dislocated, 2; slight injuries by falls of coal and rock, 47; injured by hoisting cage, 1; burned by steam, 1; burned by explosive gas, 1; burned by powder and otherwise injured from premature blasts, 4; injured by pit cars, 16; injured by railroad car, 1; injured by sledge hammer, 1. Average number of tons mined to each non-fatal accident, 24,496.2. Average number of persons employed to each fatal accident, 240; average number of persons employed to each non-fatal accident, 56.3.

There was 184,919 tons of coke made during the year.

For 1890, the production by eleven months' returns, and estimate made for December, is 3,075,781 tons. There has been shipped to Kansas, Nebraska, Texas, Utah, California and Nevada, 989 801 tons. The average value of the coal on the car at the mines is estimated at $1.87 per ton, making the spot value of the production, for the year, $5,751,710.47. The average number of persons employed at the mines is 6,172. Average thickness of the coal seams worked is 5 feet, 8½ inches; the thickest is 14 feet, the thinnest is 3 feet.

The average price paid to the miners for digging and loading the coal and timbering their working places is 73.4 cents per ton; the highest is $1.12½; the lowest is 50 cents. The average wages paid for labor inside of mines is $2.60 per day, including track-layers, timbermen, mule drivers, machine runners and road cleaners; the highest day wage being $3.50, paid to machine runners; the lowest, $2.00, to road cleaners.

The average cost (estimated) of producing the coal on railroad car at the mines, including royalty, is $1.50 per ton.

There were 14 lives lost during the year—6 by falls of rock, 4 by falls of coal, 1 by being run over by pit cars; 1 by an explosion of gas (CH_4), 1 by falling down a shaft, and 1 by premature blast. By nationality there were 3 English, 8 Italians, 2 Austrians, and 1 French. Average number of tons mined for each life lost is, 219,698.5.

There occurred 75 non-fatal accidents; 17 were caused by falls of coal; by falls of rock, 21; by explosion of gas, 4; kicked by mules, 2; injured by cars, 17; and serious ones, bones broken, 14. Average number of tons mined to each non-fatal accident, 41,010.6; average number of persons employed to each non-fatal accident, 82.3; number of persons employed to each fatal accident, 440.8.

WHITE ASH MINE DISASTER.

This sad disaster is doubtless yet fresh in the minds of many, it being the most fatal accident that marks the category of fatal accidents in this report, in which ten men lost their lives. It occurred in the White Ash mine, at Golden, about four o'clock on the ninth day of September, 1889, shortly after the unfortunate men had descended the shaft to commence work on the afternoon shift. At 9 o'clock P. M., I received a telephone message from Mr. Paul Lanius, manager of the mine, which stated: "Come to Golden at once, on a matter of grave importance."

I arrived at the scene of the accident about 12 o'clock, when I was informed that water from the old Loveland shaft had broken into the workings, and that ten men were entombed. After carefully meditating over the situation, I at once commenced to make preliminary arrangements for the recovery of the bodies. I found that the shaft was full to the mouth with black damp (C. $O.^2$), and by the aid of a hand line, I ascertained that the face of the water was 100 feet above the bottom of the shaft, which to me clearly demonstrated that the men were already dead *beyond question.* I found that the hoisting cage was fast at a point 630 feet from the surface, no doubt being buried up with *débris* washed down from the "gobs" of the upper levels and "stops" by the enormous pressure that such a body of water in rushing down the almost vertical workings. (See

accompanying map.) The ventilating fan was run up to its capacity, and other arrangements made to remove the noxious gases from the shaft, which soon commenced to decrease, and by three o'clock on the morning of the tenth instant, I lowered a light with a hand line to a depth of 530 feet, at which point it was extinguished by the carbonic acid gas.

The line was then lowered further down to measure the height of the water, and was found 140 feet up the shaft. A bottle was attached to the end of the line and filled with water from below, and brought to the surface, when I was astonished to find that the water had a temperature of 115° Fahrenheit.

This startling discovery quickly brought to my mind, in a tangible shape, something I had strongly suspected on my first visit there, in 1883, as well as on later inspections, viz: That extensive "gob fires" existed in parts of the old workings on the upper level of the White Ash mine, which, it is said, had caved in and been abandoned for upwards of ten years. The water in the Loveland shaft, from which a quantity was pumped daily to feed the steam boilers used by the Golden Brick Company, was known to be at a rather low temperature. Thus, the sudden increase in temperature fully explains that the water, after breaking into the White Ash mine, had passed through, and may have swept before it, the heated "gobs" which had been burning there for years, being supplied with air to support combustion through cave holes extending to the surface.

Failing to detach the hoisting cable from the cage, another was furnished by Mr. Lanius, and by eight o'clock Mr. Evan Jones, foreman of the mine, and myself were lowered into the shaft in a sinking bucket. On descending to a depth of 280 feet, we discovered a strong heat coming out of the cross-cut between the vein and the shaft.

On examination, we found that a portion of the old workings in this level were on fire, and judging from the

intense heat and quantity of air circulating (the fire forming the part of a furnace) there, we felt satisfied that the fire itself would soon reach the shaft timbers, and the question of building off and isolating the fire was now an impossibility, as the strata was very broken, and the shaft timbers were already smoking. We descended some 200 feet below this level, where we found the carbonic acid gas so strong that we could not go further. From this point we could hear water running into the shaft from the 520 feet level. It also appeared to us that the stopping in the cross-cut leading to the 440 feet level had been swept out, and that "black damp" was being expelled from it which almost extinguished our lights.

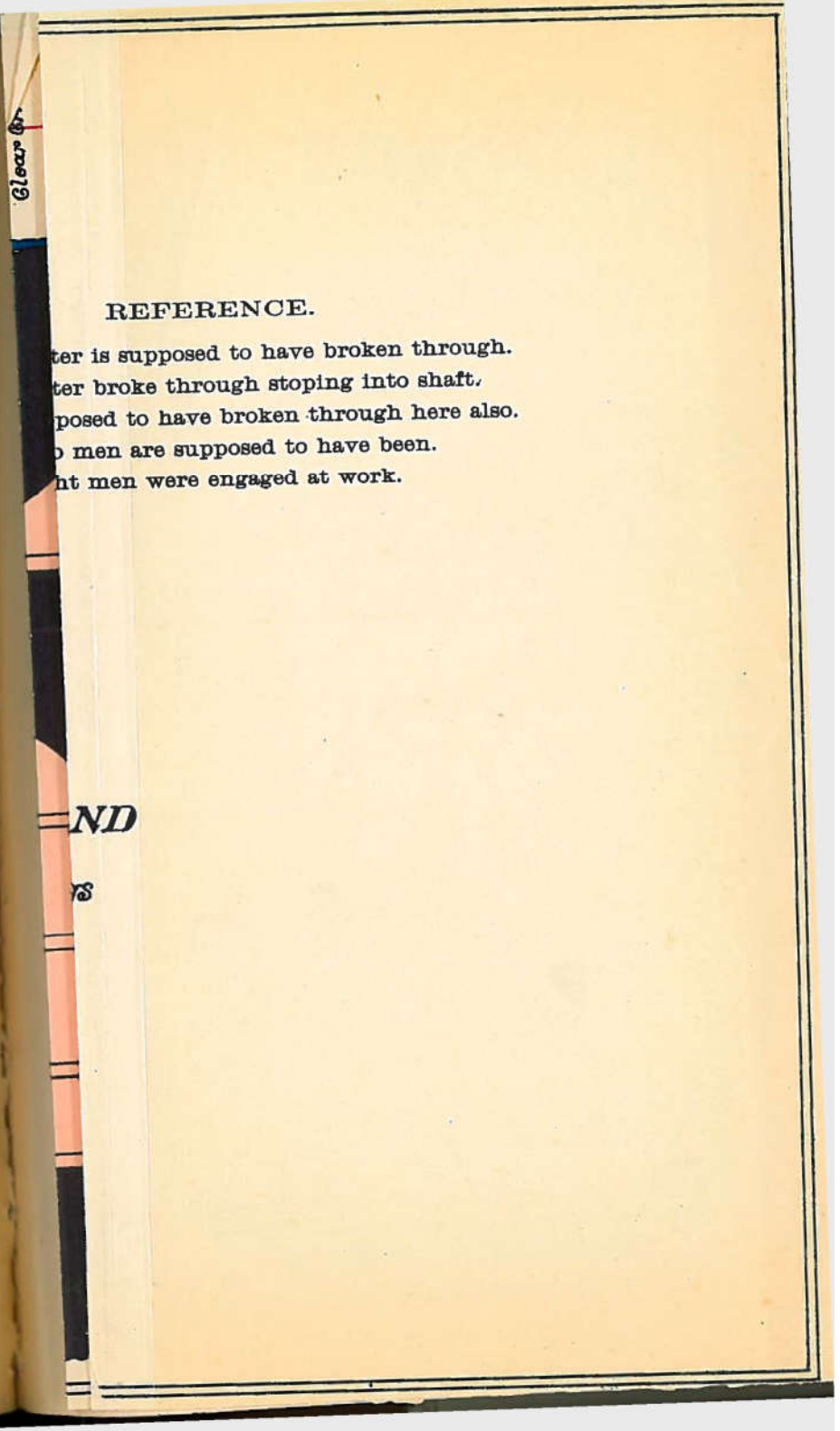
We then gave the signal to ascend, but stopped again at the seat of the fire, which was making rapid progress; the rocks in proximity to the shaft were fairly crackling with the intense heat, and it was with great difficulty we could breathe. We then gave the signal to ascend to the surface which we reached very much to our relief.

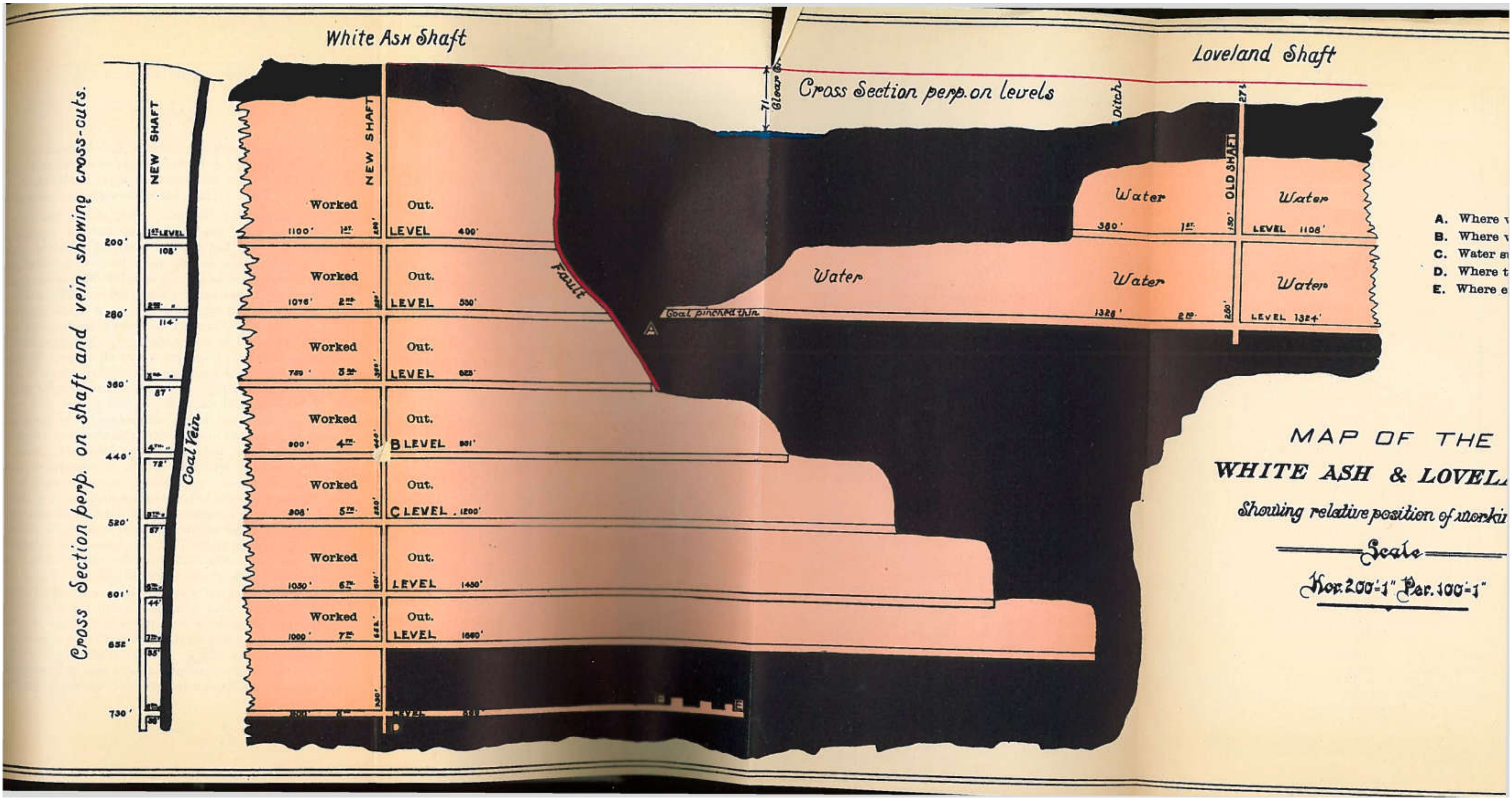
It would have been a foolhardy undertaking to have then attempted or allowed further work, so I gave orders to stop the ventilating fan and seal up both the White Ash and the Loveland mines, to isolate the fire as much as possible, in hopes that the amount of carbonic acid gas generating would in time check the progress of the fire, for until such was done it would have been impossible for any one to enter the mine. I returned to Golden on the 12th instant, and after having a consultation with Mr. Lanius and other mining men, it was agreed that the best course to take was to let the mines remain sealed up for ten days and to isolate the fire from air as thoroughly as possible. The amount of water in the workings with the daily growth of the two mines was figured, and the result showed that with the largest pumps that the shaft would admit it would take about seventy days' actual pumping. Then there would be the time in putting in the pumps, and the frequent changes in lowering them as the water decreased; besides,

I figured that there would be an enormous quantity of *débris* to be removed from the shaft and the level in which the men were entombed. Thus from careful calculation it was estimated that under the most favorable circumstances it would take from five to six months to have reached the bodies, at the extreme end of the lower level. On the 21st of September I went to Golden with a view to offer my assistance in the re-opening of the shaft, when I found that no preparations had been made in the way of procuring pumps and other materials for the work. On calling upon Mr. Lanius, the managing partner of the company, he informed me in behalf of the other members that they would to the extent of the last dollar of their incorporated capital donate to a fund for the recovery of the bodies, but as their incorporated capital was only $5,000 it would be necessary to have a much larger amount to undertake the almost hopeless task. To understand my position in the case, I returned to Denver and consulted the State Attorney General, who informed me that under the present condition of things I had then no further duties to perform in the premises.

I was one of a committee, of which the Hon. John Nichols (then mayor of the town of Golden) was a member, who called upon Governor Job A. Cooper and laid the matter before him, with accompanying diagrams, showing the workings and relative position of the two mines.

The committee desired to learn if the State could do anything to assist in the matter. The Governor, though in great sympathy personally with our desires, could not, under existing laws, do anything with the case in the name of the State. About this time, the impending question of ever being able to recover the bodies before decomposition had reached a state of complete dissolution, became imminent to the most anxious mind. Thus the bodies of the ten men found in the workings of this fateful mine their resting place. The water kept on rising until it reached a point in the shaft eighty feet from the surface, which is on a level with the creek bed.




White Ash Shaft
Loveland Shaft
Cross Section perp. on levels
Cross Section perp. on shaft and vein showing cross-cuts.
NEW SHAFT
Coal Vein
OLD SHAFT
Ditch
Fault
Coal pinched thin
Worked
Out.
LEVEL
Water
A. Where
B. Where
C. Water
D. Where
E. Where
MAP OF THE
WHITE ASH & LOVEL
Showing relative position of worki
Scale
Hor. 200'=1" Per. 100'=1"

REMARKS.

The Loveland shaft, it appears was abandoned ten years ago; also the three upper levels of the White Ash mine wers abandoned about the same time, and *no* work has been done on that portion of the mine since then.

It is my opinion that at point "A" (see map) the strata composing the "foot and hanging walls" had during the above period of time, softened, and had gradually fallen out, relieving the coal, which may have broken off from time to time, until the pillar became so weak that it was unable to withstand the pressure of the water lying almost vertically above it. It is also thought that a "gob fire" may have existed in proximity to point "A," and the same may have assisted in the displacement of the pillar. The pillar left between the two mines would have undoubtedly been of ample thickness to guard against inundation from a body of water in a horizontal or slightly inclined workings. Our mining law prescribes that drill holes shall be kept ahead of the working face at least twelve feet when in proximity to abandoned workings where water is suspected to exist. And while such a precaution may be all that would be necessary to take in level veins, yet such would be of little service in vertical ones. In my opinion it would be a very hard matter to define what thickness of a pillar should be left. From my experience I would not consider a 100 foot pillar an absolute safeguard against inundation in a vertical vein, for I believe it is quite possible, especially where soft material lies between the coal and foot wall, for the coal to break and "run" to a sufficient degree as to cause cracks to reach the top of the pillar, through which a heavy pressure of water would quickly make its way in great volumes; thus, mining in a vertical vein under a body of water cannot be followed with safety, and should be prohibited by law. I trust that our coming Legislature will pass a bill to regulate, in this respect, the working of vertical veins in coal mines, compelling the

owner or agent to drain all upper workings and keep them free from water by pumping or otherwise while working lower levels or approaching abandoned workings. The White Ash mine had but one shaft, and through it was the only means of ingress to or egress from the workings.

I had repeatedly called the attention of those operating the mine to the necessity of having a second opening, and considerable controversy occurred between the manager of the mine and this office relating thereto; and also to the condition of the shaft timbers which I considered unsafe. Frequent inspections of this mine during the year of 1889. Mr. L. S. Jones made an inspection on March 5, and at that time found the shaft in fair condition, but advised careful watch on the timbers, as a "creep" or settling of the strata was perceptible. On May 3, I made an inspection, and found some of the shaft timbers giving away, I notified the company regarding the same and requested that the shaft be retimbered in places and a second opening made. The manager promptly assured me that such instructions would be carried out so far as retimbering the shaft was concerned, but gave no definite answer as to a second opening.

I therefore consulted the State Attorney-General relative to the matter, and on his advice, and in accordance with section two of the mining law, enjoined the company from working more than ten men until a second opening would be made as required by law. This official notice was given to the company on the 21st of June, but in the meantime the manager had been making arrangements to commence work on a new shaft to be sunk on the north side of the creek, in which connection was to be made with the White Ash mine. On the 8th of July I again made an inspection, with a committee of three, and found the work of retimbering the shaft progressing. On the 19th of August I received the following letter from the manager.

JOHN McNEIL,
State Inspector of Coal Mines,
Denver, Colorado:

DEAR SIR:—Referring to the White Ash operation, I beg to state, that the south side of the mine has been entirely abandoned, and all work is now confined to the north side, which in conformation with our coal mining law, section 2, we are extending to connect with a second opening on the north side of Clear Creek, work on which is being performed with due diligence. We are also, in accordance with your instructions, re-timbering the present shaft.

Yours truly,
P. LANIUS, *Manager.*

The men at work in the mine, on learning that I had requested that further operations should cease, and my endeavors to have the same put in safe condition, forwarded to the office the following petition:

GOLDEN, COLORADO,
July 12, 1889.

JOHN McNEIL,
State Inspector of Mines,
Denver, Colorado:

DEAR SIR:—Understanding that your recent inspections of the White Ash coal mine has been unfavorable for its continued operation, we, the undersigned miners employed therein, thankful for your vigilance for our safety, respectfully petition that, if possible, you would allow the operation to continue until the coal opened up by present development is worked out, provided that the owners and lessee place new timbers in certain parts of the shaft, so its safety may be increased for this additional time. To those of us with homes and families here, a shut-down would make a great hardship. And for the good of all, we hope you will be able to devise some means which will allow us to continue at our present work.

Signed,

ROBERT HOLDSWORTH,
JOS. HOTTER,
JOHN WILLIAMS,
JOHN COLLINS,
JOHN MURPHY,
RICHARD ROWE,
JOSEPH ALLEN,
HARRY ALLEN,
EVAN JONES,
P. MASTERSON,
JOSEPH CUFFNER,
GEORGE YORKE.

While all this controversy and precautions were being considered for the safety of those men against imminent danger which existed, and could be seen and was being guarded against, there was death lurking astride the gloom of which no one ever dreamed about, and the fatal pillar, which had withstood the pressure of the water for ten years, gave way.

The men who lost their lives had expressed themselves that their safety was assured since the re-timbering of the shaft and other necessary work was being done.

The lower levels of the mine were flooded, and the shaft filled up some thirty feet in a few minutes after the pillar broke.

LIST OF FATAL ACCIDENTS—1889.

January 2—Frank Forkas, at Rouse mine No. 1, Colorado Fuel Company, Huerfano county, killed by a fall of rock while engaged in undermining the coal. The rock was of a bell shape, having a "slip" all around its edge, and the coal on being mined from under it suddenly relieved the rock, which probably fell without giving any warning. Forkas, it is said, was an experienced miner.

January 11—C. D. Rice, at Cameron mine, Colorado Coal and Iron Company, Huerfano county, killed by a fall of rock. Mr. Rice was an experienced miner, and his working place was found well timbered. The rock which fell was freed from sustaining force by a glassy "slip" which run parallel with the face of the coal, and could not be readily noticed; its weight caused it to break away from the line of the nearest props and caught the man under it.

January 21—Alfred Calonne, at Marshall mine No. 3, Marshall Consolidated Coal Company, Boulder county, killed by a fall of coal while engaged undermining in a

"pillar" that was somewhat broken by a shot that had been previously fired. On mining to the powder cracks the coal suddenly fell over, striking Calonne with great force.

January 30—John Stuebel, at Cannon mine, Cannon Coal Company, Boulder county, killed by a fall of coal. Stuebel was at work in an entry where a shot had been fired on the previous shift to the accident, which had only removed a portion of the undermined coal, and had made a powder crack ten inches over on the solid which run parallel with the face of the entry. Stuebel on undermining into the crack removed all sustaining force from that portion of the coal, which suddenly fell on him.

June 8—John Smyth, at New Castle mine, Grand River Coal & Coke Company, Garfield county, killed by falling down a "chute." Upon an investigation of this accident it was found that Smyth had returned to the mine at 7:30 o'clock p. m. for the purpose of firing two shots, which required a little work. It appears that he had climbed up the chute (the face of which was but thirteen feet above the main level), and had in some way lost his balance and fell to the bottom on his head, breaking his neck. I am of the opinion that the man was overcome by noxious gas at the face of the chute—probably free nitrogen—and had lost consciousness before falling. I have felt the effects of the above gas to a degree in this mine, and have noticed it in high places so strong as to extinguish a light. The mine at this time was poorly ventilated, and notice had been given the company to erect a ventilating fan, which was soon afterwards put in operation.

July 2—Dominick Angelico, at Coal Creek mine No. 2, Colorado Coal and Iron Company, Fremont county, seriously injured by a fall of coal, from which he died on the 4th inst. On an investigation it was found that Angelico had been engaged undermining a portion of coal which had been previously loosened by a shot, and on mining into the powder crack the coal suddenly fell over on him.