Creek No. 2 mine, Fremont county, back injured by fall of slate.

August 10—Christopher Elleriette, miner, at No. 1

mine of the Rockvale colliery, Fremont county, back and thigh severely bruised by a fall of rock.

August 15—Daniel Lawley, mule driver at Mitchell mine, Weld county, arm injured by kick from mule.

August 23—Samuel Boay, miner, at Mitchell mine, Weld county, foot crushed by fall of coal.

August 25—Thomas Miller, miner, at No. 3 mine of the Rockvale colliery, leg broken below the knee by a fall of slate from the roof, while loading a car in his working place.

August 27—Edward John, miner, at No. 1 mine, Rockvale colliery, Fremont county, was injured by a fall of rock.

September 13—John Schilling, miner, at Mitchell mine, Weld county, foot bruised by a fall of rock.

September 7—John Sweny, miner, at Crested Butte mine, Colorado Coal and Iron Company, Gunnison county, back and leg bruised by a fall of slate.

October 7—James Thorley, miner, at No. 1 mine, Rockvale colliery, Fremont county, was injured on the legs and hips by a fall of rock while loading a car.

October 18—Stephen Kanick, miner, No. 4 shaft, Rockvale colliery, Fremont county, received severe injuries by a premature blast. It appears that Kanick had prepared to fire a shot in the coal, and, after lighting the squib, went back in the roadway until it would go off. Just at that time a shot went off in the adjoining room. Kanick thought it was his shot, and went back into his room. He had just reached there when his shot went off, some of the coal striking him on the arms and other parts of his body.

October 29—George Dando, miner, No. 1 shaft, Rockvale colliery, Fremont county, head cut and toes of right foot entirely cut off by a falling rock from side of "brushing," while engaged buiding a "pack-wall."

October 14—Edward Edwards, miner, Crested Butte mine, Colorado Coal and Iron Company, legs bruised by a fall.

October 13—William J. Thomas, miner, at Franceville mine, El Paso county, burned by powder.

October 25—Max Morgestern, miner, Coal Creek mine, No. 1, Fremont county, left leg broken in two places by a fall of coal, while he was engaged in undermining.

December 2—Charles Mathews, miner, Star mine, Boulder county, leg broken below knee by a fall of slate from between the top and bottom coal, at his working face.

PREVENTION OF ACCIDENTS.

This subject is the most important that can be brought before mining men, and it frequently forms the topic for discussion among them, the question being asked: "How, and by what methods can accidents in mines be reduced to a minimum?" Four years ago this subject received mature consideration on the part of some of the most prominent mining men in our State, and through their untiring efforts the matter was brought before the Fourth Session of the General Assembly of the State for legislation. Many members of that honorable body worked indefatigably (notably the Hon. B. F. Rockafellow, member for Fremont county), and secured the passage of a bill for "An act to regulate the working and inspection of coal mines," which also provided for the appointment of a State Inspector, whose duty it would be to see that the law was enforced, and to visit the mines sufficiently often to prevent any laxity of discipline on the part of the several mine operators, and to make official reports. In many instances the duty of the Mine Inspector is misunderstood, the principal reason being that a great many of the miners are not acquainted with the mining law by which they are governed, and seem to construe the duty of the Inspector to be equivalent to that of an active manager of the mines. It is not unusual, after the occurrence of an accident in a mine, for persons to ask: "Well, what does the Inspector say about this? When did he last inspect the workings of the mine? Is he not in some way responsible for the occurrence of the casualty?" etc. Such remarks are, of course, absurd on their face,

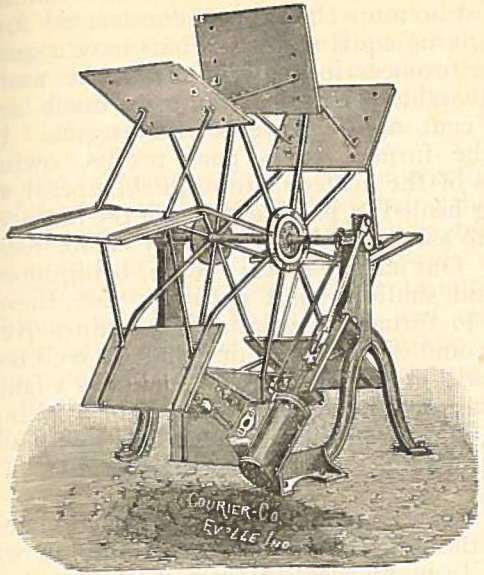
for an Inspector may make a careful examination of the workings and hoisting appliances of a mine, thoroughly satisfying himself that the condition of the mine is all that can be desired at the time of such examination; yet in one day or one hour afterwards, danger at some point may be imminent. The Inspection Law governing coal mines is not only an absolute necessity, but a great safeguard and blessing to all those engaged in such industry, for it is one of the greatest preventives of accidents. Yet, in itself, *it is no guarantee* of safety.

The superintendent, pit boss and every workman in or around a mine must ever remember and fully realize that their security depends, to a very large extent, on their own efforts, carefulness and ability. Coal mining is, at best, a very dangerous occupation. Nevertheless, I am inclined to think that disobedience, incompetence and negligence fully explain the cause of as many accidents, if not more, than are due to the hazardous character of the occupation itself. In investigating the cause of accidents, I find it is very often the case that a large part of the responsibility involved lies upon some one individual. Sometimes the accident occurs through the carelessness of a mine boss or a superintendent in not enforcing strict discipline among the workmen; or, in some cases, in consequence of such mine boss or superintendent not having the necessary qualification of experience or practical and theoretical knowledge of his business, so as to be utterly unfit to manage the operations of a coal mine with any regard to safety or economy. Again, the ignorance and recklessness displayed among some miners and other operatives, are another great barrier in the way of reducing the number and serious character of accidents. To relate instances of the recklessness which I have myself witnessed on some of my visits to mines would seem, even to miners, beyond belief, though nevertheless true. It is much to be regretted that in some cases the superintendents and mine bosses express no disapproval of seriously dangerous practices, nor do they themselves set a good example in that respect, but are equally guilty of practices which call for the strongest condemnation as needlessly exposing life and property to serious risk.

It should be one of the most important duties of such a responsible office, to ever be on the alert as to the proper conduct, guidance and discipline of the persons employed in a business which, under favorable circumstances, is ever considered hazardous. As an illustration of this, I mention an instance which happened to come under my own observation. On my arrival at a certain mine, where nearly a hundred men were employed, for the purpose of making an inspection, I informed the engineer that I desired to descend the shaft, whereupon he stopped the cage at the "lower landing" for me to get on. To my surprise, I found that a car was on the cage, and also that a loaded car was on the other cage, which had just left the bottom of the shaft. I at once demanded an explanation from the engineer for such a violation of the law, to which he replied: "That other persons were lowered in that way, and he did not see the necessity of a change in the rule for me." I caused him to lower back the cage, and had the cars removed before I went down. I talked with the "cager," at the bottom of the shaft, relative to the matter. He replied: "Oh, that is nothing, the superintendent himself and anyone else rides up on the cage with a loaded car when they feel like it." On being spoken to on the subject, the superintendent offered some flimsy excuse, and looked upon it as too trifling to be worthy of notice. Such a person is entirely in the wrong place as the superintendent of a coal mine. There are, however, many managers and superintendents who have prepared special rules for the guidance of all the employés engaged in or around the mines under their control. Such rules are often very stringent in their nature, and are of much value when carried out in accordance with the spirit in which they were framed. But while a system of laws may be the most perfect that human ingenuity can devise, still a lack of rigid discipline in enforcing them must sometimes lead to disaster. It has been the rule in the discussion of methods for the prevention of accidents, to come to the conclusion that a higher standard of practical knowledge and technical education among miners is urgently needed. While I believe that every encouragement should be given to secure such a standard, yet I am constrained to think, from my knowledge

of men in general, and miners in particular, that it would be impossible, under any system of education, to thoroughly escape from the consequences of recklessness or carelessness, for it seems more or less to be part and parcel of man's moral nature.

What, then, is the best course of procedure? I am of the opinion that no better course could be taken to obviate dangers, than to enact a law by which persons having the active management of coal mines would be obliged to obtain previously a certificate of competency, secured on their own merits before a State mining board of examiners; such certificate not only to be given to men who are well versed in the mining of coal theoretically, but to men possessing a thoroughly practical knowledge and ranking high in intelligence and character. The holders of such certificates should be held responsible for the carrying out, in their integrity, of the mining laws of the State and the special rules of the owners of the coal mines. Realizing such responsibility, they will take care that such laws and rules are faithfully and rigorously enforced, for which purpose they will require from the workmen an uncompromising obedience to their orders, which will be absolute. If mine bosses were required to hold a certificate of competency before being allowed to fill such a position, it would be placing a premium on the acquisition of knowledge in mining, and one result would be that the more intelligent operatives would strive to earn such a reward. If such an act were passed by our next Legislature, it would be a step in the right direction, and would do much to raise the standard of education in the science of coal mining.



VENTILATING FANS.

It has advanced into the magnitude of an axiom that the most economical, reliable and effectual contrivance yet invented to ventilate coal mines, is a fan driven by steam power. Its advantages over all other artificial means are obvious to any one versed on the subject.

Some years ago the mechanical construction of ventilating fans consisted of a great deal of extra work and finish and attachments not necessary for its proper working, so that it became very expensive; therefore, operators of collieries of small proportions could not very well afford to expend the amount of money requisite to purchase a fan and engine, and erect such massive structures as were then in common use in connection with its operation. But in the last few years there is probably no subject in all coal mining operations which has received so much attention from eminent mining engineers as has the subject of mechanical ventilation. And the result of such scientific research is fully demonstrated in the fact that a well constructed fan and engine,

with all necessary fittings, casing and buildings complete, cost no more than a well constructed furnace capable of giving equal results. Fans have a great advantage over furnaces in shallow shafts, the useful result, under favorable conditions, being as much as seventy-five per cent. of the power of the engine. In shallow mines the furnace gives poor results, owing to the shortness of the heated column in the upcast shafts, the air being heated in passing through the furnace, scarcely getting to ascend with any rapidity before reaching the surface. Our mines in this State, being mostly drifts, slopes and shallow shaft openings, are, therefore, not adapted to furnace ventilation. In mines over 700 feet in depth, and especially in dry shafts, a well constructed furnace will give just as good results as a fan, as far as the amount of air propelled around the workings is concerned. But, even then, the fan has many advantages over the furnace, for the following reasons:

That it can be reversed at will from exhausting the air from the mine to forcing the air into it, with equal results. In many cases this is a great advantage in very cold weather, where water is dripping from the sides of the hoisting shaft, which can be made the upcast and the warm air prevent freezing, an annoyance prevalent in many of the mines of this State. But little trouble is experienced in running a fan, and where the hoisting of coal is done by steam power, its cost in operating is comparatively nothing, for the quantity of steam required to run an eight or ten-foot fan (which is a sufficient size to ventilate most of our mines where no fire damp exists), is in most cases but trifling. The engineer in charge of the hoisting engine can also attend to the fan. By having a valve in close proximity to his engine, he can regulate the speed of the fan as required.

It can be readily seen that after the first cost of the fan, the mine can be ventilated at a very small expense.

The first cost of a furnace suitable for a mine of small proportions, is, of course, less than that of a fan; but, after being used a year or two, its cost will have far exceeded that of the fan.

I have carefully taken notes relative to the cost of furnaces in use throughout the State, and also have had some information from superintendents regarding the cost of their attendance, etc., and find that the expense of fuel and attendance ranges from $250 to $1,250 a year, according to the proportions of the mines.

I have also taken notes on the cost of erecting quite a number of fans throughout the State during the past two years, and thereby find that a ten-foot diameter fan, and a suitable engine to run it, which is capable of propelling 15,000 to 25,000 cubic feet of air per minute through the workings, according to distance and area of air courses, can be erected for from $400 to $500, according to circumstances. The fans in question are built by William E. Cole, at City Foundry, Washington, Indiana. They are built in sizes from seven to fifteen feet in diameter. They are very effective and remarkably cheap.

LAS ANIMAS COUNTY.

EL MORO MINE.

Is situated at the terminus of the El Moro branch of the Denver and Rio Grande railroad. The coal vein is of a fine bituminous quality; is about eight feet in thickness, and lies comparatively level; the capacity of the mine is about one thousand tons per day.

On my visit of inspection, I found this mine in good condition.

STARKVILLE MINE, T. C. & C. CO.

This mine is situated on the Atchison, Topeka and Santa Fé railroad, and about two miles from the town of Trinidad; is a drift opening, and is ventilated by a six-foot diameter Murphy fan. The coal vein is six feet in thickness, and is a bituminous coal of good quality. A large part of the output is manufactured into coke.

On my visits of inspection I found the mine in good condition. This company is at present making a new opening on the same field, which promises to be an extensive mine.

TRINIDAD CONSOLIDATED COAL AND STONE COMPANY,

Is a small opening, in which only a few miners are employed. There are a few other openings in this county, working from two to six men.

TABLE SHOWING NUMBER OF MINES IN LAS ANIMAS COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have your boilers been inspected?	Have you a map of your mine in inspector's office?	Volume of air circulating in cubic feet per minute.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal and coke for year ending Dec. 31, 1885, in tons.	Mine ventilated by.	Have you two separate openings?	Has there been any fire damp detected in your mine?
El Moro	C. C. & I. Co.	Pueblo	Drift	Horse	Yes	Yes	28,000	Bitumin's	7-6	264,206	Furnace	Yes	No
Starkville	T. C. & C. Co.	Raton, N. M.	Drift	Horse	Yes	Yes	22,000	Bitumin's	6-6	226,354	Fan	Yes	Yes
	Cons. Coal & Stone Co	Trinidad	Drift	Horse						10,000			

There are a few small openings in this county, working from three to ten men in winter.

TABLE SHOWING NUMBER OF MINES IN HUERFANO COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have your boilers been inspected?	Have you a map of your mine in Inspector's office?	Mine ventilated by.	Volume of air circulating in cubic feet per minute.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal for year ending Dec. 31, 1885.	Have you two separate openings?	Has there been any fire damp detected in your mine?
Walsen	C. C. & I. Co.	Pueblo	Slope	Steam	Yes	Yes	Furnace	19,000	Lignite	6—0	89441	Yes	Yes
Cameron	C. C. & I. Co.	Pueblo	Slope	Steam	Yes	Yes	Furnace	21,000	Lignite	3—6		Yes	Yes
La Veta	D. D. Ryus	La Veta	Drift.								125		

PARK COUNTY.

The coal measures in this county are badly broken up by eruptions. The coal veins are therefore very irregular, and much troubled with "hitches," "dykes" and other dislocations in the strata. The veins are only found in deposits, and the area of such is very uncertain. A great deal of money has been expended by the Union Coal Company in prospecting this field at their No. 4 mine, at Como, which was opened about three years ago, where large hoisting machinery and all modern appliances were erected, so as to insure a large output; but before the mine had been long in operation, a fault was discovered on each side of the slope, from the appearance of which, the indications were, that the formation had there broken, and that the coal seam and strata overlaying it had slipped down. The direction of these dislocations runs toward each other, and looked as if they would finally intersect at a point which may be about 1,500 feet from where the coal crops out to the surface. The coal in sight has been nearly mined out. The company has prospected at all points where it was thought that the vein might be found, but with no success as yet. In a drill hole, which was bored to a depth of 800 feet, by a diamond drill, the "journal" of which showed up rather peculiarly, parts of the strata passed through would show a favorable section of coal measure; then the drill would enter into silicious rocks, entirely foreign to the measures, of which the scale of hardness would be nearly equal to that of the diamonds of the drill. The result of this boring showed that the measures were badly broken, and that the rocks from an earlier age had been thrown up in a jumbled mass with the coal bearing strata. The original owners of the D. & S. P. R. R. Company had a similar experience on the same coal field, at a point one mile north-west of the town of Como, where they opened on a deposit and put up extensive coke ovens and other improvements, worth $80,000, but had to abandon the works after working but a very short time. The quality of coal is semi-bituminous, and when found in place, dips from 16 to 55 degrees. The largest deposit of coal so far found in this county, is the one in which No. 1 mine of the Union Coal Company is now working.

TABLE SHOWING NUMBER OF MINES, ETC., IN PARK COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have your boilers been inspected?	Have you a map of your mine in Inspector's office?	Mine ventilated by.	Volume of air circulating in cubic feet per minute.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal for year ending December 31, 1885.	Have you two separate openings?	Has there been any fire damp detected in your mine?
Como No. 1	U. C. Co . . .	Denver.	Slope.	Steam	Yes.	Yes.	Steam jet	18,000	Semi-Bitum's	10—0	43,752	Yes.	. . Yes
Como No. 4	U. C. Co . . .	Denver.	Slope.	Steam	Yes.	Yes.	Steam jet	16,500	Semi-Bitum's	10—0		Yes.	. . Yes

SECTION OF STRATA
OF THE
CAÑON COAL FIELD

Continued

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH
Heavy Bedded Sandstone	55		61' 2"	
Brown Shale	6			61
Coal		2		61 2
Brown Shale	6			
White Calcareous Sandstone	37	6	44' 10"	
Coal & Fireclay	1	4		104
Dark Drab Shale	3			106 8
White Calcareous Sandstone	17	8	26' 11"	
Dark Grey Shale	4	10		131 6
Coal	1	5		132 11
Fire Clay	4	6		
Brown Sandstone				139 5
Light Drab Shale	2			
Coal		6		139 11
Dark Brown Shale	33	2		
White Sand Stone	11	4	64' 4"	

CAÑON COAL FIELD

Continued

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH
Dark Brown Shale	17	2	644"	
	1	6		203 1
Fireclay	1	2		203 3
Coal	1			
Reddish Brown Shale	8	9		
White Sandstone	5			
Dark Brown Shale			39'10"	
White Sandstone	12	6		
Light Drab Shale	11	5		243 11
	1	2		243 1
Coal	6	5		
White Calcareous sandstone	4	4		
Light Grey Shale				
White Sandstone	64		78'9"	
	3	6		322 4
Light Drab Shale		6		322 10
Coal				
White Sandstone	84		85'6"	
	1	6		406 10
Coal				408 4

CAÑON COAL FIELD

Continued

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH	
White Sandstone	51				
Hard Reddish Sandstone	2				
Reddish Brown Sandstone	25	6			
Reddish Brown Sandstone With Thin Bed of Clay	24		209' 6"		
Sandstone	82				
Slate	11				
White Sandstone	7	3		617	1
Coal		9		617	10

CAÑON COAL FIELD

Continued.

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH	
Hard Sandstone	10	3			
Soft Soapstone		4			
Slate	31	4	46'11"		
				663	5
Coal	1	4		664	9
Hard Sandstone	15	5			
Soapstone	3	8	34'7"		
Slate	18				
				701	10
Coal		6		702	4
Hard Sandstone	1	6			
Grey Slate	11				
Hard Sandstone	4	10			
Soft Slate	6	11			
Hard Dark Sandstone	6	6			
White Sandstone	2	4			
Arenaceous Shale	3	7			
Soft Slate	2	7			
Sandstone	4	8	58'10"		
Grey Slate	6	11			
Hard Black Slate	5	4			
Sandstone	2			760	6
Coal		8		761	2

CAÑON COAL FIELD

Continued

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH	
Hard Stone	1	11			
Soft Slate	1	8			
Black Slate	21	3			
Sandstone	2	9	46'3"		
Slate	0	9			
Sandstone	1				
Slate	2	8			
Calcareous Slate	2	10			
Slate	2	10		806	10
Coal		6		807	4
Black Slate	22	11	26'3"		
				830	3
Coal	3	4		833	7
Arenaceous Shale	9	7			
Black Slate	5				
Sandstone	2	6			
Arenaceous Shale	1	9			
Hard Sandstone		10		853	3

FREMONT COUNTY.

The coal beds, so far as known in this county, occur in rather an extensive area in what is known as the Cañon City coal fields, which are found in the strata of the cretaceous. About one mile south of Cañon City the coal seams make their appearance in the foot-hills in a tilted position, at various dips, from ten to forty degrees, which have, to all appearance, been broken off and tilted by eruptions from the adjacent horizontal seams. Quite a number of different and distinct seams crop out to view on the dislocated portions of the formation lying between Cañon City and the Coal Creek coal field, but the greater number of them are, however, too thin to become workable seams. The lower stratum of coal is opened at Coal Creek by the Colorado Coal and Iron Company, and has been worked extensively for the past fifteen years. The coal here crops out to the north-east of Coal Creek; the dip of the seam is about five degrees, and it lies nearly due west. One mile south-west from Coal Creek is located the town and colliery of Rockvale. The coal bed is found here at a depth of 300 feet, in which thickness nine stratums of coal are passed through, but the only workable seam is the lower one, which is three feet three inches in thickness, is of an excellent quality, and may be used for either steam, smelting or domestic purposes. The Coal Creek and Rockvale collieries mine and ship from this locality what is known in our market as the celebrated Cañon lignite coal, which is much the best lignite, so far as known, in the State. The coal formation consists of massive and laminated sandstone, arenaceous shales and slates. Coal occurs at various localities in a south-western direction between Rockvale and the Green Horn range of mountains. The coal in places is cut out from erosions and eruptions, yet an extensive area of workable coal may be found. The Atchison, Topeka and Santa Fé railroad company own large tracts of land in that vicinity, on a part of which they opened and shipped some coal in 1882, from an opening known as the Shaw mine. They have not yet, however, extended their road to this point; therefore no coal is now being mined there.

TABLE SHOWING NUMBER OF MINES, ETC., IN FREMONT COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Slope, shaft or drift.	Power used.	Have you safety catches on cages?	Have your boilers been regularly inspected?	Have you a map of your mine in Inspector's office?	Mine ventilated by.	Volume of air circulating in cubic feet per minute at inlet.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal for year ending Dec. 31, 1885, in tons.	Have you two separate openings?	Does the mine generate any fire damp?
Coal Creek No. 1.	C. C. & I. Co.	Pueblo	Slope.	Steam	. . .	Yes.	Yes	Fan	31500	Lignite.	5—0	129099	Yes.	Yes
Oak Creek	C. C. & I. Co.	Pueblo	Slope.	Steam	. . .	Yes.	Yes	Furnace	19000	Lignite.	4—6		Yes.	Yes
Rockvale No. 1.	C. C. & C. Co.	Topeka, Kans	Shaft.	Steam	Yes.	Yes.	Yes	Fan	23000	Lignite.	3—3		Yes.	Yes
Rockvale No. 3.	C. C. & C. Co.	Topeka, Kans	Shaft.	Steam	Yes.	Yes.	Yes	Fan	16000	Lignite.	4—6	169623	Yes.	Yes
Rockvale No. 4.	C. C. & C. Co.	Topeka, Kans	Shaft.	Steam	Yes.	Yes.	Yes	Fan	28000	Lignite.	3—4		Yes.	Yes
Caldwell	C. C. & O. Co.	Denver	Slope.	Steam	. . .	Yes.	Yes	Furnace	7500	Lignite.	3—6	18474	Yes.	Yes
Thornton	T. & Co.	Cañon City	Slope.	Steam	. . .	. . .	. . .	Natural	. . .	Lignite.	7—0	10042	Yes.	No
† Hayes	Hayes	Cañon City	Slope.	Horse	. . .	. . .	. . .	Natural	. . .	Lignite.	3—0	1000	. . .	No
† Carson	C. C. & O. Co.	Denver	Slope.	Horse	. . .	. . .	. . .	Natural	. . .	Lignite.	6—0	400	Yes.	No

† These mines do not come under the "Act to regulate mines."

FREMONT COUNTY MINES.

CAÑON CITY COAL COMPANY'S NO. 1 MINE, AT ROCKVALE,

Is a shaft opening at a depth of 300 feet. The coal seam is three feet three inches in thickness, and is worked by the long-wall system. The ventilation is produced by an eight-foot diameter Murphy fan. Considerable improvements have been made during the last year, with a view to increase the output of coal. An improved hoisting engine has been placed below at the top of the dip workings, to haul the coal therefrom. The daily capacity at the present time is nearly one thousand tons.

NO. 3 MINE, CAÑON CITY COAL COMPANY,

Is located at Oak Creek, about one mile due north of Rockvale. The coal seam here worked is about five feet in thickness, and lies at a depth of 135 feet, and 60 feet above the Rockvale vein. It is worked by the room and pillar system, and is ventilated by a Murphy fan six feet in diameter. A great deal of water has to be contended with as compared with other mines in this locality. This shaft will be abandoned in the course of a few months, when all the available coal will be worked out from the vein in question, on the company's property.

SHAFT NO. 4, CAÑON CITY COAL COMPANY,

Is situated a little over two thousand feet north from No. 1 mine, and is working on the same vein. The two mines are connected by communication entries, throughout which distance is an available and safe traveling way for egress for the workmen, in case of an emergency at either shaft. The coal seam is worked by the long-wall system. The ventilation is produced by a ten-foot diameter fan of the Guibal make; the hoisting machinery and dumping appliances for handling coal are fairly good.

NO. 5, CAÑON CITY COAL COMPANY,

Is situated about one and a half miles south-east from Cañon City. The coal vein is eight feet in thickness, and lies at an angle of eight degrees. This property was known as the Thornton mine, but has been sold to the Cañon City Coal Company. There is no railroad built as yet to this mine, but as the above coal company and the Atchison, Topeka and Santa Fé Railroad are of the same identity, it may be expected that a branch from their road will reach the mine before a long time has elapsed. When the mine was turned over to the Cañon City Coal Company, it was in a rather crude condition; but it is safe to say that all necessary requirements will be promptly attended to by this company, no coal company in the State having shown more desire to comply with the Coal Mines Regulation Act. The works at these mines are superintended by Mr. Robert Savage.

COAL CREEK SLOPE NO. 1,

Is situated at the town of Coal Creek, and is reached by a branch from the Denver and Rio Grande railroad. Some important improvements have been made at this mine during the last year, notably among which is a very complete haulage system, consisting of an endless rope, which is operated on two parallel dip entries, which are about 4,000 feet in length. The rope makes its circuit around these two parallel entries. The driving engine is placed at the bottom of the main slope, which is 1,800 feet in length, and it is at this point that the main haulage system delivers the loaded cars, and from there the engine on the surface hoists them to the tipple on top. The driving engine of the haulage system is run by compressed air, which is conducted from the compressors situated on the surface at the top of the main slope.

The ventilation is produced by an eight-foot diameter Murphy fan. The air current is divided into two separate splits.

COAL CREEK NO. 2, C. C. & I. CO.

This property was formerly known by the name of the Caldwell colliery; but it has been sold to the Colorado Coal and Iron Company during the last year, and is now being operated by them extensively. When this property came into the hands of the above company, it was very poor in condition; but they have spared no expense in putting the same into fine order. New aircourses have been made, and a very good overcast bridge built with a view to split the air current into separate currents. A ventilating fan, fifteen feet in diameter, has been erected, which forces an abundance of air into the mine. Fire damp exudes freely from the coal at advanced points where the coal is being excavated. Great care and constant watching is needed to keep the air current up to the face of the work, so as to render the gas harmless.

OAK CREEK SLOPE, C. C. & I. CO.,

Was abandoned last summer. The quality of the coal has been a great barrier to the economical operation of the mines in that vicinity; as it is a much inferior coal compared with other Cañon City coals, and could not therefore find either a ready sale or command a sufficient price in the markets to justify the company in working it.

The work at these mines is superintended by Mr. George Hadden.

There are a few small mines opened in the vicinity of Cañon City, which supply some coal to the State Penitentiary and to the city. No railroad branch has yet reached these mines.

TABLE SHOWING NUMBER OF MINES, ETC., IN BOULDER COUNTY—1885.

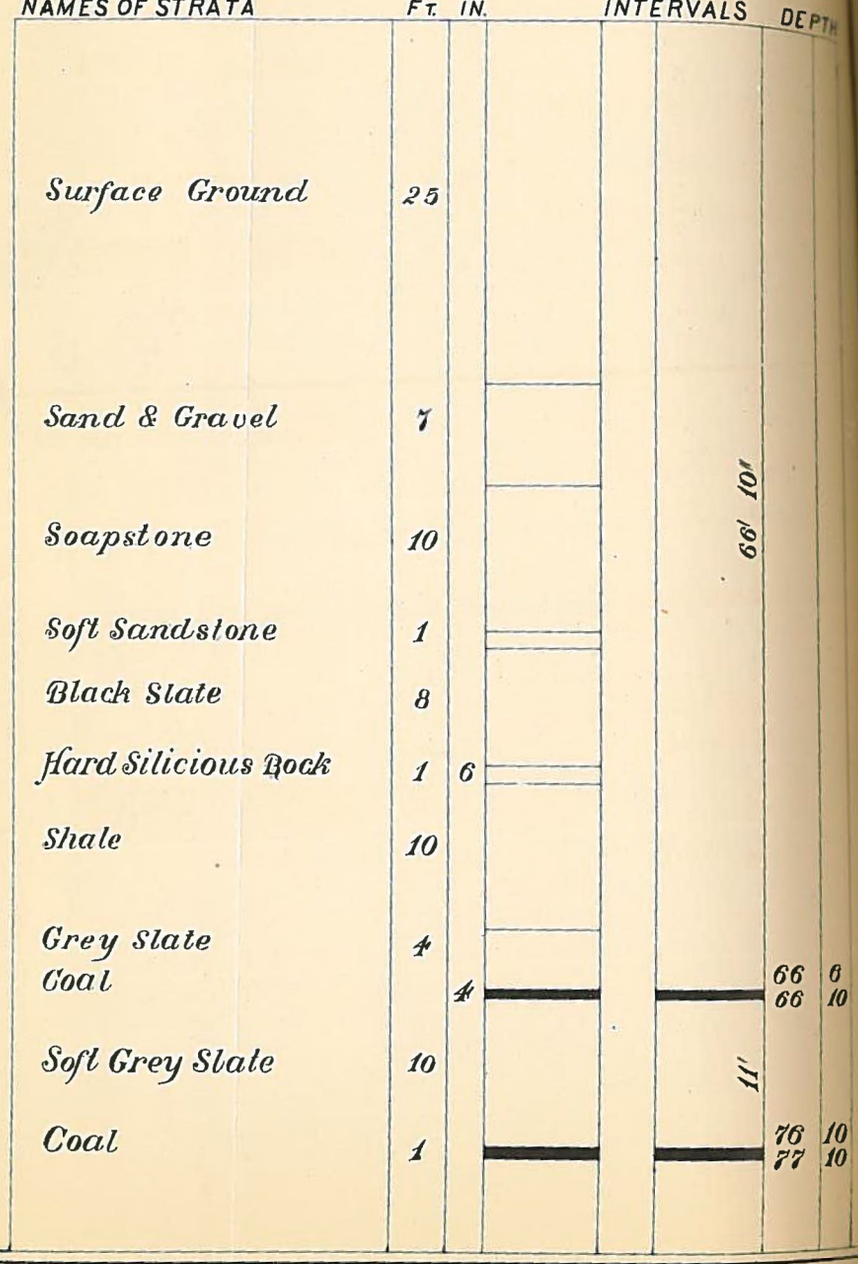
NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have you safety-catches on cages?	Mine ventilated by.	Volume of air circulating, in cubic feet per minute.	Have you a map of your mine in Inspector's office?	Quality of coal.	Thickness of seam, in feet and inches.	Production of coal for year ending Dec. 31, 1885, in tons.	Are there iron covers on the cages?	Have your boilers been regularly inspected?	Have you two separate openings?	Has there ever been any explosive gas detected in your mine?
†Louisville . .	U. C. Co . . .	Denver . .	Shaft	Steam	Yes	Furnace	13,000	Yes	Lignite	8- 0	33,646	Yes	Yes	Yes	. Yes
*Northrup . . .	U. C. Co . . .	. . . . .	. . . .	. . . .	. . .	. . . . .	. . . .	. . .	. . . . .	. . .	. . . .	. .	. . .	. . .	. . .
Star	S. C. Co . . .	Canfield .	Shaft	Steam	Yes	Fan . .	15,000	Yes	Lignite	5- 0	11,039	Yes	Yes	Yes	. .No
Marshall . . .	M. C. Co . . .	Denver . .	Slope	Steam	. .	Furnace	6,000	Yes	Lignite	8- 0	52,402	. . .	No .	Yes	. .No
Jackson	J. C. Co . . .	Denver . .	Shaft	Steam	Yes	Fan . .	12,000	Yes	Lignite	5- 0	26,477	Yes	Yes	Yes	. .No
Superior	S. C. Co . . .	Denver . .	Shaft	Steam	Yes	Furnace	4,000	Yes	Lignite	4- 6	4,812	Yes	Yes	Yes	. .No
Stewart	G. & M. Co .	Denver . .	Shaft	Steam	Yes	Furnace	11,000	Yes	Lignite	4- 6	25,000	Yes	Yes	Yes	. .No
Climax	C. C. Co . . .	. . . . .	Shaft	Horse	No .	Natural	1,000	. . .	Lignite	3- 6	800	No .	. . .	No .	. .No
Garfield	Gar'd C. Co .	Denver . .	Shaft	Steam	Yes	Furnace	8,000	Yes	Lignite	4-10	7,977	Yes	Yes	Yes	. .No
Fox	Fox C. Co . .	Langford .	Slope	Steam	. . .	Furnace	9,000	Yes	Lignite	9- 0	22,000	. . .	No .	Yes	. .No
‡McGregor . . .	C. M. Neil&Co	Denver . .	Shaft	Steam	Yes	St'm jet	4,000	Yes	Lignite	4- 6	1,518	Yes	Yes	No .	. .No
‡Cleveland . . .	C. C. Co . .	Denver . .	Shaft	Steam	Yes	Steam .	4,000	Yes	Lignite	4- 6	1,000	Yes	No .	No .	. .No
Black Diamond	B. D. C. Co . .	Langford .	Slope	Horse	. . .	. . . . .	. . . .	No .	Lignite	6- 6	990	. . .	. . .	. . .	. . .

*This mine is abandoned.

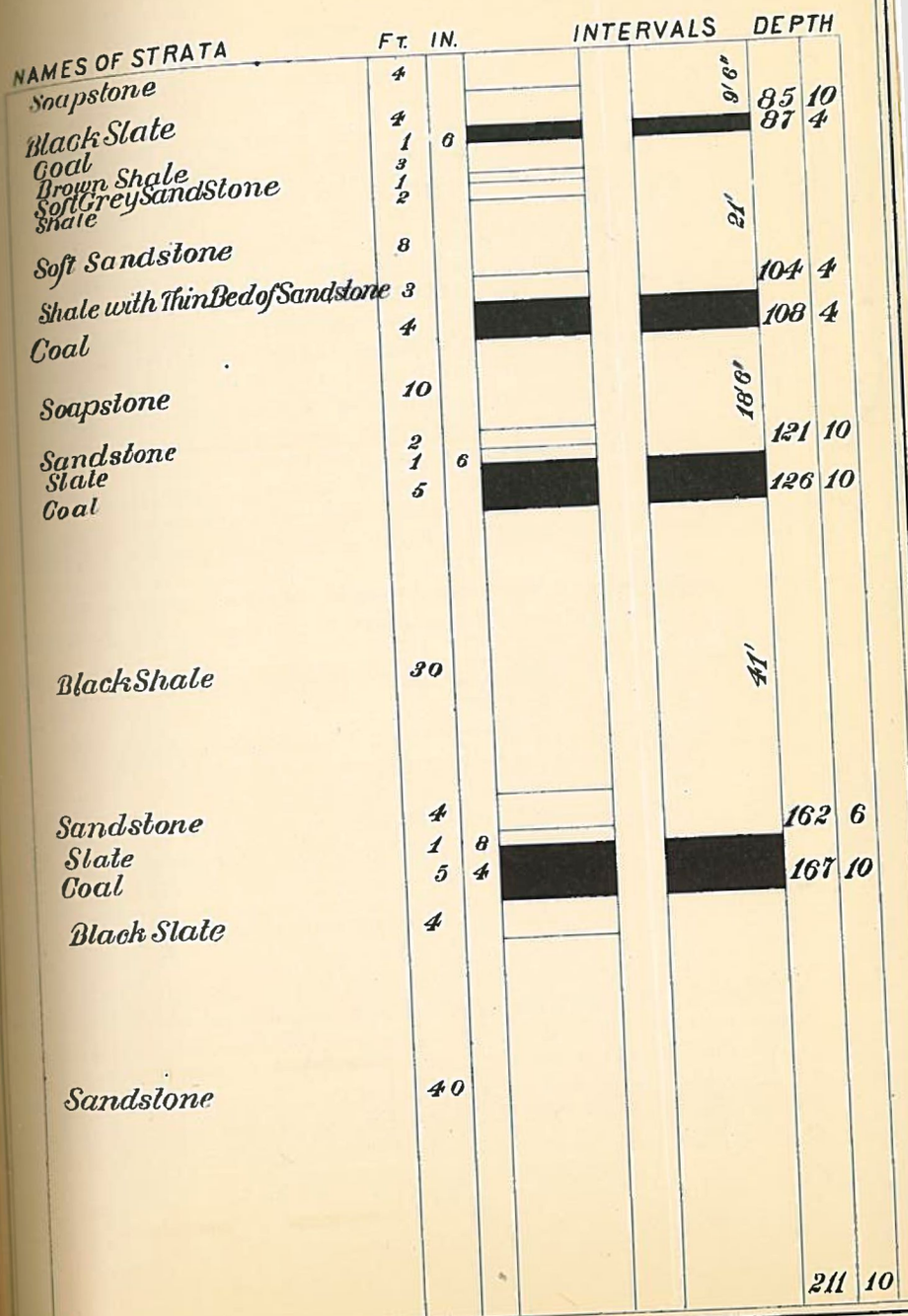
†This mine worked but seven months during the year.

‡These mines are new openings, and were in operation two months.

SECTION OF STRATA
OF THE
ERIE COAL FIELD
Boulder & Weld Counties



ERIE COAL FIELD
Continued



BOULDER COUNTY MINES.

STAR MINE, S. C. CO.

Is located at the town of Canfield. The coal seam is reached by a shaft, and is five feet in thickness, and is worked by the room and pillar system.

On visiting this mine, I found that the ventilation was very poor, and the workings were in part densely charged with black damp. I at once called the attention of the manager to this state of things, and obtained his promise that he would in some way remedy the same. The Inspector, wishing to be as forbearing as possible, before enforcing the law, gave him a sufficient time in which to make the necessary repairs, but they were not done, and forbearance in such a case ceased to be a virtue. I, through the advice of the Attorney General, took steps in suspending the mining operations. The company, being notified of this effect, at once telegraphed East for a ten-foot diameter ventilating fan to be sent on to their mine, which they erected with all dispatch. The mine is now in good condition.

FOX AND PATTERSON MINE.

This colliery is situated about four miles from Boulder, and is reached by a branch of the Union Pacific railroad. When visited, the mine was in good condition. The coal vein is nine feet in thickness, and its quality compares favorably with the best Northern lignite coal.

GARFIELD MINE, G. C. CO.

Is on the line of the Denver, Utah and Pacific railway. Some unpleasant controversy took place between this company and the Inspector, relative to the location of a ventilating furnace, which was placed at the bottom of their escape shaft. This, I considered to be a contravention, and not in accordance with the spirit of the

"Act to regulate coal mines," wherein it is clearly set forth that "distinct mean of ingress and egress shall always be available to persons employed therein." An air shaft, therefore, could not be available for egress to persons, if a ventilating furnace was situated and in use at the bottom of it. I used my best endeavors, but unavailingly, to procure an amicable settlement without resorting to law, but I was compelled to hand the case over to the Attorney General and district attorney of Boulder county, who at once saw that my case was good, and so notified the company. They, on learning that suit was entered against them, came and showed every willingness to abandon the furnace, and put in its stead a ventilating fan at the top of the escape shaft, and so to erect it, that an opening would be left for egress. As this was about what I had recommended, and having no desire to bring the case into court, if it could be otherwise settled, I had the case withdrawn. The ventilating fan is now in operation with good results.

STEWART MINE, G. M. C. CO.

This mine is ventilated by a furnace, which was located at the bottom of the escape shaft. I called the attention of the company to the effect that their escape shaft could not be considered available for the egress of persons from the mine under such conditions, and advised them to change their mode of ventilation, which they promptly informed me they would do. They have since erected a ten-foot diameter Cole fan for ventilating the mine, which suits the requirements of the case far better than a furnace, for, in that locality, a great deal of black damp is given off from the stratums, and as the coal seam is but at a depth of 90 to 120 feet from the surface, no very good results could be expected from a furnace, as the heating column is not of sufficient length to put in motion a proper quantity of air. In parts of this district I have seen the coals on the grate of the furnace lying black, and it was with some difficulty that fire was kept up, from the reason that the black damp ($C. O.^{2}$ carbonic acid gas) was being given off in such quantities as almost to prevent combustion of fuel.

LOUISVILLE MINE.

This is the most extensively worked mine in Northern Colorado, but it has not been in operation over one-third of the time during the last two years, all owing to a chronic state of strikes existing among the miners, into which they have been foolishly advised by some would-be leaders. It is hoped that the miners in this locality will attend to and settle their own difficulties in future, and give so-called professional workingmen the cold shoulder. There was also much time lost through the occurrence of an extensive gob fire breaking out from old abandoned workings. These gob fires had been allowed to go on in the abandoned workings for three years. I had repeatedly advised the management to build up suitable walls, so as to completely isolate the fires from air, which could have been done. The stopings put in were faulty ones, through which air passed and reached the seat of the fire; thus combustion was kept up continually. The gas generated from these fires exploded, during one night, with such terrific force as to dislodge from their places all trap-doors and stopings, thus cutting off the air current, and filling the workings with such dense smoke that it was impossible to reach the seat of fire, the flames from which shot out at times from the upcast shaft. They were therefore compelled to seal down all the openings to the mine, which was kept so isolated for two months, at the end of which time the fire had died out and the workings were reopened. The mine was then owned and operated by the Union Coal Company, who have since sold out to the Marshall Consolidated Coal Company, who are now engaged in having the pillars drawn out. They will abandon this mine, and will open out at another part of the coal field.

SUPERIOR MINE

Was abandoned last summer. The greater portion of the coal in the territory owned by the company had been worked out. Gob fires had been known to exist in this mine some time before it was abandoned, and were partly the cause of the company closing down at the time they did. The openings to the mine were properly banked,

with a view to isolating the fires, but I am of the opinion that air enough to support combustion may pass through the broken strata at worked-out parts of the mine, which have caved sufficiently to be traceable on the surface. Mine owners operating in close proximity to the mine in question, will do well to exercise caution in approaching the same.

M'GREGOR MINE

Is located on the Erie coal field. The coal vein is four feet six inches in thickness, and is reached by a shaft at a depth of 100 feet. This mine was opened and put in operation a little over one year ago. An escape shaft was put down lately, and the company contemplate putting up a ventilating fan in the near future. As it now is, the mine is in fairly good condition.

CLEVELAND MINE

Is on the Erie coal field. The coal seam is reached at a depth of a little over one hundred feet, and is four feet six inches in thickness. This is also a new mine, and was put in operation about eighteen months ago. An escape shaft has been sunk lately, and the company intend to put up a ventilating fan soon.

THE MARSHALL MINES

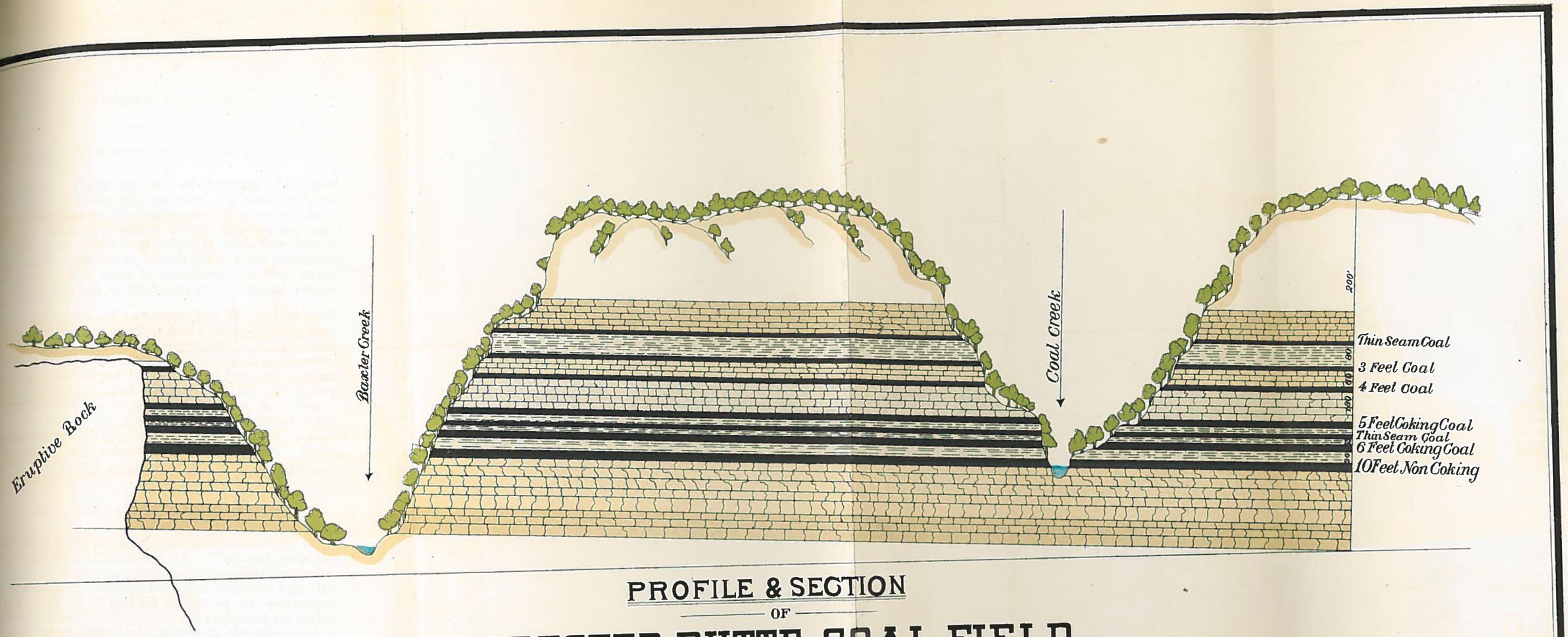
Are located six miles from Boulder, and are reached by a branch of the Union Pacific railroad. The coal seam is eight feet in thickness, and lies at a dip of about six degrees. This property was known by the name of the Langford colliery, but it was sold a year ago to the Marshall Consolidated Coal Company, who have expended large sums of money on improvements.

They mine the coal exclusively by the Leg Mining machines. A new mine has been opened during the last year; it is equipped with all modern appliances, so as to insure a large output.

Complaint has reached this office relative to bad ventilation existing there. I visited the mine in question and found that such complaints were justly made. The

ventilating current was almost stagnant, and the workings were densely charged with black damp. I immediately notified the company that I should expect them to take steps at once to have the necessary improvements made, so as to insure a sufficient quantity of air circulating around and through the workings. I advised them to procure ventilating fans, as the most suitable for the requirements of the mines, to which proposition they assented, and sent East for a ventilating fan twelve feet in diameter. Rather a ludicrous point was selected at one of these mines for the erection of a ventilating furnace. The superintendent being notified that the arrangements of the mines were not in compliance with the law relative to ventilation, and instructed to remedy the same, informed the Inspector that he had already concluded to build a good furnace, which would put in circulation an abundance of air, and stated that he would locate it at the top of the air shaft, so that there would be no danger from fire. I tried to persuade him that it was altogether wrong to build a furnace there, and that most assuredly he could have no good results from it, and explained to him the reason why; but he was not convinced; so I kindly assured him that he was about to build for himself a monument of stupidity, for which he would be sorry.

He built it, however, on the surface, too, and no doubt expected to show the Inspector that an extensive mine could be ventilated from a furnace located on the surface. So a magnificent furnace was built of fine fire brick and massive stone work, and a chimney twenty-five feet high was built of sandstone, perfectly round, the diameter of which was six feet. This fine structure was built about fifteen feet from the mouth of the shaft, and a double boarded house was built over the shaft which connected it with the furnace. One good, big fire in this new furnace was enough to teach this man (who had managed mines several years), that he had been very much mistaken in the laws and rules which govern ventilation. The furnace was pulled down lately, and rebuilt at the bottom of the shaft; and gives fair results.



PROFILE & SECTION

OF

CRESTED BUTTE COAL FIELD

On Line South 50 East Horizontal Scale 2000 Ft. 1 Inch

Copied from J.R. Cameron M.E.

John Mc Neil M.E.

GUNNISON COUNTY.

CRESTED BUTTE MINE NO. 2, C. C. & I. CO.

Is opened by a drift run in from the crop of the coal seam on the mountain side, situated in a western direction from the town of Crested Butte. The vein is about six feet in thickness, and is a first-class coking coal. The greater part of the coal output is made into coke at the company's coke ovens, which are in close proximity to the mine. The coke is considered the best in the State, and is shipped to Utah and other western points.

The mine gives off explosive gas, but not in such abundance as was given off at No. 1 mine. The ventilation is produced by an eight-foot diameter Murphy fan; the air courses are made large, and are kept in good order, the area of which is not less than fifty feet, and in some parts much more. The quantity of air circulating through the workings is 50,000 cubic feet per minute. The miners and all other workmen are compelled to use safety lamps exclusively, and are not allowed to take into the mine any tobacco, pipes or matches. Strict discipline is enforced in carrying out the above precautions.

THE OHIO CREEK ANTHRACITE COAL COMPANY.

This mine is situated west of Mount Carbon, about twenty miles from Gunnison City. The coal vein lies at an angle of thirty-five degrees, is four feet six inches in thickness, is bituminous coal, and crops out upon the mountain side, at a vertical height of 400 feet above the base of the mountain. A tunnel eight feet six inches wide, and seven feet high, enters at the base, and is driven through the rock on a gentle grade (so that water will drain to the mouth of the tunnel) to a distance of 1,150 feet at which point it intersects the coal vein. Here the vein is opened by levels run to the north and south on the edge of the coal seam. The coal left above will be worked out by rooms, in which chutes will be

used to conduct the coal down into "hoppers," located on main levels, from which the pit cars will be loaded.

The company are putting up twenty coke ovens, and they expect to build more as soon as other developments will justify them in doing so. The improvements already made on this property have cost over fifty thousand dollars. There is no railroad yet put in, so no coal has been shipped. A branch from the Denver, South Park and Pacific railroad is expected to be in progress to this mine soon. The parties owning the property are a stock company from the East. The amount of stock is said to be $200,000.

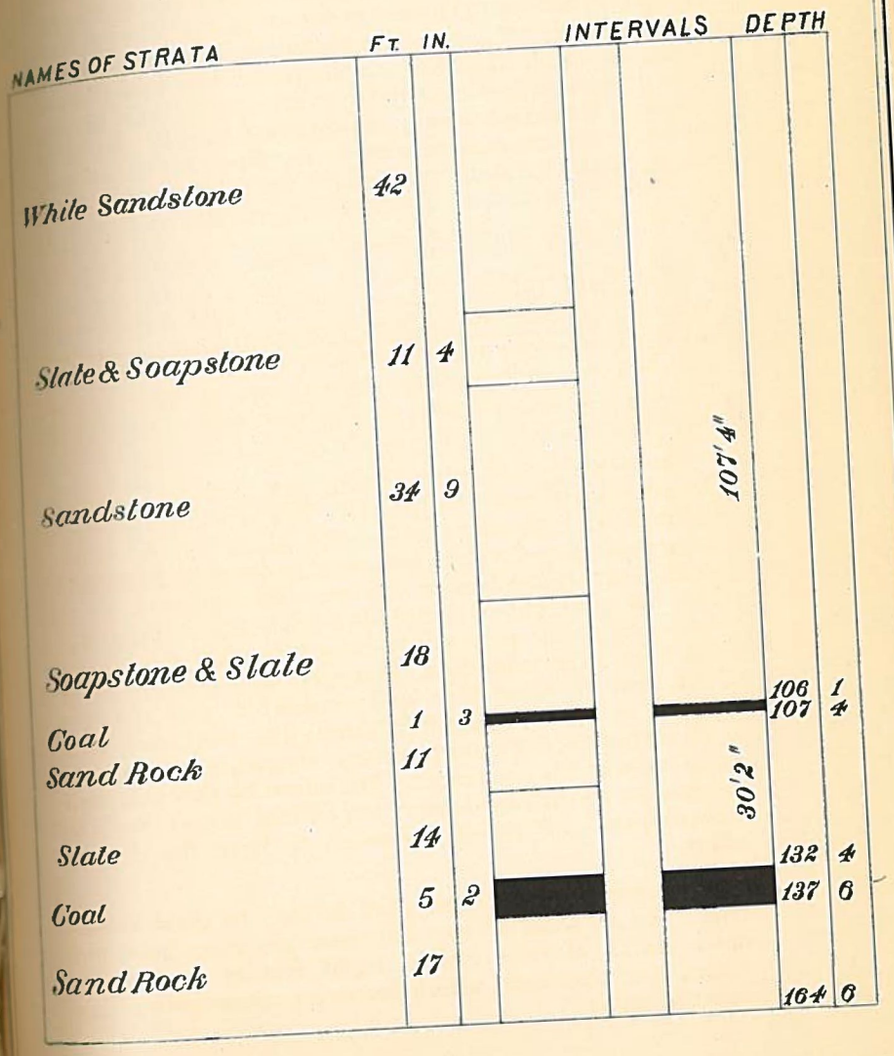
BALDWIN MINE, UNION COAL COMPANY,

Is located on the Denver, South Park and Pacific railroad, eighteen miles from Gunnison City. The coal vein is reached by a shaft 150 feet deep. The seam is four feet six inches in thickness, and of a semi-bituminous quality, and lies at a gentle dip of about four degrees.

On visiting this mine during hot weather, I found the air current very feeble, and the workings densely charged with powder smoke and black damp. (Carbonic acid gas—$C.O.^2$) I at once notified the assistant general superintendent of the fact, and requested him to have the mine put in compliance with the mining law, at as early a date as possible, which he took steps to do. The mine superintendent, however, was constrained to think that his mine was well ventilated, and caused a petition or paper to be taken among the workmen, with a view that they should put their signatures thereto, so as to support his statement. He meant by this nefarious scheme to try and controvert my official report made to his company. It failed, however, to have the desired effect.

The mine is now, I am glad to say, in good condition. An air shaft of 100 feet area has since been put down, and a Murphy fan of eight feet in diameter is placed over the shaft, which forces an abundance of air into the mine.

SECTION OF STRATA
OF THE
BALDWIN MINE
Gunnison Co.



ANTHRACITE MESA MINE

Is situated at the terminus of the Crested Butte branch of the D. & R. G. R. R. The vein is five feet in thickness; is an anthracite of good quality, and is opened by a drift at the extreme dip of the company's coal field, which point lies at an elevation of about 800 feet above the valley where the railroad and coal breakers are situated. The coal is run down from the mine by a self-acting plane, the average pitch of which is about thirty degrees. The altitude at this mine and vicinity is 10,000 feet above the sea level. Operations cannot be economically followed during the winter months, owing to the heavy snow storms which prevail in that locality.

There are a number of small mines opened in this county, which produce some coal, but they are not of any magnitude.

TABLE SHOWING NUMBER OF MINES, ETC., IN GUNNISON COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Shaft, slope or drift?	Have you safety catches on cages?	Have your boilers been inspected?	Have you a map of your mine in Inspector's office?	Volume of air circulating, in cubic feet per minute.	Quality of coal.	Thickness of seam, in feet and inches.	Production of coal for year ending Dec. 31, 1885, in tons.	Have you two separate openings?	Has there ever been any explosive gas detected in your mine?	Mine ventilated by.
Crested Butte	C. C. & I. Co.	Pueblo	Drift .	. . . .	Yes .	Yes .	50,000	Bituminous .	6—0	79,914	Yes .	Yes .	. . . Fan
†Baldwin . .	U. C. Co . . .	Denver	Shaft	Yes .	Yes .	Yes .	25,000	Semi-Bitum's	4—6	14,174	Yes .	Yes .	. . . Fan
*Anthracite .	Colo. Fuel Co.	Crested Butte	Drift .	. . . .	Yes .	Yes .	12,000	Anthracite .	5—4	26,020	Yes .	No . .	Furnace
Kuebler . .	Kuebler . . .	Gunnison . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . . .	. . .	250	. . . .	. . . .	. . . .

†This mine was in operation seven months during the year.
There are a few small openings in this county which produce some coal, which is given approximately with grand total.
*This mine was shut down a few months during the year, owing to exceptionally heavy snows.

JEFFERSON COUNTY.

The coal veins in this county are termed pitching veins, from the fact that they are found variably at a dip of fifty to eighty degrees, and are found cropping out in proximity to the mountains. At the White Ash mine, located at Golden, a shaft over 600 feet deep is sunk alongside of the vein, and at that depth the quality of the coal is much better than that found in other openings which are near the surface.

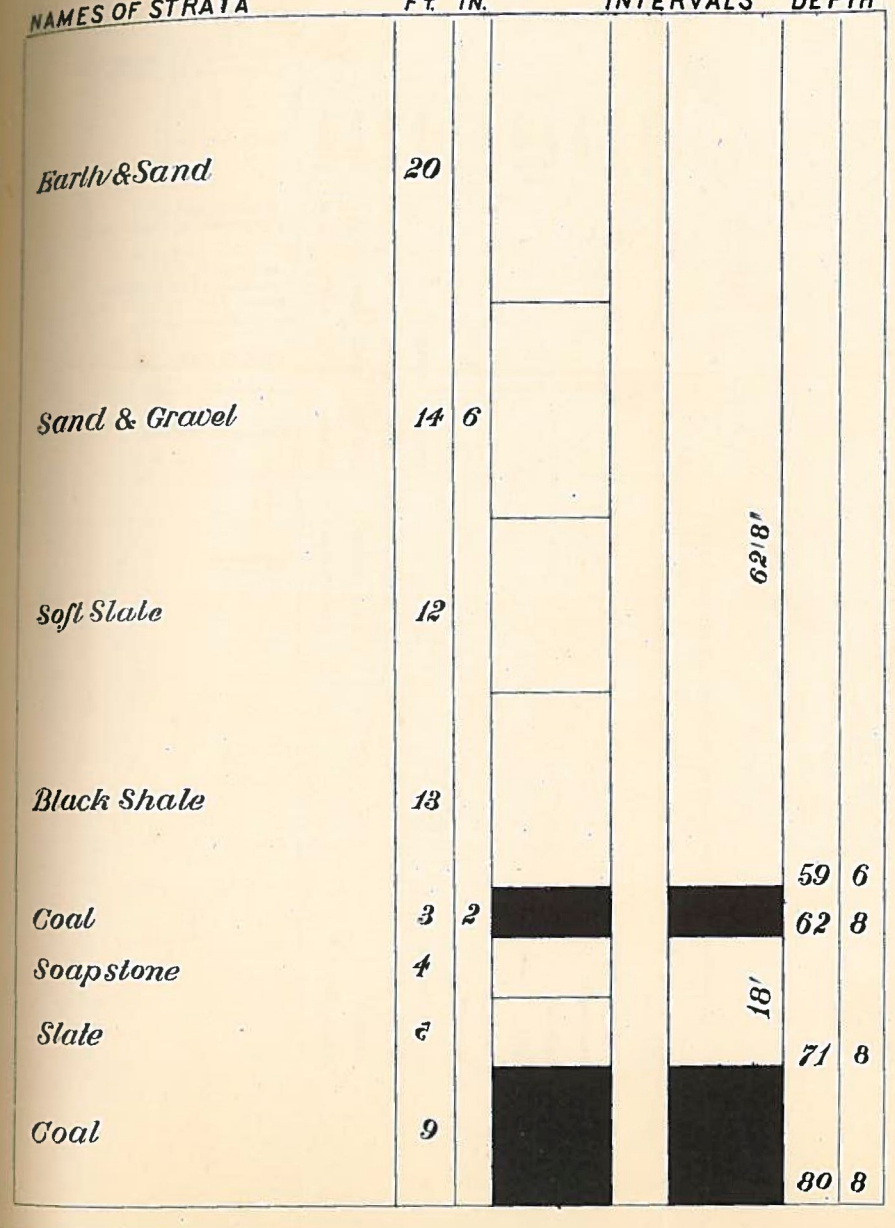
The tilted coal measures of this county evidently show that they have been broken off from the horizontal beds found in the adjoining county of Boulder. The croppings of these tilted veins can be traced running in a southern direction through Jefferson and Douglas counties, and again, the same veins can be found cropping out between Colorado Springs and Franceville, El Paso county, where they are found lying at a gentle dip of from six to eight degrees. The Texas & Gulf railroad here mines coal extensively in the largest vein, which is nine feet in thickness. The quality of the coal seam throughout these counties is lignite, which varies in different localities in thickness and quality.

SECTION OF STRATA

OF THE

FRANCEVILLE MINE

El Paso Co.



JEFFERSON COUNTY MINES—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Have you a map of your mine in Inspector's office?	Thickness of seam in feet and inches.	Quality of coal.	Production of coal for year ending December 31, 1885, in tons.	Has there been any fire damp detected in your mine?	Power used.
White Ash	Paul Lanius	Golden	Shaft.	Yes	8—0	Lignite.	21,928	No	Steam
Ralston	Paul Lanius	Golden	Shaft.	Yes	8—0	Lignite.		No	Steam
Golden Star	G. H. Goldsworthy	Golden	Shaft.			Lignite.	820	No	Steam
*Mount Carbon	Mt. Co	Denver	Shaft.			Lignite.			Steam
*Murphy						Lignite.			
*Loveland						Lignite.			
*Hoyt						Lignite.			
*Pittsburg						Lignite.			
*Newcastle						Lignite.			
*Rocky Mountain						Lignite.			
*Elighton						Lignite.			

* These mines have not been in operation during the year.

EL PASO COUNTY COAL MINES—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have you a map of your mine in Inspector's office?	Mine ventilated by.	Volume of air circulating per minute in cubic feet.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal for year ending December 31, 1885, in tons.	Have you two separate openings?	Has there been any fire damp detected in your mine?
Franceville	D. & N. O. R. R.	Denver	Slope.	Steam	Yes	Furnace	13,000	Lignite.	8—0	39,083	Yes.	No
McFerran	J. H. B. McFerran	Colo. Springs	Shaft.	Steam	No	Natural	4,000	Lignite.	8—0	1,000	No.	No
France	M. France	Colo. Springs	Slope.	Horse						2,000		

WELD COUNTY MINES.

BOULDER VALLEY MINE, UNION COAL COMPANY,

Has been abandoned, and the hoisting machinery and appliances have been moved off the property. It is said that the chronic state of strikes that had existed there had much to do with the closing down of this colliery, which is, without a doubt, quite true. Yet another cause of abandoning the property was that the pillars left in it to support the superincumbent strata were far too small. This deficiency caused a "creep" to become local over a large area of the workings, and necesitated too heavy an expense in timbering, so as to keep the air courses and haulage roads open. Great annoyance has been experienced in that locality from the same miserable mistake.

MITCHELL MINE, M., C. & L. CO.

Is located on the Denver, Utah and Pacific railway. Some important improvements have been made during the last year. Notably among them is a ten-foot diameter fan, which has been lately erected for the better ventilating of the mine, and to insure an escape shaft which shall always be available for the workmen. The ventilation was formerly produced by steam jets and exhaust from a steam pump. In warm weather this means was altogether inadequate to cope with the requirements needed to put in circulation a sufficient quantity of air for such an extensive mine. The ventilating fan gives good results, and forces into the workings an abundance of air. The mine is now in very good condition.

BAKER MINE

Is situated on the Denver, Utah and Pacific railway, about twenty miles from Denver. The coal seam is eight to ten feet in thickness, and dips about fifteen degrees in a western direction. The quality of the coal can com-

pare with the best of the northern coals. On my visits of inspection I always found this mine in good condition.

There are a number of small mines in this county which produce some coal during the winter months, but the force employed in any one of them does not exceed over eight men. Therefore, the Inspector gives but little attention to them, further than collecting statistics.

TABLE SHOWING NUMBER OF MINES, ETC., IN WELD COUNTY—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Power used.	Have you safety catches on cages?	Have you a map of your mine in Inspector's office?	Mine ventilated by.	Volume of air circulating in cubic feet per minute.	Quality of coal.	Thickness of seam in feet and inches.	Production of coal for year ending Dec. 31, 1885, in tons.	Are there iron covers on the cages?	Have you two separate openings?	Has there ever been any explosive gas detected in your mine?
†Boulder Valley	U. C. Co	Denver	Shaft	Steam	Yes	Yes	Furnace	8,000	Lignite	7—0	7,310	Yes	Yes	No
Mitchell	D. U. & P. R'y Co.	Denver	Shaft	Steam	Yes	Yes	St'm jet	10,000	Lignite	5—6	28,413	Yes	Yes	No
Baker	D. W. Davis	Erie	Slope	Steam	...	Yes	Furnace	6,000	Lignite	10—0	2,986	...	Yes	...
Eaton	Wm. McCall	Eaton	Slope	Horse	....	....	.....	.....	Lignite	...	334	...	...	...

†This mine was in operation but four months during the year, and is now abandoned.
There are a few small mines which produce some coal during winter months.

SECTION OF STRATA
OF THE
MAMMOTH COAL VEIN AT DURANGO
LA PLATA CO.

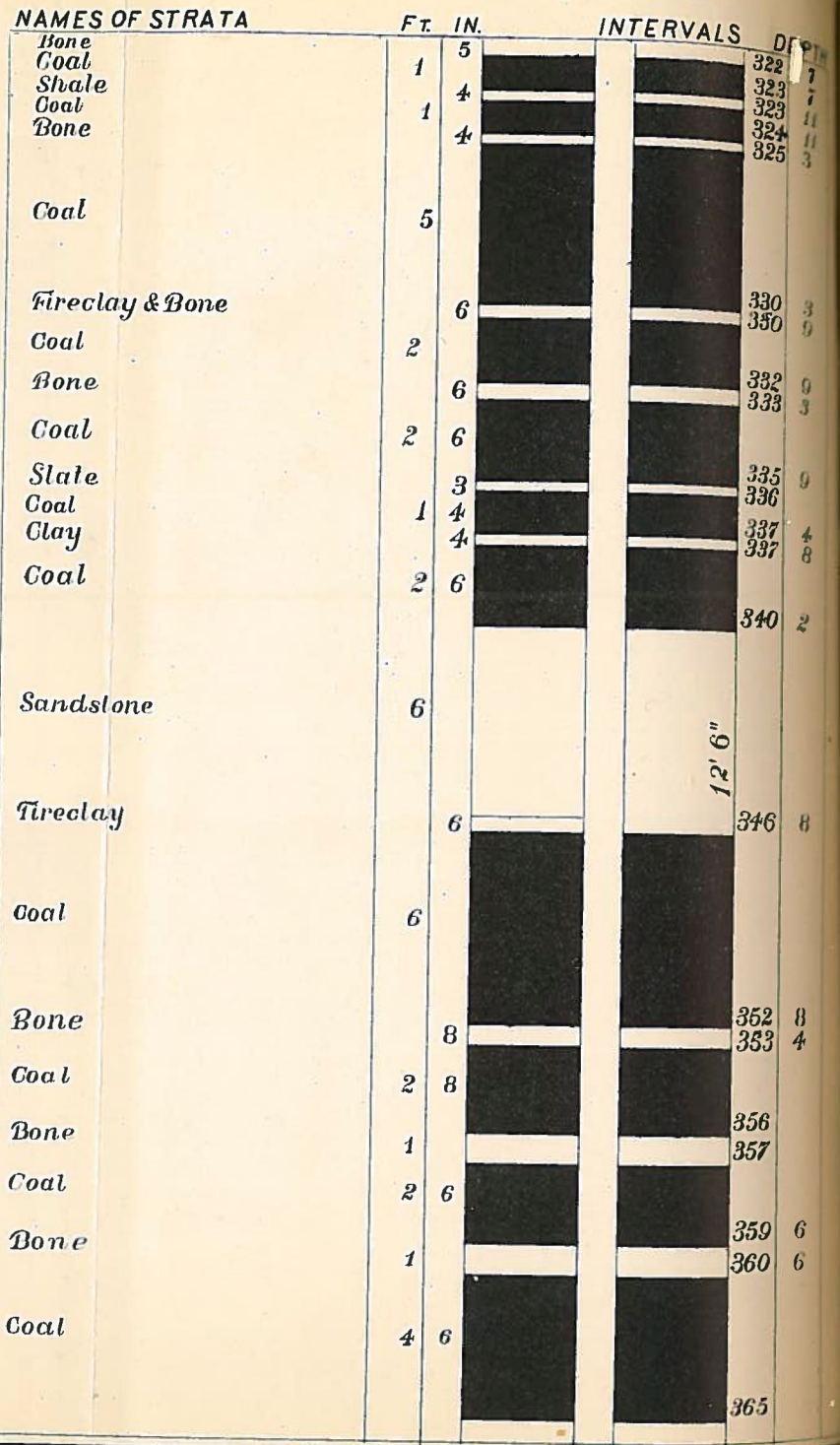
NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH	
Soft Sandstone	40				
Iron Ore	12		102'6"		
Massive Sandstone	45				
Coal	5	6		97	
Fireclay		10		102	6
Sandstone Slate &c.	140		148'4"		
Fireclay & Bone	5			248	4
Coal	2	6		250	10

DURANGO COAL FIELD
Continued

NAMES OF STRATA	FT.	IN.	INTERVALS	DEPTH	
Bone & Slate		12			
Sandstone	25		63'8"		
Shale	25				
				301	10
Coal	2	9		304	7
Slate		6		305	1
Coal	7				
				312	1
Bone		8		312	9
Coal	2	6		315	3
Fireclay				315	6
Coal	1	3		316	6
Fireclay		3		316	9
Coal		6		317	3
Bone		3		317	6
Coal	1			318	8
Slate or Bone		6		319	2
Coal	3				
				322	2

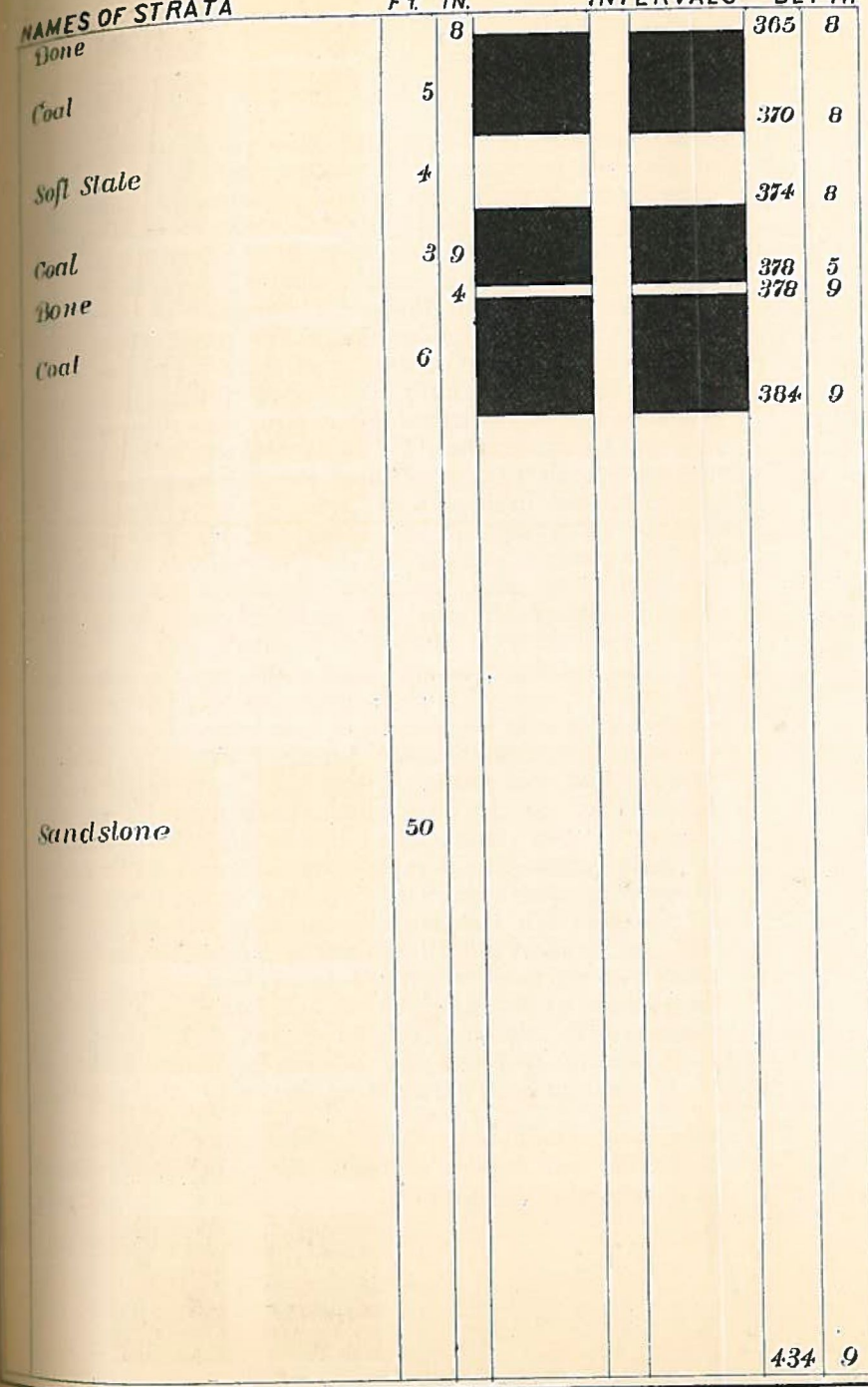
DURANGO COAL FIELD

Continued



DURANGO COAL FIELD

Continued



LA PLATA COUNTY COAL FIELDS.

Extensive coal beds are found to underlay the greater part of this county. The quality of the coal is principally bituminous, and is well adapted for coking, as has been demonstrated by the quantities that have been coked in the Beehive coke ovens, owned by the San Juan Smelting Company, from the various seams in proximity to Durango. A great many openings have been made along the mountain sides, where the coal crops out in abundance, in numerous seams, of various thicknesses and qualities. In places over 1,000 feet of the coal formation (known geologically as the Fox Hills Group) are exposed to view. These coal seams, according to their location, are found lying at different angles, from a comparatively level to a pitch of forty degrees. The mines of the San Juan Coal Company are located half a mile south-west from the town of Durango. The vein crops out up on the mountain side, on an inclined distance of 2,200 feet from the base; the vertical height gained in this distance is a little over 800 feet. The coal seam is three and a half feet in thickness, and lies quite regularly at an angle of five degrees. There has never been detected any fire damp in this mine, which may be explained from the reason that the coal is far above water level; and also from the fact that the coal and strata, both above and below it, are cut off and exposed to day around the entire coal field. The coal is run down from the mine over a self-acting plane to the railroad below. Three other veins crop out between the floor of the vein in question and the base of the mountain, which are of fair quality but rather thin. The Durango Coal and Land Company have secured some very good coal land, and are now engaged in opening out a colliery. The coal is of good quality. They expect to have a branch of the Denver and Rio Grande Railroad put into their coal fields in the near future.

The Carbonaria mines are situated about two miles south of Durango, on what is termed the Mammoth Coal Vein of Colorado, and is generally claimed to be

ninety feet thick, but it is not so, for it is badly broken up and divided by stratums of slate, fire-clay and "bone," so that the thickest stratum of workable coal is but seven feet thick, in which is some "bone." The vein crops out near the base of the mountains in the vicinity of Carbonaria, on the east side of the Animas river, and the dip of the bend is 35 degrees. A drift commences on the lowest stratum of coal, and is run in water level. Thus, from the above dip, it will be seen that the drift will cut through the entire stratums of coal, which is the case, and some coal has been worked from several veins. In some, chutes have been worked up through to day on the edge of the mountain side. Large quantities of explosive gas are being given off in this mine, the gas appearing to exude principally from the coal floor.

I am of the opinion that the finest quality of coal in that locality lies away to the dip, but it would require ventilating, pumping and hoisting machinery to work the same. This, as yet, cannot be expected to be done, as the limited quantity of coal needed to supply the market would not justify such expensive operations. This property belongs to the Durango Coal and Land Company.

I took accurate measurements of the various coal stratums, and the layers of sandstone, fire-clay, "bone" and slate which separate them. (See section of Mammoth Vein.) The two coal belts here mentioned are the principal ones from which coal is now mined, but there is another series of veins situated between Carbonaria and Durango, in which some openings have been made, but the seams are too thin to be worked to any profit.

LA PLATA COUNTY MINES—1885.

NAME OF MINE.	Operators.	Postoffice address.	Kind of mine.	Quality of coal.	Production of coal in tons for year ending Dec. 31, 1885.	Has there been any fire damp detected in your mine?
Corbonaria	J. G. Jackson	Durango.	Drift	Bituminous	5,900	Yes
San Juan	S. J. C. M. Co.	Durango.	Drift & plane	Bituminous	3,500	No
Champion	C. C. Co	Durango.	Drift	Bituminous	2,700	No
Black Diamond	B. D. C. Co	Durango.	Drift	Bituminous	1,200	No
Driscoll	D. & H. C. Co	Durango.	Drift	Bituminous	900	No
Knapp	K. & T. C. Co	Durango.	Drift	Bituminous	647	No

LA PLATA MINES—1886.

NAME OF MINE.	Name of company.	Manager.	Mine superintendent.	Town and postoffice address.	Production of coal for year ending Dec. 31, 1886, in tons.	Kind of mine.	Is there fire damp generated in your mine?
San Juan	S. S. Coal Co.	T. F. Barbour	Lewis S. Jones	Durango, Colo.	14,000	Drift	No
Carbonaria	G. D. Jackson	.....	.....	Durango, Colo.	2,256	Drift	Yes
Porter	Porter C. Co.	S. E. Herr	.....	Durango, Colo.	1,910	Drift	No

ARAPAHOE COUNTY—1886.

NAME OF MINE.	Name of company.	Superintendent.	Town and postoffice address.	Production of coal for year ending Dec. 31, 1886, in tons.	Kind of mine.
*Scranton	D. R. & L. Co.	A. Hall	Denver, Colo.	11,000	Slope

*This miue has been opened during the year.

The following circular was issued from this office, at Denver, Colorado, October 5, 1885:

To Owners, Miners and Superintendents of Coal Mines:

GENTLEMEN:

I am sorry (but I feel compelled) to say that the "Coal Mines Regulation Act," in some of its important sections, is not being complied with according to the requirements of the law. Some operators have sent to this office maps of their mines in such miserable shape that they are utterly worthless to be placed on file as a matter of record for any future use to our State, many of them being no better than imaginary plans, and are unworthy of being designated by any other name than mere subterfuges. In some cases, they are platted on very poor paper, with a common black pencil. This condition of things is an insult to this office, and will not any longer be tolerated. I feel that I am competent to judge what the law requires in this case, and shall positively reject all maps that are not in compliance with section one, which reads as follows: "That the owner or agent of each coal mine or colliery in this State, employing ten or more men, shall make, or cause to be made, within six months after the passage of this act, an accurate map or plan of the workings of such coal mine or colliery, on a scale not exceeding one hundred feet to the inch, showing the bearing and distances of the workings, with the general inclinations of the stratum, and any material deflections in such workings, and the boundary lines of such coal mine or colliery, which shall be kept for the use of the Inspector, at the office of the said mine, in the county where such mine or colliery is located, and which shall be kept up every three months; and shall also deposit a true copy of such map or plan with the Inspector of Coal Mines, and with the recorder of the county in which said coal mine or colliery is situated, to be filed in their respective offices; and said owner or agent shall cause, on or before the tenth day of January in every year, a statement of the workings of such coal mine during the year past, from the last report to the end of the December month just preceding, to be marked on the original map or plan of said coal mine or colliery; *Provided*, If the owner or

agent of any coal mine shall neglect or refuse, or for any other cause fail, for the period of one month after the time prescribed, to furnish said map or plan as hereby required, or if the Inspector shall find or have reason to believe said map or plan is inaccurate in any material part, he is hereby authorized to cause a correct map or plan of the actual workings of such coal mine or colliery to be made at the expense of the owner thereof, the cost of which shall be recoverable from said owner by an action, as in cases of other debts, and shall cause a copy of the same to be filed in the office of the recorder of the county in which said coal mine or colliery is situated."

I do not wish to be understood that maps must appear in fine artistic work, in order that they meet the requirements of the law, but I do insist that they shall be accurate, legible and drawn on suitable paper or tracing cloth to a scale provided for in the above section. It will only be fair to state here, that many companies have fully complied with the law in this respect, as far as the requirements of my office are concerned, and to them credit is due, both for accuracy and workmanship. A continuance of the same method is all that can be asked for from them.

Section one of the mining law was amended by the last General Assembly of the State, so as to cause a copy of the maps of coal mines to be filed with the recorder of the county in which said coal mines are located. *This, I think, may be considered a superfluity*, yet such is the law, which I hope is being complied with.

I wish to call the attention of superintendents to section seven, relative to steam boilers. I find in looking over the files, that some superintendents are neglecting sending in their reports as to the condition of the steam boilers. Said section reads as follows: "All boilers used in generating steam in and about coal mines and colleries, shall be kept in good order, and the owner or agent shall have said boilers examined and inspected by a competent boiler maker, or other well qualified person, as often as once every six months, and the result of such examination shall be certified in writing to the Mining Inspector; and every steam boiler shall be provided with a proper steam guage, water gauge and safety valve."

I will also state that all accidents occurring in, or around any coal mine, must be immediately reported to this office; and in case of fatal accidents, the coroner of the county must also be immediately notified.

Again, many of the mining bosses are falling off in their regularity in sending in and making out intelligibly the "Inspector's Monthly report forms." I wish to say to them, that in taking measurements, always give the velocity of the air current per minute in feet, and the area of places where the reading on anemometer is taken. Add to the reading of velocity the amount allowed for the friction of anemometer; this done, multiply by the area, and it will give the amount of air passing in cubic feet per minute. For example, say the air course is 7′ wide and 6′ high, its area would be 6′×7′=42, and the velocity say was 500′ per minute, and suppose the friction or anemometer was equivalent to 30′, then 500′+30′=530×42=22,260 cubic feet per minute.

Furthermore, it is required that all correspondence from miners and others with this office shall be made under the genuine name of the writer. The reasons for this are obvious and altogether unnecessary for explanation. Every communication, the writer may be assured, will be treated with confidence; and the consideration due to its importance. *Anonymous letters will be at once consigned to the waste basket.* This office is no advisory commission, and any subjects submitted to me to be passed upon not outlined in the act book, or conforming to the spirit of the act, I shall cast aside *without a moment's hesitation.*

I am responsible to the Governor, to my bondsmen and the people interested in mining, for the faithful discharge of my duties, which I shall earnestly strive to discharge with faith and impartiality to all.

In conclusion, I hope that the object which is sought to be obtained by this circular will be accomplished, and that there will be no need of the issuance of further admonitory epistles.

I remain, yours faithfully,

JOHN McNEIL,

State Inspector of Coal Mines.

NEW COAL FIELDS.

The prospecting done every year further demonstrates the magnitude of our coal resources. The productive and partially developed coal fields of Colorado now embrace an aggregate area of over 1,000,000 square acres, while the area of the coal bearing formation is estimated by geologists to aggregate over 26,000,000 square acres, consisting of three varieties, namely: the lignites, bituminous and anthracite coals, of various grades and qualities.

The geographical location of the anthracite coal field lies between Slate River and Rock Creek, and north of Crested Butte, Gunnison county. There are also extensive fields of good coking coal in that vicinity.

The various railroad companies in this State, of late, are turning their attention to these coal fields, and a great deal of prospecting has been done during the last two years, with much success. The bituminous and anthracite coals are here found to predominate in the cretaceous formation, and vary in quality according to location and different conditions.

Geologists agree in the opinion that the anthracite varieties are produced from the bituminous veins, by being subjected to heat and pressure. Near the head of Rock Creek, on Chair Mountain and Slate Mountain, anthracite is found ranging in thickness from eighteen inches to six feet, nearly all of it dipping about forty-five degrees. About four miles below Chair Mountain is a vein of coking coal about four feet thick, also dipping about forty-five degrees; and between this and the anthracite is a good domestic coal of a semi-bituminous quality. At the head of Coal Creek, which empties into Rock Creek, about eight miles below Chair Mountain, is found a basin of coking coal measuring about twelve miles along the outcrop. Here there are several seams, aggregating at least twenty-four feet thick. In some places the stratums of shale between the coal seams disappear, and the veins come together and show a

thickness of twenty-two feet of clean coal, and dips from nine to twenty-four degrees.

Coal is also found on Thompson Creek, one of the tributaries of Rock Creek, which empties into Rock Creek about five miles above its mouth. Here and in Jerome Park, on one of the tributaries of Thompson Creek, is also found coking coal, varying in thickness from six to twelve feet.

The above coal fields are likely to come into prominence as a coal producing center in the near future.

A new field of lignite coal, located seventeen miles east of Denver, has been opened during the last year, and is now operated and owned by the Denver Railroad and Land Company. The coal seam worked is about seven feet in thickness, and lies at a gentle dip of about three degrees, dipping to the east. The coal now being mined at this property is of an inferior quality, and is much softer than the majority of northern lignites, and will slack quickly on being exposed to the weather. This may be somewhat explained from the fact that the coal now being mined there is from an opening located in the most unfavorable part that could have been selected on the entire coal field. On other parts of this property (which consists of a few thousand acres) a better quality of coal can be expected, for the good reason that the vein lies under 100 feet of more cover of strata.

As a rule, our lignite coals are of such a nature that we find them very light, soft, loose in texture, and fragile near the surface; more especially so where alluvial deposits constitute the formation over the coal.

MINES OF HUERFANO COUNTY—1886.

NAME OF MINE.	Name of company operating mine.	General Manager.	General Supt.	Asst. Gen'l Supt.	Town and postoffice address of general office.	Mine Supt.	Town and postoffice nearest to the mine.	Shaft or slope.	Ventilation by fan or furnace.	Volume of air, in cubic feet per minute, at inlet.	Have you two separate openings to the mine?	Is there any fire damp generated in your mine?	Production of coal for year ending Dec. 31, 1886, in tons.
Walsen	C. C. & I. Co.	A. H. Danforth	Jno Cameron	J. K. Robinson	Pueblo, Colo.	Chas. Lamb	Walsenburg.	Slope	Furnace	24,000	Yes	Yes	89,913
Cameron								Slope	Furnace	18,000	Yes	Yes	

MINES IN JEFFERSON COUNTY—1886.

NAME OF MINE.	Name of company or individual operating mine.	Manager.	Town and postoffice address.	Kind of mine.	Production of coal for year ending Dec. 31, 1886, in tons.	Ventilation by fan or furnace?
White Ash	Paul Lanius.	Paul Lanius.	Golden	Shaft	9,020	Fan
Golden Star	G. C. S. Co.	T. L. Belden.	Golden	Shaft	998	

There are a few small openings in this county that ship some coal in the winter, an estimate of which is given in grand total.

TABLE SHOWING NUMBER OF PRODUCING MINES, ETC., IN BOULDER CO.—1886.

NAME OF MINE.	Name of company or individual operating mine.	General superintendent.	Mine superintendent.	Town and postoffice address of general office.	Town and postoffice address nearest to mine.	Mine ventilated by fan, furnace or otherwise.	Volume of air in cubic feet per minute at inlet.	Have you two separate openings to the mine?	Production of coal for year ending Dec. 31, 1886, in tons.	Slope, shaft or drift?
Louisville	Marshall Con. C. Co.	Robt. Rubidge	John Simpson	Denver, Colo.	Louisville	Furnace	14,000	Yes	55,896	Shaft
Marshall	M. C. C. M. C	Robt. Rubidge	Thomas Berry	Denver, Colo.	Langford	Furnace	8,000	Yes	64,934	Slope
Cleveland	Cleveland C. Co			Denver, Colo.	Erie	Steam	4,500	Yes	6,100	Shaft
Star	S. C. Co	M. Brennan		Canfield	Canfield	Fan	11,300	Yes	7,946	Shaft
Jackson	J. C. Co	D. S. Woods	M. Richards	Denver	Canfield	Fan	12,200	Yes	21,000	Slope
Fox	Fox Coal Co	M. P. Fox		Boulder, Colo.	Langford	Furnace	10,000	Yes	24,652	Shaft
Garfield	G. Coal Co	Wm. Padfield	James Pallott	Denver	Erie	Fan	17,500	Yes	6,942	Shaft
McGregor	McGregor Coal Co.	C. S. Fister	Chas. McNeill	Denver	Erie	Steam	4,500	Yes	5,657	Shaft
Stewart	S. C. Co	H. Marfell	J. Calderhead	Denver	Erie	Fan	16,800	Yes	20,973	Shaft
*Wise	W. C. Co			Canfield					3,000	Shaft

*This mine was opened during the year.

TABLE SHOWING NUMBER OF PRODUCING MINES IN WELD COUNTY—1886.

NAME OF MINE.	Name of company or individual operating mine.	General Superintendent.	Town and postoffice address of general office.	Mine Superintendent.	Town and postoffice address nearest to mine.	Drift, slope or shaft.	Ventilation by fan, furnace or otherwise.	Production of coal for year ending Dec. 31, 1886, in tons.	Are there two separate openings for the mine?	Volume of air in cubic feet, at inlet, per minute.
Mitchell	Mitchell C. & L. Co	L. M. Foutz .	Denver, Colo	Alex. Patterson	Erie .	Shaft.	Fan . .	18,840	Yes .	18,000
Baker	D. W. Davis	D. W. Davis .	Denver, Colo	. . . . .	Erie .	Slope.	Furnace	3,187	Yes .	6,000

There are a number of small mines in this county which work a few men in winter time.

PARK COUNTY COAL MINES—1886.

NAME OF MINE.	Name of company.	General Manager.	General Superintendent.	Town and postoffice address of general office.	Drift, slope or shaft.	Ventilated by fan or otherwise.	Volume of air in cubic feet per minute at inlet.	Production of coal for year ending Dec. 31, 1886, in tons.	Are there two separate openings to the mine?	Mine Superintendent.	Town and postoffice address nearest to the mine.
Como No. 1	U. C. Co . .	D. O. Clark	— Hopkins	Omaha	Slope .	Fan .	25,000	23,823	Yes .	W. H. Brown	. Como
*Como No. 4	U. C. Co . .				Slope .	Steam	12,000		Yes .		

* This mine is abandoned.

EL PASO COUNTY COAL MINES—1886.

NAME OF MINE.	Name of company or individual operating mine.	General superintendent.	Town and postoffice address of general office.	Drift, slope or shaft.	Ventilated by fan or otherwise.	Volume of air in cubic feet per minute at inlet.	Production of coal for year ending Dec. 31, 1886, in tons.	Are there two openings to the mine?	Town and postoffice address nearest to the mine.
Franceville	Franceville Coal Co	John Hopkins	Denver, Colo.	Slope	Fan	24,000	50,000	Yes	Franceville
McFerran	J. H. B. McFerran	.....	Colo. Springs	Shaft	.....	.....	3,000	No	Franceville

TABLE SHOWING NUMBER OF PRODUCING, ETC., MINES IN GUNNISON CO—1886.

NAME OF MINE.	Name of company or individual operating mine.	General Manager.	General Superintendent.	Assistant General Superintendent.	Town and postoffice address of general office.	Mine Superintendent.	Town and postoffice address nearest to mine.	Drift, slope or shaft.	Ventilation by fan, furnace or otherwise.	Volume of air in cubic feet, at inlet, per minute.	Is there fire damp generated in the mine?	Production of coal for year ending Dec. 31, 1886, in tons.	Number of tons of coke produced during the year.
Crested Butte	C. C. & I. Co.	A. H. Danforth.	Jno Cameron.	J. K. Robinson	Pueblo, Colo.	John Gibson.	Crested Butte.	Drift.	Fan	53,800	Yes	102,918	29,003
Baldwin	Union Coal Co.	D. O. Clark	— Hopkins.	.....	Omaha, Neb.	J. Cummiskey.	Baldwin	Shaft	Fan	35,000	Yes	37,405	....
Anthracite Meta	Colo. Fuel Co.	— Kuebler	.....	.....	Denver, Colo.	C. F. Lawton.	Anthracite.	Drift.	Furnace	14,000	No.	19,628	....
*Mount Carbon	Mt. Carbon C. Co.	W. L. Hines.	.....	.....	Mount Carbon	.....	.....	Drift.	.....	.....	No.	None	None

*This mine has just been opened during the year; developments done are very extensive; said to cost ($100,000) one hundred thousand dollars. There are a number of small mines in this county, but during the year very little coal from them was produced.

TABLE SHOWING NUMBER OF MINES, ETC., IN FREMONT COUNTY—1886.

NAME OF MINE.	Name of company or individual operating mine.	General manager.	General superintendent.	Assistant general superintendent.	Town and postoffice address of general office.	Mine superintendent.	Town and postoffice address nearest to mine.	Drift, slope or shaft.	Ventilation by fan, furnace or otherwise.	Volume of air in cubic feet at inlet, per minute.	Is there fire damp generated in the mine?	Production of coal for year ending Dec. 31, 1886, in tons.	Have you two separate openings?
Rockvale, No. 1	C. C. C. Co.	W. W. Allen.	E. G. Savage	....	Topeka, Kas.	Robert Savage.	Rockvale Colo.	Shaft	Fan	24,300	Yes	205,212	Yes
Rockvale, No. 3								Shaft	Fan	32,000	Yes		Yes
Rockvale No. 4								Shaft	Fan	18,000	Yes		Yes
*Rockvale No. 5								Slope	.....	....	Yes		Yes
Coal Creek No. 1	C.C.& I.Co	A. H. Danforth	J.Cameron.	J. K. Robinson	Pueblo, Colo.	George Hadden	Coal Cr'k Colo.	Slope	Fan	33,000	Yes	126,812	Yes
†Coal Creek No. 2								Slope	Fan	30,000	Yes		Yes
Oak Creek								Slope	2 furn's	20,000	Yes		Yes
Hayes	Hayes	....	....	....	Cañon City	.....	.....	.....	.....	....	No	.....	Yes

*This mine was purchased of the Thornton Coal Co. by C. C. C. Co. during the year.
†This mine was purchased of the Caldwell Coal Co. by the C. C. & I. Co. during the year.

TABLE SHOWING NUMBER OF MINES, ETC., IN LAS ANIMAS COUNTY—1886.

NAME OF MINE.	Name of company or individual operating mine.	General Manager.	General Superintendent.	Assistant General Superintendent.	Town and postoffice address of general officer.	Mine Superintendent.	Town and postoffice address nearest to mine.	Slope, shaft or drift.	Ventilation by fan, furnace or otherwise.	Volume of air circulating in cubic feet per minute, at inlet.	Is there fire damp generated in your mine?	Production of coal for year ending Dec. 31, 1886, in tons.	Have you two separate openings?	Number of tons of coke produced during the year.
Starkville	T. C. & C. Co	W. W. Allen	E. G. Savage	.....	Topeka, Kan	— Humphrey	Sta'kville	Drift	Fan	22,000	Yes	143403	Yes	28,314
El Moro	C. C. & I. Co	A.H. Danforth	Jno. Cameron	J.K. Robinson	Pueblo, Colo	James Lamb	El Moro	Drift	Fu'n'ce	23,500	..	286303	Yes	82,845

There are a few small mines in this county that work from three to ten men winter time. Production is estimated in grand total.

LONG WALL.

This is a system of mining by which a coal vein can be worked out in sections of two hundred to eight hundred feet in one breadth; or it may consist in working out all the coal in one continuous face, extending in somewhat of a circular shape around the entire workings of a mine, which increases in area as the coal is excavated, until the boundary lines or limits of the coal field are reached. The haulage roads are branched out and made through the "gob," and are kept up in close proximity with the working face as the work progresses. Pillars of sufficient size should always be left around the bottom of the shaft so as to protect it and its necessary timberings and other structures on the surface from any damage that might be caused by the settling or "creep" of the roof. Care should be taken to have these pillars left large enough, for insufficient pillars in this mode of work are a very bad feature, as, when they are unable to resist the enormous weight which is brought upon them by the first break or "creep" of the superincumbent strata, which is caused by the coal being worked out for some distance from the shaft pillars, which may be fifty feet, or it may be much more, depending on the character of the rocks overlying the coal bed, the nature of the floor under it, and depth from the surface. Where thick stratums of sandstone overlie the coal vein, an extensive area sometimes is worked out around the shaft before the first breaking of the strata occurs. Under such conditions, the grinding effect on the shaft pillars is very severe, and should the pillars not be large enough to resist and break off the strata, then the disturbance of the measures will continue its grinding force, and crush over the entire pillars. Thus, the roof and floor will "creep" together, and will necessitate much expense and annoyance to repair such a disaster. When they are left sufficiently large, then the binding force is broken off on a line with the end of the pillars, and within such radius the coal roof and floor are left comparatively solid. The size of the pillars depends on

what depth the coal seam is from the surface and the nature of the measures.

It may be stated, in some cases (of late years), that after the coal vein has been reached with a shaft, the entire coal has been taken out from around the shaft bottom and no pillars left, but that timber cribs, rock and *debris* are put in to pack and support the roof. This, however, is a practice that ought to be avoided, for it is often the case that the sinking of the strata upon the "pack walls" displaces the shaft timbers and top structures, causing more expense and annoyance than would be justifiable in not driving in the necessary narrow-work in winning out the shaft pillars.

The "long wall" system is applicable to thin seams rather than to thick ones, as it will be seen that in thin seams there is not so much space between the roof and the floor to be packed as would be in thick seams. Thin seams may be considered from two to four feet, but under favorable circumstances larger veins may be worked successfully. Coal seams best adapted for this mode of working are those which are free from faults, have a good roof, a strong coal with a free parting from the top, a few inches of soft slate or soapstone under the coal to undermine in, and not too soft a floor. All roadways should be left ten to twelve feet wide between pack walls, to allow for lessening by crush. The pack wall or buildings protecting haulage roads, should be built at least nine feet in length along the face, and be properly built with stones in front, and well packed in the center with *debris*. Back timber should be well drawn out, so as to allow the roof to cave in the gob behind the workmen, otherwise too much weight will be thrown on the face, and the roof will break there, and may fall.

I think it is well to build middle packs three or four feet wide and four yards apart. A large quantity of timber can be saved in this way, and the middle packs will answer the purpose much better. The rocks for these packs and walls are obtained from falls, and the necessary work required to be done in the roads leading to working face, to keep the same of sufficient height and weight to allow the passage of cars, etc. Cross-

roads should be branched off from main levels or headings at such distance as will cut off old side-roads often enough so as to do away with the expense required to keep open long side-roads. The distance between such cross-roads might be 100 feet, or it may be much more; this must be determined by the nature of the roof and floor. The distance of working face between side-roads should be as much as is practicable, for the fewer roads to be brushed and kept up, the cheaper we may expect the coal. The distance may be eighty feet; it is often more. In some cases small buggies with low wheels, or sleds shod with iron, are used by the miner to convey coal from the far ends of the working face to the roadway where the coal is loaded into the pit cars, when the vein is too small to allow of the passage of a pit car along the working face. As the coal is worked out, the roof sinks gradually on the gobs and pack walls. Repairs are continually needed on the roads, in order to keep them at a proper height until the strata has completely settled and crushed down the walls of rock into a compact form, then the roads will stand nearly as well as if they were tunnels through solid rock. The roof and floor of the abandoned side-roads, and other space devoid of coal or gob, will creep together in time, and will look to all appearance, as solid as before the coal was excavated, thus leaving no abandoned workings standing open in which explosive gas can accumulate.

It is desirable that the face of coal be worked steadily ahead as much as possible, so as to be constantly moving under fresh roof, and with this in view, only sufficient wall face should be opened as will suit the output required; as it is very expensive to have surplus workings open in this system of work. Two thousand feet of wall face in a seam three feet in thickness could give an output of six hundred tons per day.

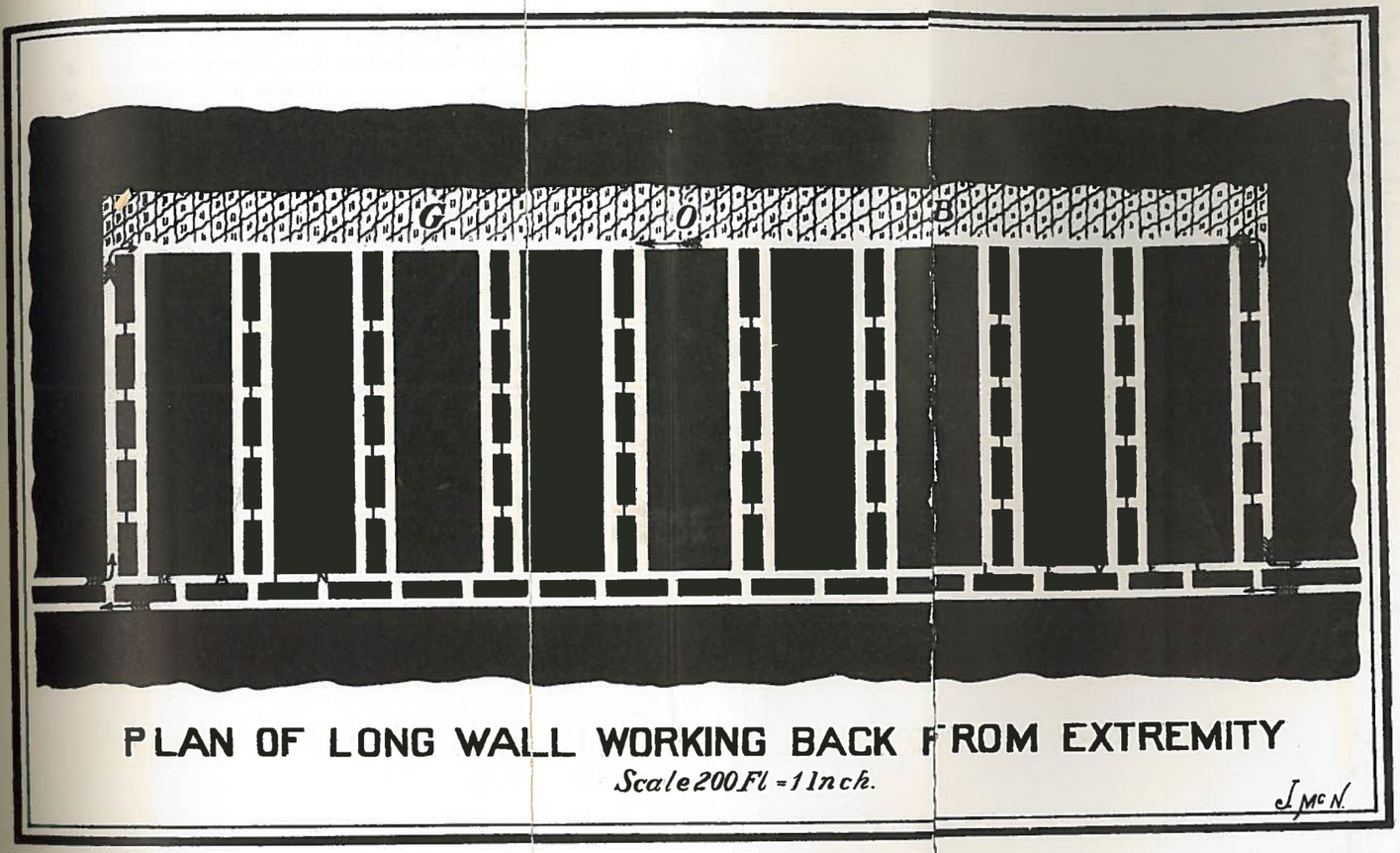
It is more convenient and economical, too, to have all stone work and repairing of hauling roads done during the night time. Men accustomed to such work are of great assistance, as there is considerable skill required in the proper building of pack walls, taking down the top, cribbing, etc.

An important point to consider, is to find out which way to work the coal vein, so as to suit existing requirements. In lignite, or non-coking coals, the slack made is of no value, and it is often the case that it is handled at great loss; it being an absolute necessity in most of our mines to take and hoist all slack out, as a precaution for guarding against spontaneous combustion and gob fires. Under such conditions it is then necessary to have the working face on the end, or on half end, and plane of the coal seam. In this way the coal may not be so easily mined, as it requires to be undermined further before it will be ready to wedge down, than when worked on the plane or face; but a much less percentage of slack will be obtained, and the coal will be got out in better condition, thus increasing the produce of merchantable coal. When a coal seam is worked on the face, the pressure on the roof has a more grinding effect, and the coal will fracture and crush out more easily, because the natural cleavage of the seam is subjected to the direct pressure from the roof. This is true in nearly all cases, but is more especially so in deep mines, or where the coal vein is tender.

In laying out the direction of main haulage roads should receive careful consideration, with a view to drainage, and also to enable them to receive the full benefit of all suitable gradients whenever possible; for an economical method of haulage should never be lost sight of, as it is one of the chief items which decrease the cost of the output.

Self-acting planes can often be successfully operated on main headings, and endless or tail ropes used on main levels with good results, especially where the haulage road is long. Levels worked with a view to adopt this system of haulage should be kept perfectly straight throughout their entire distance, if possible.

There are various ways in which long wall may be worked. The method above explained is the system which is generally adopted. Another mode is to drive from main levels or heading two places near each other, leaving a small pillar between them, in which cross-cuts can be put through as often as desired, so that the air current may sweep to the working face. A pillar of coal



sixty feet (or more, if it is found practicable) is left when other two places are driven up in the wh 'e coal, and so on, in like manner. When these places reach the extremity of the block of coal to be taken out, then the large pillars are holed through, and worked back to main entry. (See accompanying maps.)

In coal seams, where no fire damp has been detected, the practice of driving one wide place, with a haulage road on each "rib," and "gobbed" or braticed in the center, so that a sufficient quantity of air may reach the face, can be followed. Coal may be worked up, and taken back in this manner when the extremity to be reached is not over 200 feet. The system of driving double places, however, is much more desirable.

Where the long wall system is applicable, it will be found much more desirable than other modes of working. The reasons are briefly: Effective ventilation, the air current being always up to the coal face where the miners are at work; economy in working, more coal being obtained from each acre of the coal field.

COAL MINES.

(S. B. 168.)

AN ACT TO AMEND CHAPTER SIXTEEN OF THE GENERAL STATUTES OF THE STATE OF COLORADO, ENTITLED "COAL MINES." APPROVED FEBRUARY 24, 1883.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. That said chapter XVI. be amended so as to read as follows: SECTION 1. That the owner or agent of each coal mine or colliery in this State, employing ten or more men, shall make, or cause to be made, within six months after the passage of this act, an accurate map or plan of the workings of such coal mine or colliery, on a scale not exceeding one hundred feet to the inch, showing the bearings and distances of the workings, with the general inclinations of the stratum, and any material deflections in such workings, and the boundary lines of such coal mine or colliery, which shall be kept for the use of the Inspector, at the office of the said mine in the county where such mine or colliery is located, and which shall be kept up every three months; and shall also deposit a true copy of such map or plan with the Inspector of Coal Mines, and with the recorder of the county in which said coal mine or colliery is situated, to be filed in their respective offices; and said owner or agent shall cause, on or before the tenth day of January every year, a statement of the workings of such coal mine during the year past, from the last report to the end of the December month just preceding, to be marked on the original map or plan of said coal mine or colliery; *Provided*, If the owner or agent of any coal mine shall neglect, or refuse, or for any couse, fail, for the period of one month after the time prescribed, to furnish said map or plan as hereby required, or if the Inspector shall find or have reason to believe said map or plan is inaccurate in any material part, he is hereby authorized to cause a correct map or plan of the actual workings of such coal mine or colliery

to be made at the expense of the owner thereof, the cost of which shall be recoverable from said owner by an action, as in cases of other debts, and shall cause a copy of the same to be filed in the office of the recorder of the county in which said coal mine or colliery is situated.

SEC. 2. It shall not be lawful, after six months from the passage of this act, for the owner or agent of any coal mine, wherein over fifteen thousand square yards have been excavated, to employ or permit more than fifteen person to work therein, except in opening shafts or outlets, unless there are to every seam of coal worked in each mine, at least two separate outlets, separated by natural strata of not less than one hundred feet in bredth, by which shafts or outlets, distinct means of ingress or egress are always available to the persons employed in the mine, and air shafts, in which are constructed and maintained ladder ways, shall be deemed and held to be an escape shaft within the provisions of this act, and no escape shaft be required; but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until fifteen thousand square yards have been excavated in such mine, and to all other coal mines, whether opened and worked by shafts, slopes or drifts to such openings or outlets, must be provided within twelve months after fifteen thousand square yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for the owner or agent of such mine to permit more than fifteen persons to work therein during each twenty four hours. In case a coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein, and the owner thereof does not own suitable surface ground for another opening, he may select and approximate any adjoining land for that purpose, and for approach thereto, and shall be governed in his proceedings in appropriating such land by the provisions of law in force providing for the appropriation of private property by corporations, and such appropriation may be made whether he is a corporator or not; but no land shall be appropriated under the provisions of this act until the court is satisfied that suitable premises cannot be obtained by contract upon reasonable terms.

Escapement shafts or other communication with a contiguous mine, as aforesaid, shall be constructed in connection with every vein or stratum of coal worked in such coal mine or colliery, as provided herein.

SEC. 3. In all cases where the human voice cannot be distinctly heard, the owner or agent shall provide and maintain a metal tube from top to the bottom of the slope or shaft, or a telephone connection suitably adapted to the free passage of sound, through which conversation may be held between persons at the bottom and at the top of the shaft or slope; also, the ordinary means of signaling to and from the top and bottom of the shaft or slope; and in the top of every shaft shall keep an approved safety gate and an approved safety catch, and sufficient cover overhead on every carriage used for lowering and hoisting persons; and the said owner or agent shall see that sufficient flanges or horns are attached to the sides of the drum of every machine that is used for lowering and hoisting persons in and out of the mine, and also, that adequate brakes are attached thereto; the main link attached to the swivel of the wire rope, shall be made of the best quality of iron, and shall be tested by weights satisfactory to the Inspector of Mines of the State; and bridle chains shall be attached to the main link from the cross-pieces of the carriage; and no single link chain shall be used for lowering or raising persons into or out of said mine; and not more than five persons for each ton capacity of the hoisting machinery used at any coal mine shall be lowered or hoisted by the machine at any one time.

SEC. 4. The owner or agent of every coal mine or colliery, whether shaft, slope or drift, shall provide and maintain for every such mine an amount of ventilation not less than one hundred cubic feet, and such additional number of cubic feet as may be ordered by said mine inspector, per minute, per person employed in such mine, and also an amount of ventilation of not less than five hundred cubic feet per minute for each mule or horse used in said mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute and render harmless and

repel the poisonous and noxious gases from each and every working place in the mine, and break-throughs or air-ways shall be driven as often as the Inspector of Mines may order, at the different mines inspected by him, and all break-throughs or air-ways, except those last made near the working faces of the mines, shall be closed up and made air-tight, by brattice, trap-doors or otherwise, so that the current of air in circulation in the mine may sweep to the interior of the mine, where the persons employed in such mine are at work; and all mines governed by this statute shall be provided with artificial means of producing ventilation, when necessary to provide a sufficient quantity of air, such as fanning, or suction fans, exhaust steam furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air; but in case a furnace shall be used for ventilating purposes, it shall be built in such a manner as to prevent the communication of fire to any part of the works, by lining the upcast with an incombustible material for a sufficient distance up from the said furnace. All mines generating fire damp shall be kept free from standing gas, and every working place shall be carefully examined every morning with a safety lamp, by a competent person or persons, before any of the workmen are allowed to enter the mine; and the person making such examination shall mark on the face of the workings the day of the month; and in all mines, whether they generate fire damp or not, the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will shut up of their own accord and cannot stand open; and the owner or agent shall employ a practical and competent inside overseer, to be called a "mining boss," who shall keep a careful watch over the ventilating apparatus, and the air-ways, traveling ways, pumps, timbers and drainage; also, shall see that, as the miners advance their excavations, that all loose coal, slate and rock overhead are carefully secured against falling in or upon the traveling ways, and that sufficient timber, of suitable lengths and sizes, is furnished for the places where they are to be used, and placed in the working places of the mines; and he shall measure the ventilation at least once a week, at the

inlet and outlet, and also at or near the face of all the entries; and the measurement of air so made shall be noted on blanks furnished by the Mine Inspector; and on the first week day of each month the "mining boss" of each mine shall sign one of such blanks, properly filled, and forward the same by mail to said Mine Inspector, a copy of which shall be filed at the office of the coal company, subject to inspection by miners.

SEC. 5. No person shall knowingly be employed as an engineer or mining boss, or take charge of any machinery or appliance whereby men are lowered into or hoisted out of any mine, but an experienced, competent and sober person; and no person shall ride upon a loaded wagon or cage used for hoisting purposes in any shaft or slope. No young person under twelve years of age, or woman or girl of any age, shall be permitted to enter any coal mine to work therein, nor any person under the age of sixteen years, unless he can read and write.

SEC. 6. All safety lamps used for examining or working coal mines, shall be the property of the owner of the mine, and shall be under the charge of the agent thereof. The term "owner" in this act shall mean the immediate proprietor, lessee, or occupier of any coal mine, or colliery, or any part thereof; and the term "agent" shall mean any person having, on behalf of the owner as aforesaid, the care and management of any coal mine, or colliery, or any part thereof.

SEC. 7. All boilers used in generating steam in and about coal mines and collieries, shall be kept in good order, and the owner or agent, as aforesaid, shall have said boilers examined and inspected, by a competent boiler-maker, or other well qualified person, as often as once every six months, and the result of such examination shall be certified, in writing, to the Mining Inspector; and every steam boiler shall be provided with a proper steam gauge, water gauge, and safety valve; and all underground, self-acting, or engine planes, or gangways, on which coal cars are drawn and persons travel, shall be provided with some proper means of signaling between the stopping places and the ends of said planes

or gangeways; and sufficient places of refuge, at the sides of said planes or gangeways, shall be provided, at intervals of not more than fifty feet apart; and there shall be cut, in the side of every hoisting shaft, at the bottom thereof, a traveling way, sufficiently high and wide to enable persons to pass the shaft, in going from one side of the mine to the other, without passing over or under the cage or hoisting apparatus.

SEC. 8. Whenever loss of life, or serious personal injury, shall occur by reason of any explosion, or of any accident whatsoever, in or about any coal mine or colliery, it shall be the duty of the owner or agent thereof to give notice to the Mine Inspector, and if any person is killed thereby, to the coroner of the county also, and the Inspector shall immediately go to the scene of said accident and render such assistance as he may deem necessary for the safety of the men, and shall ascertain, by the testimony before the coroner, or by taking other evidence, the cause of such explosion or accident, and file record thereof in his office.

SEC. 9. In all coal mines in the State, the miners employed and working therein, the owners of the land, or other person interested in the rental or royalty of any such mine, shall at all proper times have full right of access to, and examinations of, all scales, machinery, or apparatus used in or about such mine; to determine the quality of the coal mined, for the purpose of testing the accuracy of all such scales, machinery or apparatus; and such land owners or other persons may designate or appoint a competent person to act for them, who shall at all proper times have full right of access to, and examination of, such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person, on behalf of the land owners, or other person interested in the rental or royalty, jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such person shall make no unnecessary interference with the use of such scales, machinery or apparatus, and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to

inspect, not oftener than once in every month, the mine and the machinery connected therewith, and to measure the ventilating current, and if the owner, agent, or manager so desires, he may accompany said miners, by himself, or two or more persons whom he may appoint for that purpose. The owner, agent, or manager shall afford every necessary facility for making such inspection and measurement; but the said miners shall not in any way interrupt or impede the work going on in the mine at the time of such inspection and measurement.

SEC. 10. Any miners, workmen, or other person, who shall intentionally injure any shaft, lamp, instrument, air-course or brattice, or obstruct or throw open air-ways, or open a door and not close it again, or carry lighted pipes or matches into places that are worked by safety lamps, or handle or disturb any part of the machinery, or enter any place of the mine against caution; or who wilfully neglects or refuses to securely prop the roof of any working place under his control, or disobey any order given in carrying out the provisions of this act, or do any other act whereby the lives or the health of persons, or the security of the mines or machinery is endangered, shall be deemed guilty of a misdemeanor, and upon conviction may be punished by a fine of not less than twenty-five dollars, nor more than two hundred dollars, or may be imprisoned in the county jail not less than thirty days, nor more than one year, or may be punished by both such fine and imprisonment, at the discretion of the court.

SEC. 11. In case any owner or agent disregards the requirements of this act, any court of competent jurisdiction may, on application of the Inspector, by civil action in the name of the State, enjoin or restrain the owner or agent from working or operating such mine with more than twelve miners underground during each twenty-four hours, until it is made to conform with the provisions of this act. And such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent, authorized by law for the matter complained of in such action.

SEC. 12. For any injury to person or property occasioned by any violation of this act, or any wilful failure

to comply with its provisions by any owner or lessee or oporator, of any coal mine or opening, a right of action against the party at fault shall accrue to the party injured for the direct damages sustained thereby, and in any case of loss of life by reason of such violation or failure, a right of action against the owners and operators of such coal mine or colliery shall accrue to the widow and lineal heirs of the person whose life shall be lost, for like recovery of damages for the injury they shall have sustained.

SEC. 13. The provisions of this act shall not apply to or affect any coal mine in which not more than ten men are employed underground during each twenty-four hours, but on the application of the proprietor, or of the miners in any such mine, or when the Mine Inspector may deem it necessary, said Mine Inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this act, that he deems necessary for the safety and health of miners.

SEC. 14. That the board of examiners, heretofore appointed under the provisions of this act concerning coal mines, approved February 24, 1883, and amended by this act, shall hold their office for and during the time for which they were appointed, to wit: until January 1, A. D. 1887. And it shall be the duty of the board of examiners to meet at such times, and at such places within this State, as may be directed by the Governor of this State, and examine such persons as may present themselves for examination, touching their qualifications for the office of Mine Inspector, as provided in this act, and shall inquire into their character and qualifications, and shall certify the names of such persons as they shall find to be competent to fill such office of Mine Inspector, to the Governor, which list of names, so certified, shall be placed on file in the office of the Secretary of State. Members of such board of examiners shall, before entering upon their duties, take and subscribe the following oath, viz: We, the undersigned, do solemnly swear (or affirm), that we will perform the duties of examiners of applicants for appointment of Inspector of Coal Mines, to the best of our abilities, and that in recommending or

rejecting said applicants, we will be governed by the evidence of qualifications to fill the position under the law creating the same, and not by any consideration of political or personal favors; that we will certify to all whom we may find qualified, accordiug to the true intent and meaning of the act, and none others, to the best of our judgment. The qualifications of candidates for said office of Inspector of Mines, to be inquired into and certified by said examiners, shall be as follows, namely: They shall be citizens of the United States, of temperate habits, of good repute as men of personal integrity, shall have obtained the age of thirty years, and shall have had at least one year's experience in the working of coal mines of Colorado, and five years of practical experience in the working of coal mines in the United States, and have a practical knowledge of mining engineering, and of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp. The board of examiners shall receive six dollars per day, and same mileage as is allowed to members of the Legislature, to be paid out of the State treasury, upon the filing of the certificates of the examining board in the office of the Secretary of State, as hereinbefore provided. As often as vacancies in said office of Inspector of Mines shall occur, by death, resignation, or malfeasance in office, which shall be determined in the same manner as in the case of any other officer of the State government, the Governor shall fill the same, by appointment, for the unexpired term, from the names on file in the office of the Secretary of State, as hereinbefore mentioned as having passed examination. On January 1, A. D. 1887, and every four years thereafter, the Governor shall appoint one reputable mining engineer, of known ability, and shall notify the judges of four of the judicial districts of the State, within which coal mines are being operated, to each appoint one reputable coal miner, of known experience and practice, from their respective districts, and the five so appointed shall constitute a new board of examiners, whose duties, term of service and compensation, shall be the same as those provided for by this section; and from the names that may be certified by them, the Gov-

ernor shall appoint the Inspector of Mines provided for in this act. Nothing in this act shall be construed to prevent the re-appointment of any Inspector of Coal Mines. The Inspector of Coal Mines shall receive for his services an annual salary of two thousand dollars, and ten cents per mile mileage for all distances traveled in the discharge of his official duties, to be paid monthly by State Treasurer; and said Inspector shall reside in the State, and shall keep an office at the capitol, or other building, in which the offices of the State are located. Each Inspector is hereby authorized to procure such instruments, and chemical tests, and stationery, from time to time, as may be necessary to the proper discharge of his duties under this act, at the expense of the State, which shall be paid by the State Treasurer, upon accounts duly certified by him and audited by the proper department of the State. All instruments, plans, books, memoranda, notes, etc., pertaining to the office, shall be the property of the State, and shall be delivered to their successors in office.

SEC. 15. The Inspector of Coal Mines shall, before entering upon the discharge of his duties, give bond in the sum of five thousand dollars, with sureties, to be approved by the judge of the District court in which he resides, conditioned for the faithful discharge of his duty, and take an oath (or affimation) to discharge his duties impartially and with fidelity, to the best of his knowledge and ability.

SEC. 16. No person acting as a manager or agent of any coal mine, or as a mining engineer for any coal mining company, or to be interested in operating any coal mine, shall at the same time act as an Inspector of Coal Mines under this act.

SEC. 17. The Inspector of Coal Mines shall devote the whole of his time to the duties of his office. It shall be his duty to enter into and thoroughly examine all coal mines in this State, in which more than ten men are employed, at least once each quarter, to see that all the provisions of this act are observed and strictly carried out; and the Inspector may enter, inspect and examine any coal mine in the State, and the works

and machinery belonging thereto, at all reasonable times, by night or day, but so as not to unnecessarily obstruct or impede the working of the mine; and the owner, or agent, of such mine is hereby required to furnish the means necessary for such entry and inspection, of which inspection the Inspector shall make a record, to be filed in his office, and which shall show the number of mines, and development on the same, during the past year, and of persons employed in and about each mine, and the extent to which the law is obeyed, the progress made in the improvements sought to be secured by the passage of this act, the number of accidents and deaths resulting from injuries received in coal mines, as also statistics showing output of coal and development made annually at each mine, with all facts concerning the production and transportation of coal to market, and other facts of public interest, coming under the provisions of this act, which record shall, on or before the first Monday in November preceding the biennial sessions of the Legislature, be filed in the office of the Secretary of State, to be by him included in the biennial report of his department.

SEC. 18. That the owner or agent of each coal mine or colliery in the State, employing ten or more men, shall, when working in close proximity to an abandoned mine, or part of a mine, containing inflammable gas or fire-damp, cause bore holes to be kept at least twelve feet in advance of the coal-face of all working places in such mine or colliery; and when directed to do so by said Mine Inspector, shall cause bore-holes to be driven in a like manner on both sides of said workings; and said owner or agent shall cause all abandoned shafts, air-shafts, slopes or cave-holes to be securely and safely fenced off, for the protection of persons working in said mine.

SEC. 19. The mining boss, or other competent person, shall make daily inspection of ropes, chains, cages and other hoisting appliances, guides and shaft timbers, and make a record of such daily inspection in a book, kept at the office of the mine, for that purpose, and the fire boss shall keep a daily record of any defects in the ventilating appliances, and any standing gas that may

be found in said mine, designating the entry and room in which said gas is found. Each of the records herein required to be kept, shall be open at all times to the Mine Inspector's and miners' committee's inspection, and a copy thereof shall be filed in the office of the said Mine Inspector on the first Monday of December of each year.

SEC. 20. The neglect or refusal to perform the duties required to be performed by any section of this act, or the violation of any of the provisions hereof, shall be deemed a misdemeanor, and any person so neglecting or refusing to perform such duties, or violating such provisions, shall, upon conviction, be punished by a fine of not less than one hundred dollars, nor exceeding five hundred dollars, at the discretion of the court, and all penalties recovered under this act shall be paid into the treasury of the State.

SEC. 21. All acts or parts of acts, inconsistent with the provisions of this act, are hereby repealed.

SEC. 22. An emergency exists; therefore, this act shall take effect and be in force from and after its passage.

Approved April 8, 1885.

[A COPY OF THE MINING LAW OF GREAT BRITAIN.]

The Coal Miners' Regulation Act.

(35 and 36 Victoria, Cap. 76.)

SPECIAL RULES

For the conduct and guidance of the persons acting in the management of this mine, or employed in or about the same, to prevent dangerous aecidents, and to provide for the safety and proper discipline of the persons employed in or about the mine, in terms of Section 52 of the Statute, 35 and 36 Victoria, Cap. 76.

In these special rules, the word "agent" means a person having, on behalf of the owner, care and direction of any mine, or any part thereof, and superior to the manager; the word "manager" means the certificated manager under the act, and includes the plural as well as singular; the word "overman" means a person employed and acting under the manager, and includes plural as well as singular; the word "miners" means every person employed in the mine, in the cutting, or excavation, or removal of coal, ironstone, shale, fireclay, or other minerals, metals or materials.

AGENT.

1. The agent, where one is appointed separate from the owner, shall have, as representing the owner, the care and direction of the mines committed to his charge; and it shall be his duty to take a general supervision thereof; to see that the manager attends to and performs his duties, and generally to act as the owner's representative, and see that the mines are conducted in conformity with the requirements of the act.

N. B.—The agent is furnished, for his guidance, with printed copies (1) of the act itself, (2) of the statutory abstract thereof, and (3) of the Special Rules.

MANAGER.

2. Generally, the mine (or division of the same, when divided in terms by the statute), to which the manager has been appointed, shall be under the control and daily supervision of the manager, whose duty it shall be to carry out, and see carried out, the various provisions of the act, so far as incumbent on him, or on those acting under his control and directions, and to see that sufficient materials and appliances are always provided for the proper carrying out of all necessary operations.

Copies of the statute itself, of the abstract thereof, and of these Special Rules, are supplied to each manager.

OVERMAN.

3. Subject to the control and supervision of the manager, the whole operative details shall be under the care and charge of the overman. The overman shall see that the workmen of every class, in their several departments, discharge their duties; and shall receive and attend to all reports made to him, as to the state of repair of the air-courses, machinery, mid-wall trap doors, roads, cubes and working places. He shall cause remedies to be provided where needed; and shall see the General and Special Rules faithfully and vigorously enforced; and he shall have power to hire and discharge workmen.

4. He shall have under his immediate and special charge the shaft, slides, pumps and relative fittings, all of which he shall keep safe and efficient.

5. He shall attend to the ventilation, in terms of General Rule No. 1, and to the observance of the other General Rules in section 51, so far as these, from their nature, can be observed by himself, or fail to be observed by others under his charge.

6. He shall perform the special duties, as to the examination of machinery and others, set forth in General Rule No. 29.

7. He shall see that a plentiful supply of timber, for props and other purposes, required by the workmen to carry on their operations with safety to themselves, is always ready; and shall cause the same to be cut in proper lengths, and laid down in the working places, as provided for in Rule 28.

8. He shall, without delay, report to the manager, or agent or owner, any matter or thing coming under his notice, necessary to be observed or carried out, with a view to compliance with the General or Special Rules, which he cannot himself perform.

N. B.—Copies of the statute itself, of the abstract thereof, and of these Special Rules, supplied to each overman.

PIT-HEADMAN (OR BANKSMAN).

9. The pit-headman, during the several shifts, if more than one, shall, subject to the control and supervision of the manager, have charge of the workmen employed about the pit-head, and each workman shall act under his directions. He shall observe that, at all times, there is sent down the pit a stock of timber for props and other necessary purposes, for the use of the miners and other workmen, and report to the manager, if at any time he observes, or has reported to him, that there is a deficiency of such timber or other articles. He shall superintend and direct the safe removal from the cage of all loaded hutches arriving at the pit-head, and see to the safe replacing of the return hutches on the cage. He shall be in attendance in the morning, or at such other time of the day as the miners' shift commences, and shall see that no person is allowed to go upon the cage until the engineman has ascertained and reported the safety of so doing, in terms of Special Rule 16. He shall regulate the number of men descending at a time, taking care that not more than four to a single cage, or eight to a double cage, shall ride on such cages, respectively, and no one along with a hutch.

10. The pit-headman (in absence of some other person specially appointed for the purpose, and independently of the manager and overman) shall, once at least in every twenty-four hours, carefully inspect the ropes, chains, slides, pit-head frames and other apparatus used for the lowering and raising of the cages, so far as exposed to his observation; and if he discover, or be informed of, any defect or weakness likely to produce danger, he shall stop the raising or lowering of men or materials until such defect or weakness be remedied. He shall also be careful to prevent the fall of any stone, coal, or other substance, into the shaft from the surface, and shall communicate to the manager or overman any necessity for a skilled person being employed to rectify any defect in the shaft, ropes, chains, pit-head frame and other apparatus.

11. It shall be his duty to see that the shaft is securely fenced in at the close of the shift.

12. In the absence of the weigher, specially appointed for the purpose, it shall be the duty of the pit-headman to act as weigher, and to see that all tubs or hutches are properly filled with the mineral "contracted to be gotten," and that the proper deductions be made, in respect of stones or materials, other than the minerals contracted to be gotten, or in respect of tubs, baskets or hutches improperly filled—in terms of section 17 of this act.

WEIGHER.

13. When a person is specially appointed as weigher, it shall be his duty to attend to the matters embraced in the immediately preceding rule.

ENGINEMAN.

14. The engineman at the pit-head shall, during the hours of his shift, remain continually in charge of, and so near his engine as at all times to have it completely and entirely under his control. He shall be careful that the engines and boilers are always in good working condition, and that the pumps and whole machinery and gearing connected with his engine are in a safe and

effective state, and any fly-wheel, or exposed and dangerous parts of the machinery securely fenced. He shall have charge of the furnacemen, where these are employed, and be responsible for the regularity with which steam is kept up, and for the proper state of the boilers. He shall have steam raised, and the engine and machinery in working order, in time to allow the fireman, roadsmen, overman or manager to descend the pit to examine the condition of the mine before the miners' or other workmen's shift shall commence.

15. He shall thoroughly acquaint himself with, and shall watch and attend to the various signals made for raising or lowering the cage, whether laden with men or materials, or when empty—shall carefully and exactly set down the cage at the landing places—shall observe the indicator attached to the machinery, showing the position of the load in the shaft, and manage the break connected with the engine. The engineman shall further attend to and see that any steam and water gauges, and safety valve, attached to the steam boiler are kept in good order.

16. Before allowing the descent of workmen into the mine on any morning, the engineman shall be bound to run each cage at least once, from the pit-head to the pit-bottom, to ascertain whether everything is right, and if any defect shall be discovered, he shall stop the engine, and shall not, on any pretext, allow the descent of workmen until the matter has been reported to the manager, overman, or person in charge, who shall direct what remedy shall be necessary. The engineman shall not allow any workman to descend the pit until the fireman shall have reported the safety of doing so.

17. He is prohibited from allowing any person whatever to interfere with the engine in any way, while being wrought, and from allowing or permitting any person, other than those authorized by the owner, agent, manager or overman, to enter, or remain in the engine house.

18. He shall attend to all signals, and make the necessary return signals, which shall be as follows:

19. The bottomer, or person acting in his absence, shall make the following signals from the bottom, being those appointed in this mine for guiding the ascent of the cage, and

20. He shall strike or ring the bell *once*, for the ascent of the cage, whether loaded or empty.

21. The engineman shall make a counter-signal, if there be any reason why the cage should not ascend, and in case the signal mentioned in Special Rule 20 be given at any time when the cage is in motion, the engineman shall immediately stop the engine.

22. The bottomer shall strike or ring the signal bell *thrice*, in rapid succession, intimating that men are about to ascend, when the engineman shall signal that all is ready; thereupon the bottomer shall make the usual signal of *one* stroke of the bell, whereupon the cage shall be raised.

23. The bottomer shall strike or ring the signal bell *twice* when he desires the cage to be reversed, and the ascending cage returned to the pit-bottom, and to remain there.

N. B.—Copies of the abstract of the act and of the Special Rules are furnished to the engineman.

FURNACEMAN.

24. Subject to the control of the manager or overman, the furnaceman shall act under and obey the directions of the engineman.

ROADSMEN.

25. The roadsmen, in their different divisions and shifts, if more than one, shall, at least daily, make careful inspection of the whole roadways and working places, from the pit-bottom throughout the mine, and shall keep the same free from all obstructions, and of the fixed height and width, necessary for proper passage and ventilation. They shall repair and remedy all damages and defects in the roads of the mine, and shall examine, and put, and keep in proper condition, all

trap-doors, and see the regulations enforced that the same are kept closed; and, wherever practicable, shall endeaver to make and keep such trap-doors self-acting. They shall make and place sufficient trap-doors wherever the progress of the operations of the mine shall render these necessary.

26. The roadmen shall also lay rails in the roads where requisite; and, in the absence of the manager and overman, they shall receive all proper reports or communication from the miners and other workmen, as to falls and defects in the roads, roofs and buildings, and shall proceed to and repair or remedy the fall and defects.

27. They shall stop the passage of men and materials, through or under defective roads, roofs or places, until the necessary repairs shall have been executed. They shall receive information concerning any interruption in the ventilation, or of any other cause of danger, and communicate with the manager or overman immediately, and shall aid and assist in the rectification and remedy of the same, and shall, when so employed, be permitted to use only safety lamps, in mines where inflammable gas has been found within the preceding twelve months. All lighted or combustible substances are forbidden to be used in the course of such operations.

28. It shall be the special duty of the roadsmen in their different divisions, if more than one, to observe that an adequate supply of timber, for props and other necessary purposes, is always ready at the place where the miners are at work, for the use of the miners, in supporting the roofs and sides in their working places, and to report to the manager or overman if they shall observe any want of such timber. For the purpose of carrying out this rule roadsmen are empowered to call upon drawers, putters and drivers, whether employed by the owner or miner, to convey such necessary timber from the pit-bottom, or other place of general delivery, to the working places in connection with which they are employed.

29. The roadsman shall report to the manager or overman any instances of neglect on the part of miners

in not carrying forward their faces or walls, in accordance with the plan pursued in working the mine. They shall also examine and report to the manager or overman instances of neglect and acts of carelessness on account of the part of the miners or brushers, in failing to remove, or in not removing with proper caution, the strata necessary to be removed to form roads, or in not carrying forward the brushing with sufficient regularity, and of the proper dimensions, or in leaving the brushing with loose or hanging stones in and about the strata brushed.

30. As removing falls from the roofs of roads and air-courses, and repairing defects therein, are within the roadsman's duties, and as they are charged with the maintenance of all roads and passages in the mine, they are enjoined to proceed with the greatest caution—both for their own safety and the successful execution of their duties. In these operations they must therefore be careful, and are required to prevent all other workmen coming near any defective places, or interfering with them when at work. They are required to undertake no repairs of unusual magnitude or danger, without sufficient assistance, and until provided with every necessary material, which will be supplied on application to the manager or overman.

31. Without prejudice to the foregoing directions, it will be the special duty of the roadsmen to observe the matters embraced in the following general rules:

First—Upon discovering that any part of the mine is dangerous, in terms of General Rule No. 6, to withdraw therefrom any workmen therein employed (which workmen shall be subject to the roadsman's orders, to that effect), and report the state of matters to the manager, overman or fireman.

Second—To report to the manager or overman, where they observe any violation of General Rule No. 8, as to use of gun powder.

Third—To see that every man-hole, or place of refuge, is kept clear, in terms of General Rule No. 12.

Fourth—To examine the roof and sides of every traveling road at least daily, and see that the roof and sides are safe, in terms of General Rule No. 16.

Fifth—To report any damage to any fence, casing, lining, means of signaling, or otherwise, that may be observed, in terms of General Rule No. 27.

32. Generally the roadmen shall observe and fulfil the whole duties falling within these departments, under the statute. They are furnished copies of the statutory abstract and of these Special Rules.

FIREMAN.

33. If inflammable gas has been found in the mine, within the preceding twelve months—which it shall be the duty of the manager to ascertain and intimate to the fireman—then it shall be the duty of such fireman, or firemen, if more than one, in their respective divisions or shifts, to perform the duties of examining and inspecting, with a safety lamp, the mine and roadways, and making the report thereon, all in terms of General Rule No. 2.

34. If inflammable gas has not been found in the mine, within the preceding twelve months—which it shall be the duty of the manager to ascertain and intimate to the fireman—then it shall be the duty of the fireman, or firemen, if more than one, in their respective departments, to inspect the mine and roadways, and make a report in terms of General Rule No. 3.

35. In making the examinations provided for by the foregoing Rules, the fireman shall mark with chalk the day of the month upon the face of each working place—as 1, 5, 10, 25, or other numbers, as the case may be. He shall be careful to ascertain that every part of the mine and roadways so to be examined are free from fire-damp, choke-damp and other impurities, and are safe for workmen to enter and to work therein; and in case fire-damp or other impure air shall be discovered in any working place, road or level, the fireman shall, in the first instance, thoroughly clear the same of such impurity—if that can be done easily—and shall thereupon report to the miners and other workmen that the same are safe; but if the impurity cannot be readily or at once cleared out, the miners and workmen shall not be permitted to

enter any such working places, roads or level until the impure air shall have been, by further appliances, entirely dispelled. He shall prevent miners or other workmen entering the roads or working places until a report shall have been made that they are safe. If no fire-damp, choke-damp or other impurity shall be discovered, or suspected to remain after such inspection, the fireman shall make report to the miners and workmen, and allow them to proceed to work, and shall thereupon, without delay, enter such report in the book kept for that purpose.

36. If the fireman shall encounter falls from the roof, in any of the roads which he requires to traverse, or in working places under the care of the miners, he shall not proceed further in the direction of such falls, so as to pass under the broken roof, but shall endeavor, cautiously, to ascertain if there be any accumulation of fire-damp or other impurities in, about, or beyond the falls, so that the safest way of clearing the same may be learned, and shall proceed elsewhere through the mine to examine the unobstructed parts thereof, and to complete his inspection; whereupon the fireman shall report to the manager or overman the state of the falls, and whether free from impurity, to the end that necessary directions may be given for having the same cleared away, and the roof secured; and until this shall be done, no miner or other workman shall be at liberty to proceed near, or be under the broken roof, unless employed in remedying the same.

37. In case, from any cause, the operations of the mine shall have been discontinued for an unusual length of time, and thereafter resumed, no workman shall be allowed to descend the shaft until the manager, overman, or fireman shall have first descended and reported on the state of the workings; and in discharging this duty the manager, overman or fireman must proceed with great caution, and shall not go further into the workings than he, from his own experience, shall deem safe; and in case there are reasonable grounds for apprehending the presence of impure air, he shall return to the pit-head, and remain there until precautionary measures shall have been applied to restore the proper ventilation of the mine.

38. Without prejudice to the foregoing rules, it shall also be the duty of the fireman to fence, or cause to be fenced, all entrances, in terms of General Rule No. 4; as also, in going his rounds, to observe and report to the manager or overman upon the following matters, embraced in the General Rules:

First—Any deficiency in the amount of ventilation, as provided for in terms of General Rule No. 1.

Second—Any attempt, on the part of workmen, to violate General Rule No. 5, as to going beyond the appointed station.

Third—Any violation of the terms of General Rule No. 8, as to the use of gunpowder.

Fourth—Any failure to keep clear man-holes, in terms of General Rule No. 12.

Fifth—Any failure to make secure the roof and sides of traveling roads, and working places, under General Rule No. 16.

Sixth—Any violation of General Rule No. 27, as to the damaging of fences, signals, etc.

39. It shall be the duty of the fireman, when he discovers that any part of the mine is dangerous from the presence of noxious gases, to cause the workmen to withdraw from the mine, or the part thereof so found dangerous, in terms of General Rule No. 6, and all workmen shall be subjected to his orders, in respect of this matter; and he shall thereupon, as the "competent person" appointed for the purpose, inspect the mines, or such parts thereof as are dangerous, in the manner and to the effect provided for in said General Rule, and make a report as therein provided for. Also, he shall fit up bratticing where required, of suitable height and length, so that air may be at all times conveyed from the principal air-courses for the use of the workmen, and see that all entrances are properly fenced, in terms of General Rule No. 4.

40. It shall be his duty to see that the miners are attending to the security of the roofs and sides of the working places, and for that purpose to visit each work-

ing place at least three times each day at proper intervals; and in case of finding that any miner is failing so to secure his working place, by propping the same or otherwise, to point out to such miner any such failure; and should such miner refuse or fail to perform such repairs as may be necessary to render the place secure, to require him and his assistants to remove from such working place. Besides the periodical examinations already provided for, it shall be the duty of the fireman, when applied to by any miner, stating that his working place is, in the matter of propping, in a dangerous condition, which requires the intervention of a skilled person, to proceed to such working place, examine the same, and cause such remedies to be applied as shall appear to be necessary for the safety of the place, the miner himself assisting in any necessary operation.

41. It shall likewise be the duty of the fireman or firemen in their different departments (unless some other person shall be specially appointed), where gunpowder is being used, to act as the "competent person," in terms of General Rule No. 8 (*f*), and to ascertain the state of "inflammable gas," in terms of the said General Rule, and to prevent gunpowder being used otherwise than as there provided for.

N. B.—Copies of the abstract of the act and of these special rules are furnished to each fireman.

BOTTOMER AND SIGNALMAN.

42. The bottomer shall attend, during the working shifts in the mine, to regulate the number of men who shall ascend on the cage at a time—to keep order among the drawers arriving with loaded hutches at the pit-bottom—to see that the loaded hutches are carefully placed on the cage, and secure them—to make the appointed signals necessary for regulating the ascent of men and materials—to examine and report to the manager on the state of the signal apparatus, and of the hutches used in the pit, and of the cages wrought in the shaft; and also on the state of the slides or guide-rods in which the cage moves.

43. He shall, along with the fireman, attend to, and keep in proper order, the cube or rarifying furnace in the pit.

44. The bottomer shall attend to and answer the signals made by the engineman from the surface.

45. He shall not allow any miner, drawer, or other worker in the pit, to make signals while he, the bottomer, is on duty.

46. He shall not suffer more than four men at a time to ascend the shaft in a single cage, nor more than eight in any double cage; he shall not allow any person to ascend along with a hutch, whether empty or loaded; and he is forbidden to signal the ascent, if more than the appointed number shall go on the cage, or if any worker shall attempt to ascend with a hutch.

47. In the unavoidable temporary absence of the bottomer, the roadman, or some other qualified person, shall make the necessary signals from the pit-bottom, and receive and attend to the signals sent from the surface.

48. The bottomer, or such person acting in his absence, shall make the following signals, being those appointed in this mine for guiding the ascent of the cage:

First—He shall strike or ring the signal bell at the surface *once* for the ascent of the cage, whether loaded with minerals or empty, and shall observe any counter-signal, in case of any reason why the cage should not ascend.

Second—He shall strike or ring the signal bell *thrice*, in rapid succession, when *men* are about to ascend; and after a pause, during which a signal shall be made from the surface that all is ready, he shall make the usual ascent signal of *one* stroke of the bell, whereupon the cage shall be raised.

Third—He shall strike or ring the signal bell *once*, if he observes anything wrong while the cage is in motion; and *twice* when he desires the engine to be

reversed, and the ascending cage returned to the pit-bottom, and to remain there.

49. No deviation from these signals shall be permitted on any account. The ascending signals shall not be made until the cage, with its load, whether of men or materials, are securely placed, and everything be ready for the ascent.

50. The bottomer shall not leave his post at the pit-bottom until the whole workers of his shift shall have first safely ascended the shaft.

51. He shall prevent, or report to the manager or overman, upon any neglect or violation of the General Rules, or Special Rules, coming under his observation; for which purpose copies of the abstract of the act and the Special Rules themselves are furnished to him.

MINERS AND OTHER WORKMEN.

52. Such miners and other workmen are, and shall be, generally subject to the control and orders of the agent, where one has been appointed, and of the manager and overman; but they shall also be subject to any directions which the roadsman, engineman, fireman, or bottomer may give in their respective departments, for the purpose of preventing the workmen from infringing, or of causing them to comply with any of the provisions of the act, or of the General or Special Rules.

53. Such miners or other workmen shall not proceed into traveling roads or working places until it shall have been reported to them by the firemen, or other person appointed for the purpose, that the traveling roads and working places are safe to be entered.

54. Until such report, or intimation of safety, is so made, no such miner or other workman shall pass beyond the station appointed; and, if no other place or station has been appointed they shall always understand that the pit-head is the station at which they are required to wait the necessary examination and report.

55. If, while at work, or at any time, any miner or workman shall discover, or be informed of the existence

of any obstruction in the ventilation, or stagnation, or impurity in the air of the mine, or the existence of any defect in the walls, roofs, or any other parts thereof, he shall be bound to give instant information of the circumstances to the manager, overman, roadsman, or fireman, so that these defects may be remedied, and danger therefrom averted.

56. Miners are expressly forbidden to go into, or improperly near, any place throughout the whole mine, where danger is known or suspected to exist. They are forbidden to continue at any part of a face where a sudden outburst of fire-damp shall happen, or where danger, from any cause whatever, shall apparently threaten, until the same shall have been examined and reported safe, or the impurity or other cause of danger removed.

57. The common but highly dangerous practice among miners of testing the quantity of fire-damp escaping from a blower, by igniting it with their lamps, is peremptorily prohibited.

58. Whether the operations shall be conducted by the long wall or stoop and room system, a sufficient number of suitable props being supplied at their working places, the same shall be set up by the miners in their working places, where the roof and sides require to be secured by them, in terms of General Rule 16. These props and any necessary sprags or gibs shall be set up at such times, in such number, and at such points, within the working limits, as shall, from time to time, be necessary.

59. But, besides being bound to prop and secure according to their own skill and experience, miners are required to place props within their working places in such manner as the fireman, or other person authorized to that effect, shall deem necessary and shall direct, for the safety of the workmen and the mine.

60. When employed to return upon and remove stoops left in any seam, miners shall be bound to prop and secure the roof and strata around each stoop before commencing to cut or remove the same, and such places shall be deemed "working places" under these rules.

61. If, from accident or any other cause, miners are at any time unable to find a sufficient supply of prop-wood at the place appointed, they are expressly forbidden to remain in their working places.

DRAWERS, PUTTERS AND DRIVERS.

62. Drawers, putters and drivers shall not be permitted to approach, or to enter the roads or working places until the miners shall have been allowed to proceed thither to work. They shall carefully convey their loaded hutches to the pit-bottom, or siding, or wheel, as the case may be; and when the hutches are brought to the pit-bottom, they shall not be pushed forward till the bottomer shall have taken charge of them. All drawers, putters and drivers shall be subject to the orders of the roadsmen in carrying out Rule 28 as to the conveyance of timber to working places.

BRUSHERS AND REDDSMEN.

63. Brushers and reddsmen shall, in the formation of roads, remove from the strata as much thereof as shall make them of the height and breadth required for the purposes of the mine, and shall carefully build up the side walls, and properly remove or stow away surplus material. In detaching strata, and in the use of gunpowder for blasting, great caution (and attention to the General Rule No. 8) must be observed, and every fragment of stone shattered or unloosed, shall be taken down. If, in the course of their operations, brushers and reddsmen shall expose a lipe, or joint, in any of the strata, indicating the probability of a fall at that place, or if a blower shall be opened, or an accumulation of gaseous substances be encountered among the metals, or if they shall observe any other cause of danger, they shall report the circumstance instantly to the manager, overman or roadsman, and means shall be taken by the brushers and reddsmen, in the meantime, to secure the lipe; but if the accumulation of impure air shall be so considerable as to render it at all hazardous to continue brushing or building further, until means shall have been taken to overcome and disperse the same, the

brushers and reddsmen shall cease work, and shall be careful not to approach with unprotected lamps the places where danger exists—nor at all, unless accompanied by the fireman or roadsman.

64. In brushing and building drawing roads towards faces, brushers and reddsmen are required to make their brushing and building regular and continuous, keeping pace with the progress of the miners, so that the side buildings may be carried in and the road formed at a convenient distance back, simultaneously with the excavation, of coal or other minerals.

CLERKS AND OTHERS.

65. Every clerk, or other person employed and instructed to keep any register of boys and memorandum of certificates in terms of the statute, shall be bound to make the necessary entries, so far as materials are furnished to him for that purpose, for the use of the owner, agent or manager.

DOOR-KEEPERS.

66. Every person employed in keeping a trap-door, for the production or promotion of ventilation in a mine, shall during his shift, remain continually at the post assigned him, and carefully observe the directions he receives from the manager, overman, roadsman or fireman, as to the opening or shutting of such doors, either on the occasion of other workmen passing through the same or at the beginning or end of the shift.

MISCELLANEOUS REGULATIONS.

67. The manager, fireman or roadsman are authorized to examine safety lamps, in terms of General Rule No. 7, without prejudice to the appointment of any other competent person for that purpose; and in this mine the word "workings," into which safety lamps may not be taken in terms of said General Rules, shall include all parts of the mine (below ground) from the pit-bottom inwards.

68. If, in proceeding to their working places, or in traveling along any formed road, or other part of the works—the maintenance of which, under these regulations, devolves on the owner, agent or manager—miners, drawers, or other workmen, shall meet with or see any fall from the roofs, or shall observe any dangerous place in the roofs, walls or elsewhere in their progress, they shall not pass the same, but shall instantly report the occurrence to the manager or roadsman, or other person known to have the maintenance of such places under his charge; and miners, drawers and other workmen shall not return past the fall or dangerous place until the same shall have been made secure, which it shall be imperative on the manager, overman, or other person having charge, forthwith to do.

69. As a matter of common safety, miners, drawers, and all other workers, who shall observe, or who shall come to the knowledge of any damage to, or deficiency in, any road, roof or air-course, or in any roof, permanent or temporary brattice, or in the shaft, buildings, cube, or other appliance or work, devised for making, maintaining and promoting the effective ventilation of the mine, shall be bound instantly to communicate such damage or deficiency to the manager, overman, roadsman, fireman, or other person in charge, so that the same may be forthwith repaired or rectified.

70. In like manner, every miner, drawer, and other workman, who shall observe or come to know of any defect or flaw in the cage, ropes or chains, or in any part of the engine, machinery and gearing, used in or about the mine, whereby the sufficiency thereof may be impaired, shall be bound forthwith to communicate the same, as above.

71. No miner, or other workman, shall be permitted to introduce into the mine any stranger, or person employed by them, on any pretense, without the consent of the owner, agent or manager.

72. Every miner, or other person, who shall be the immediate employer of any boy or male young person, shall be bound to see that such boy or young person leaves the mine when his period of work has expired.

73. Miners, drawers, and all others who shall have occasion to pass through any trap-door, shall thereupon closely shut the same, and shall on no account leave it open. On discontinuing work at the end of a shift, and especially where no work is to be done in the mine on the following day, care must be taken by every workman closely to shut all trap-doors, and thereby prevent the proper current of air necessary for ventilation from being diverted.

74. All workmen are expressly forbidden to throw into, deposit, or leave coals or other minerals, wood, stones, or rubbish, or materials of any kind, in any course or road, so as to interfere with or hinder the air passing into and through the mine.

75. All workmen are prohibited from entering or remaining in any place throughout the whole mine, where not absolutely required by duty to be at the time.

76. Miners and all others are prohibited from knowingly or wilfully defacing or removing marks which may be made in any part of the workings, for the guidance of the workmen in their operations. All workers are forbidden to displace, injure, or damage in any way, the stoops, props, hutches, rails, or any part of the machinery, gearing and apparatus.

77. Meetings of miners and other workmen, in a body, within the workings, or in any of the roads or air-courses, or at the pit-head, are strictly prohibited.

78. Workmen ascending or descending the shaft shall not be allowed to leave the cage while it is in motion, nor until it shall have rested at the landing place.

79. No workman shall be permited to enter, or to continue in the mine, while in a state of intoxication.

80. Wherever explosive gas is known to exist, and safety lamps are used, no person shall be allowed to smoke tobacco in such part of the mine, or have in his possession any lucifer match or other material intended for lighting tobacco.

81. Wherever safety lamps are required, or directed to be used, no person shall use any open lamp.