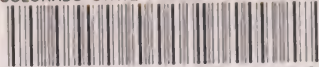


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REPORT OF THE STATE BUREAU OF MINES

DENVER, U. S. A.

E. L. WHITE, COMMISSIONER

COLORADO

FOR THE YEARS 1903-4



REPORT OF THE STATE BUREAU OF MINES
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FOR THE YEARS 1903-4

LETTER OF TRANSMITTAL

Office of the Bureau of Mines,
Denver, Colorado.

To his Excellency,

JAS. H. PEABODY,

Governor of Colorado.

Sir—I have the honor to transmit herewith biennial report of the operation of the Bureau of Mines for the years 1903 and 1904, together with the compilation of the mineral production for the year, to December 31, 1904, with tables of previous years for comparison therewith.

Respectfully submitted,

E. L. WHITE,
Commissioner of Mines.

January 1, 1905.

Report
of the
State Bureau of Mines
For the Years 1903-4

During the past two years, the mining industry throughout the State of Colorado has been operated under many difficulties, but the output of the State has been maintained at about the normal amount, compared with the immediate past. The new development in Teller county has been very notable, both in regard to old properties, in which important discoveries have been made, and in regard to new property within the developed area on which work was temporarily suspended, and which was renewed in various ways. The leasing plan of operation has produced a very decided and important influence on the whole district.

In Lake county very important development has obtained at a greater depth than has heretofore been operated, which means great promise for the future.

The development of tungsten in Boulder county is rapidly becoming an important factor in Colorado's mineral production.

The mining industry throughout the State is in a very healthy and promising condition.

There were two notable occurrences under the head of accidents reported to, and examined by the department, that were especially notable either from their appalling fatality, or from the motive apparent.

The first of these occurred at the No. 1 shaft of the Vindicator Consolidated G. M. Co., at Independence, Colorado, in which Chas. T. McCormack and Melvin Beck were killed. After careful examination of the circumstances surrounding the occurrence, it was determined that the same was caused by pre-meditated plan executed by someone unknown.

The second of these was the deplorable accident at Stratton's Independence Ltd., at Victor, Colorado, January 27, 1904, in which fifteen men were killed, and one was seriously injured. This was a most serious and appalling occurrence over which the feelings of the community were deeply wrought up.

In connection, and as a result of the above accident a Board of Inquiry was convened, who aided the department in careful investigation of the same, with a view of suggesting specific legislation that would tend to prevent the recurrence of similar accidents. The Board of Inquiry made the following report:

Victor, Colo., Jan. 31st, 1904.

Mr. E. L. White, Commissioner of Mines.

Dear Sir—In compliance with your summons, we the undersigned met as a Board of Inquiry to investigate the conditions surrounding the accident at the Independence Mine, Teller County, with a view to determining what can be suggested, to prevent such accidents in the future, on the following points:

(1) To restrict use of cages in counterbalance when hoisting men out of shaft, or lowering men into shaft.

(2) To enforce the use of some suitable overwinding device.

(3) To enforce the use of a set of chairs, placed in the gallows frame at a point that will insure the catching of the cage in its descent, if cable is released from cage.

(4) To enforce the testing by some competent person, of the safety clutches used on cages, at regular intervals.

In our investigation, regularly conducted, we found a divided sentiment in reference to recommendation number one, and we do not feel justified in recommending its enforcement.

In reference to recommendation number two, three and four, we recommend their enforcement unqualifiedly.

(Signed) J. B. CUNNINGHAM, Chairman.
E. H. NEWLAND, Secretary.
MARK D. GREVE,
J. E. DEVY,
E. E. GOULD,
J. A. BECKMAN.

And the same was submitted to the Attorney General, who wrote the following opinion:

Denver, Colo., Feb. 8, 1904.

Hon James H. Peabody,
Governor of Colorado,
State Capitol.

Dear Sir—In reply to your inquiry as to whether the following improvements can be required and the changes enforced in the construction, equipment and operation of metalliferous mines in this State, to wit:

1. The use of some suitable overwinding device.
2. The use of a set of chairs, placed in the gallows frame at a point that will insure the catching of the cage, if the cable is parted from the cage.
3. The testing of the safety clutches used on cages by some competent person at regular intervals; as recommended by the committee appointed by the Commissioner of Mines to investigate the recent Independence Mine disaster in Teller County, I desire to say that, in my opinion, these are all reasonable demands, and can be fully enforced under our present law.

A portion of the present law was passed by the Tenth General Assembly, Session Laws 1895, page 206, and entitled "An act to create a Bureau of Mines, to define the duties of the Commissioner of Mines and provide for the government thereof, and making an appropriation therefor; and to repeal an act entitled "An act dividing the State of Colorado into metalliferous mining districts; and appointing an inspector of metalliferous mines, approved April 1st, 1889, and portions of other acts in conflict herewith."

This law was amended by the Twelfth General Assembly, Session Laws, 1899, page 277, but few important changes were made, excepting the insertion of a new section, numbered 20.

The body of the act, as amended, after making provision for the location of the principal office, the appointment of a commissioner and two inspectors, further provides as follows:

"Sec. 4. It shall be the duty of the inspectors to examine and report to the Commissioner the condition of the hoisting machinery, engines, boilers, whims, cages, cars, buckets ropes and cables in use in all the metalliferous mines in operation in the State, the appliances used for the extinguishment of fires, the manner and methods of working and timbering the shafts, drifts, inclines, stopes, winzes, tunnels and upraises through which persons pass while engaged in their daily labors, all exits from the mine, and how the mine is ventilated, together with the sanitary condition of the same; and, also, how and where all explosives and inflammable oils and supplies are stored, also the system of signals used in the mine. He shall not give notice to any owner, agent, manager or lessee of the time when such inspection shall be made."

"Sec. 5. The Commissioner of Mines may, as appropriations may be made therefor, from time to time, appoint deputy inspectors in the various mining camps or districts to investigate or report on accidents, or appoint such other competent assistants as he may deem necessary and proper for the carrying out of the object of this act; * * *."

"Sec. 8. * * * The Commissioner shall, on receipt, of reliable information relating to the health and safety of the working men employed in any metalliferous mine, mill or reduc-

tion plant in the State, or whenever he deems such inspection necessary, examine or instruct one of the inspectors to examine and report to him the condition of the same. The owner, agent, manager or lessee shall have the right to appeal to the Commissioner on any difference that may arise between such parties and the inspector. On receipt of notice of any accident in a mine, mill or reduction plant, whether fatal or not, the Commissioner shall inquire into the cause of such accident."

"Sec. 10. Every owner, agent, manager or lessee of any metalliferous mine or metallurgical plant in this State shall admit the Commissioner or Inspector on the exhibition of his certificate of appointment, for the purpose of making examination and inspection provided for in this act, whenever the mine is in active operation and render any necessary assistance for such inspection. But said Commissioner or Inspector shall not unnecessarily obstruct the working of said mine or plant. The refusal of the owner, agent, manager or lessee to admit the Commissioner or inspector to such mine or plant to lawfully inspect the same shall, upon conviction, be deemed a misdemeanor, and shall be subject to a fine of not less than fifty dollars (\$50.00), nor more than three hundred dollars (\$300.00), or to be imprisoned not less than one (1), or more than three (3) months, or both such fine and imprisonment."

"Sec. 11. The Commissioner and the inspectors shall exercise a sound discretion in the enforcement of this act, and if they shall find any matter, thing, or practice, in or connected with any metalliferous mine or metallurgical plant to be dangerous or defective, so as to, in their opinion, threaten or tend to the bodily injury of any person, the commissioner or inspector shall give notice in writing thereof to the owner, agent, manager or lessees, of such mine or plant, stating in such notice the particulars in which he considers such mine or plant, part thereof or practice to be dangerous or defective; and he shall order the same to be remedied; a copy of said order shall be filed and become a part of the records of the Bureau of Mines, and said owner, agent, manager or lessee shall, upon compliance of said order immediately notify the Commissioner of Mines in writing. Upon the refusal or failure of said owner, manager, agent or lessee to report within a reasonable length of time, said owner, agent, manager or lessee shall be subject to a fine of not less than fifty dollars (\$50.00) nor more than three hundred dollars (\$300.00) for each and every such refusal or failure."

"Sec. 13. In case the owner, agent, manager or lessee, after written notice being duly given, does not conform to the provisions of this act, or disregards the requirements of this act, or any of its provisions, or lawful order of the commissioner or inspector made hereunder, any court of competent jurisdiction may, on application or information of the Commissioner of Mines, by civil action in the name of the People of the State of Colorado,

enjoin or restrain the owner, agent, manager or lessee from working the same until it is made to conform to the provisions of this act; and the costs of action paid by defendant, and such remedy shall be cumulative, and shall not effect (affect) any other proceedings against such owner, agent, manager or lessee, authorized by law for the matters complained of in such action."

"Sec. 22. All justices of the peace and county courts in their respective counties shall have original jurisdiction in prosecution for the violation of sections nine (9), ten (10), thirteen (13), nineteen (19), and twenty (20) of this act, with the right to appeal from judgement of justices of the peace to County Courts in their respective counties, under the same conditions as in civil cases; and in all trials before justices of the peace and in County Courts the defendant shall be entitled to a trial by jury as in other misdemeanor cases. District Courts in their respective districts shall have original jurisdiction upon information or indictment in all prosecutions for violations of this act."

As all the above provisions are germane to the subject matter as expressed in the title, and as the title contains but one general subject, to wit, the creation of a Bureau of Mines, no question as to the constitutionality of the act in this respect appears at this point.

However, the latter paragraph of section 19, reads:

"For the purpose of providing the necessary rules and regulations for the government of metalliferous mining in this State, the following section, to be known as section 20, is hereby enacted and made a part of this act;" and then follows section 20, attempting to regulate the construction, equipment and operation of metalliferous mines by the managements thereof, which apparently is in violation of article V, section 21 of our State Constitution, which provides that "no bill except general appropriation bills shall be passed containing more than one subject, which shall be clearly expressed in the title," and for this reason, this portion of the act, doubtless, is unconstitutional; but in accordance with the further provision of article V, section 21, "if any subject shall be embodied in any act which shall not be expressed in the title, such act shall be void only as to so much thereof as shall not be so expressed," the balance of the act is not affected thereby, and is in force and effect at this time.

The Fourteenth General Assembly, Session Laws, 1903, page 360, passed an act entitled: "An act to regulate the construction, equipment and operation of metalliferous mines, mills and metallurgical plants, providing penalties for violations thereof, and repealing all acts or parts of acts in conflict herewith," which embodies practically all the provisions of section 20 sought to be incorporated into the law of 1899, *supra*.

The act of 1903 regulates, with regard to safety, the manner of constructing tunnels, shafts and inclines; the storage of explosives, and the manner of charging holes therewith; the number of men riding, at one time, upon any cage, skip or bucket;

and prohibits the employment of any person under 18 years of age or addicted to the use of intoxicating liquor as hoisting engineer; and provides that all hoisting machinery shall be equipped with an indicator placed in plain view of the engineer; that a uniform system of code signals shall be used; that all mines having but one exit and that enclosed by the mechanical plant, shall have ample fire protection, and in addition shall have a separate emergency exit, located at a safe distance from the main entrance, equipped with ladders, where necessary, always to be kept in good repair; that in all shafts having cages, safety clutches shall be used; and that whenever loss of life or other serious accidents occur, the Commissioner shall immediately investigate the same, and make a report thereof, to be filed in his office for future reference.

Sections 25, 26 and 27 further provide:

"Section 25. The Commissioner of Mines of the State of Colorado, inspectors, or either thereof, shall have power to make such examination or inquiry as is deemed necessary to ascertain whether the provisions of this act are complied with; to examine into and make inquiry respecting the condition of any mine, mill or metallurgical plant, or part thereof, and all matters or things connected with or relating to the safety of the persons employed in or about the same; to examine into and make inquiry respecting the condition of the machinery or mechanical device, and, if deemed necessary, have same tested; to appear at all coroners' inquests held respecting accidents, and if deemed necessary, call, examine, and cross-examine witnesses, to exercise such other powers as are necessary for carrying this act into effect."

"Sec. 26. Any owner, agent, manager or lessee, whether individual, partnership or corporation, operating a metalliferous mine, mill or metallurgical plant in this State, who fails to comply with the provisions herein set forth, or either or any thereof, shall be deemed guilty of a misdemeanor, and when not otherwise provided, shall be liable to a fine of not less than twenty-five dollars, (\$25.00) nor more than three hundred dollars, (\$300.00) for each provision not complied with, and each day after conviction of failure to comply with any provision hereof, shall be deemed a separate offense and punished accordingly.

"The district attorney for the district in which such mine, mill or metallurgical plant is situated, is hereby empowered and directed to bring an action in the name of the People of the State of Colorado against such owner, agent, manager or lessee, whether individual, partnership or corporation, operating such metalliferous mine, mill or metallurgical plant when he is not complying with the provisions of this act, or any part thereof, or for the violation of any rule made in conformity with this act by the Commissioner of Mines of the State of Colorado. Such penalty when recovered shall be turned over by such district attorney to the Treasurer of the State of Colorado for the benefit of the general school fund of the State of Colorado."

"Sec. 27. Justices of the peace in their respective counties, shall have jurisdiction in prosecutions for the violation of this act, subject to the right of appeal as now provided for in cases of assault and battery."

While the act of 1903 specifically enumerates certain things that shall be done, and certain things that shall not be done in the construction, equipment and operation of metalliferous mines and mills, looking to the safety of employes, it does not prohibit the Commissioner or Inspector, either in accordance with its provisions or the provisions of the act of 1899, from recommending, and after proper notice, from enforcing such reasonable changes as are necessary for the further protection of human life.

It would be as absurd to say that because the act of 1903 does not specify the strength of the cable or the size of the timbers to be used in a mine, that a cord could be used for the former and a quarter-inch siding for the latter, as it would be to affirm that so long as a cage is equipped with safety clutches, it is immaterial whether or not the clutches work, so long as the letter of the law is complied with. And more absurd would it be at this time—after it has been demonstrated by the loss of fifteen human lives, that safety clutches, in the best of condition, do not always work—to say that the owners and operators of mines in this State can not be compelled to place chairs in the gallows frames at some suitable point to insure the catching of a descending cage, or at least to adopt other appliances equally effective.

The act of 1899, excepting section 20, and the act of 1903, supra, constitute our present law upon this subject. The power of the Legislature to pass each is beyond legitimate controversy, and each, with the exception of section 20, appears to have been passed in accordance with all constitutional requirements.

I believe the law to be amply sufficient to enforce, not only the requirements recommended by this committee, but all other reasonable requests that may be necessary for the further preservation of human life, and that the Commission of Mines and the Inspectors are given ample power through the courts, to enforce both the letter and the spirit of the law.

Respectfully submitted,

N. C. MILLER,

Attorney General.

By I. B. MELVILLE,

Assistant Attorney General.

SAFETY DEVICES.

As a result, and suggested by the various accidents that have come to the notice of the department during the biennial

period last past, the department would make the following recommendations required in all hoisting plants:

An auxiliary throttle valve.

With all shafts equipped with cages, a set of automatic chairs placed in the head frame a few inches more than the length of the cage below the sheave wheel.

With all shafts, a detaching device to prevent overwinding.

In connection with the last two recommendations, it will be necessary to provide some means of preventing the fall of men from either the cage or a bucket from the point in the gallows frame at which the cage or bucket would be stopped, either to the floor of the shafthouse or into the shaft. This can be done in various ways with cage equipment, but can only be done with the bucket equipment by the provision of doors that would close the shaft at the proper point to prevent the possibility above stated.

It will be necessary that the mine managements of all mines equipped with cages, with safety clutches, as per the requirements of the law, make careful test of these safety clutches at intervals of not more than one week apart. Much criticism of the present style of clutch for our cages is made, and many devices modifying the safety clutch for cages, have come to our attention, but we are not yet prepared to recommend as thoroughly practical, any of these, but we think that a clutch that is absolutely positive in its action can, and will be devised, and when such result obtains, believe that it will be the duty of all mining enterprises, to substitute the present style of clutch for the absolutely positive clutch.

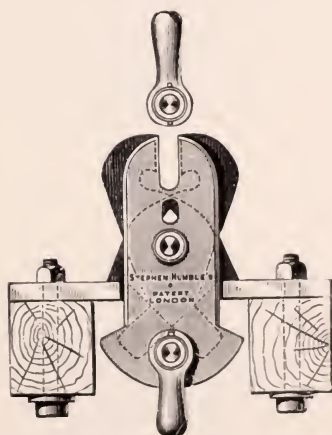
In all tunnels, the head house of the same should be constructed at a point away from the mouth of the tunnel. The only exceptions to this method of construction that will be permitted will be specific instances throughout our south country, in which the prevalence of snowslides and the natural topography of the country will prevent this arrangement.

Shaft houses should not be constructed over the collars of the shafts. A double exit must be provided in the case of both shafts and tunnels, and the only exception to this arrangement will be in the event of ample connection being made with other means of exit.

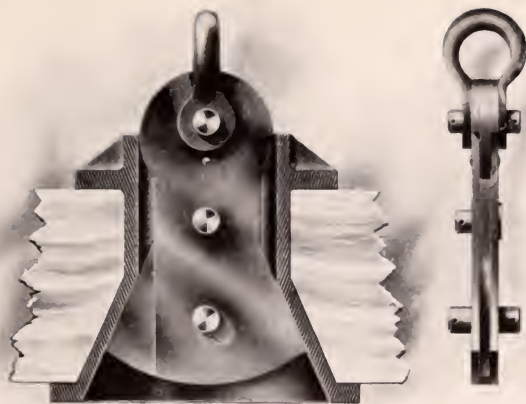
In making these requirements the apparent need of extra effort is carefully considered in the light of our record of fatal accidents, compared with other countries who keep a similar record, our percentage of fatal accidents in the metalliferous mines of Colorado is more than double that of the same record in the United Kingdom, and the requirements above noted are carefully considered to provide practical safeguard for as many as possible.



STEPHEN HUMBLE'S DETACHING HOOK WITH COPPER RIVET HOLD-
ING SAME IN POSITION FOR HOISTING.



STEPHEN HUMBLE'S DETACHING HOOK WITH COPPER RIVET.
SHEARED, AND LUGS RESTING ON CATCHPLATE.



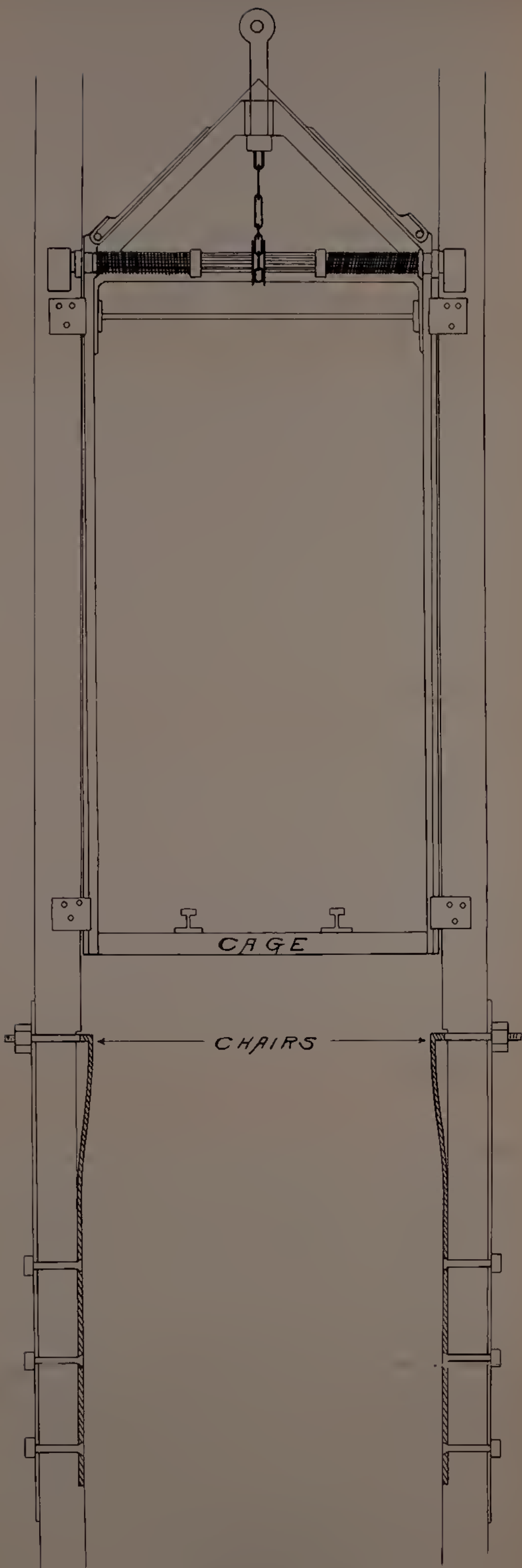
AKRON DETACHING HOOK IN POSITION FOR HOISTING.



AKRON HOOK WITH CLEVIS RELEASED.



AKRON HOOK SHOWN WITH LUGS RESTING ON TOP OF BELL.



PLAT SHOWING MANNER OF CONSTRUCTION OF COWIE AUTOMATIC CHAIR

Many safety devices have been brought to the attention of the department, and we have selected as the most necessary and practical of the number, the following, which we describe and illustrate for the general benefit of the mining industry:

A simple arrangement of spring and plates set into the guides, as illustrated in the following cut, can be made by any blacksmith at a minimum expense. The same has been in use for a long time, and is familiar to experienced miners.

The Humble safety hook, and the Akron safety hook, herewith illustrated, are devices to which we have given unqualified recommendation, for their utility has been amply proven, both in operation with, and without the automatic chair. Cuts of these devices are herewith shown in position, hoisting and resting on the plate or case with the load suspended therefrom. The scissors plates are held in place by a copper rivet while hoisting. When the safety hook, which is placed just above the cage skip or bucket, is raised high enough to pass through the hole in the catch plate, or case, the scissors blades are spread by contact with catch plate or case, the copper rivet is severed and the clevis released from the hook, passes over the sheave with the rope, while the load hangs on the catch plate or case.

CODE OF SIGNALS.

The code of signals adopted in accordance with the statute is as follows:

- 1 Bell—Hoist.
- 1 Bell—Stop (if in motion).
- 2 Bells—Lower.
- 3 Bells—Men on, run slow.
- 7 Bells—Accident, hoist or lower, by verbal orders only.
- 3-2-1 Bells—Ready to shoot.

Engineer shall, after signal 3-2-1, raise bucket or cage two feet, and lower again and remain at his post until final signal is given and command executed.

STATION SIGNALS.

- 1-1 Bells—First level.
- 1-2 Bells—Second level.
- 1-3 Bells—Third level.
- 1-4 Bells—Fourth level.
- 1-5 Bells—Fifth level.
- 2-1 Bells—Sixth level.
- 2-2 Bells—Seventh level.
- 2-3 Bells—Eighth level.
- 2-4 Bells—Ninth level.
- 2-5 Bells—Tenth level.
- 4-1 Bells—Eleventh level.

- 4-2 Bells—Twelfth level.
- 4-3 Bells—Thirteenth level.
- 4-4 Bells—Fourteenth level.
- 4-5 Bells—Fifteenth level.
- 5-1 Bells—Sixteenth level.
- 5-2 Bells—Seventeenth level.
- 5-3 Bells—Eighteenth level.
- 5-4 Bells—Nineteenth level.
- 5-5 Bells—Twentieth level.

RULES GOVERNING SIGNALS.

1. In giving ordinary signals, make strokes on bell at regular intervals. In signal similar, "Ready to shoot" (3-2-1), each bar (-) should take the same time as each stroke of the bell.

2. When men are to be hoisted, or lowered, give the signal for "Men on, run slow" (3 bells). Men must then get on cage or bucket, then give the signal to hoist or lower (1 or 2 bells).

3. After signal, "Ready to shoot" (3-2-1 bells), engineer must give signal that he is ready to hoist by raising and lowering bucket or cage two feet. Miners must then give signal, "Men on" (3 bells), then spit the fuse, get on bucket or cage and give signal to hoist.

4. All timbers, tools, etc., longer than depth of bucket, or placed within a cage, must be securely lashed before being hoisted or lowered.

5. Signal (3) bells means "Men on," and nothing in conflict therewith will be allowed. Signals to meet local demands, and not in conflict with the above, may be added by local operators, but the same must be posted in clear and legible form, in connection with the above code.

Numerous minor fatal accidents have occurred as a result of single exits to a shaft or tunnel. These have been due to arrangement of tunnel house constructed over the mouth of tunnel or of shaft house constructed over the collar of shaft.

In many parts of the State it is impossible to construct head house of a tunnel in any other position, due to prevalence of snow slides, that entail an additional risk and danger.

NEW LEGISLATION.

The Fourteenth General Assembly of the Legislature passed the following laws having a bearing on the operation of this department and its co-operation with the mines and mills of the State:

House Bill 386.

An act to regulate the construction, equipment and operation of metalliferous mines, mills and metallurgical plants, pro-

viding penalties for violations thereof, and repealing all acts or parts of acts in conflict herewith.

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

Section 1. That explosives must be stored in a magazine provided for that purpose alone; said magazine to be placed far enough from the working shaft, tunnel or incline to insure the same remaining intact in the event the entire stock of explosives in said magazine be exploded; that all explosives in excess of the amount required for a shift's work must be kept in said magazine; that no powder or other explosive be stored in underground workings where men are employed; that each mine shall provide and employ a suitable device for thawing or warming powder and keep the same in condition for use; that oils or other combustible substances shall not be kept or stored in the same magazine with explosives.

Sec. 2. That the Commissioner of Mines of the State of Colorado shall have authority to regulate and limit the amount of nitro powder stored or kept in general supply stores in mining camps or mining towns where there is no municipal law governing the storage of same.

Sec. 3. That no person shall, whether working for himself or in the employ of any person, company or corporation, while loading or charging a hole with nitro glycerine powder or other explosives, use or employ any steel or iron tamping bar; nor shall any mine manager, superintendent, foreman or shift boss, or other person having the management or direction of mine labor, allow or permit the use of such steel, iron or other metal tamping bar by employes under his management or direction.

Sec. 4. That all old timber removed shall, as soon as practicable, be taken from the mine and shall not be piled up and permitted to decay under ground.

Sec. 5. That no person addicted to the use of intoxicating liquors or under eighteen years of age shall be employed as hoisting engineer.

Sec. 6. That all hoisting machinery, using steam, electricity, air or hydraulic motive power, for the purpose of hoisting from or lowering into metalliferous mines employes and material, shall be equipped with an indicator, said indicator to be so placed near to and in clear view or hearing of the engineer.

Sec. 7. That there shall be established by the Commissioner of Mines of the State of Colorado a uniform code of signals, embracing that most generally in use in metalliferous mines, which shall be adopted in all mines using hoisting machinery.

The code of signals shall be securely posted, in clear and legible form, in the engine room, at the collar of the shaft and at each level or station. In all shafts equipped with cages,

such shafts and cages shall be fully equipped with a system of electric signals from cage and stations to engineer wherever possible.

Sec. 8. That all mines having but one exit, and the same covered with a building containing the mechanical plant, furnace room and blacksmith shop, shall have fire protection, water, if possible, and in mines where water is not available, chemical fire extinguishers or hand grenades shall be kept in convenient places for immediate use.

Sec. 9. That all persons shall be prohibited from riding upon any cage, skip or bucket loaded with tools, timber, powder or other material, except for the purpose of assisting in passing same through shaft or incline, and then only upon special signal.

Sec. 10. All person giving, or causing to be given, false signals, or riding upon any cage, skip or bucket upon signals that designate to the engineer that no employes are aboard, shall be deemed guilty of a misdemeanor.

Sec. 11. That all shafts more than two hundred (200) feet in depth, equipped with hoisting machinery, shall be divided into at least two (2) compartments, and one compartment to be partitioned off and set aside for a ladderway. The ladder shall be made sufficiently strong for the purpose demanded, and in vertical shafts, landings shall be constructed not more than twenty (20) feet apart, said landings to be closely covered, except an opening large enough to permit the passage of a man; said ladders shall be inclined at the most convenient angle which the space allows, and shall be firmly fastened and kept in good repair. In all incline shafts the landings shall be put in as above described, but a straight ladder on the incline of the shaft. Ladders in upraises and winzes shall be likewise provided and kept in repair, but where winzes connecting levels are used, only for ventilation and exit, only one such winze on each level need be equipped.

Sec. 12. That hereafter shafts equipped with buildings and machinery, with only the working shaft for exit, shall be divided into at least two (2) compartments, one of which shall be tightly partitioned off and used for a ladderway as hereinbefore provided for; said ladderway shall be securely bulkheaded at a point at least twenty-five feet below the collar of the shaft, and below this bulkhead a drift shall be run to the surface, if location of shaft is upon a side-hill; if location of shaft is upon a level, the drift shall be run to a safe distance without the walls of the building and from there upraised to the surface. Said ladderway and landings shall be kept at all times in good repair and afford easy mode of escape in event of fire.

Sec. 13. That hereafter all tunnels or adit levels at a safe distance from the mouth of same shall connect with the surface

and be provided with safe and suitable ladders, and thus afford a means of exit in case of fire destroying the buildings over the mouth of tunnel or adit level.

Sec. 14. That employes engaged in sinking the shaft or incline shall at all times be provided with chain or other kind of ladder so arranged as to insure safe means of exit.

Sec. 15. That in all shafts hereafter constructed collars of same shall be protected in such manner that persons or foreign objects can not fall into shaft. In all shafts equipped with cages safety clutches shall be used. In shafts equipped with buckets shaft doors must be constructed which will prevent any material falling into shaft from dumping.

Sec. 16. That all stations or levels shall, when practicable, have a passageway around the working shaft, so that crossing over the working compartment can be avoided. At all shaft stations a guard rail or rails shall be provided and kept in place across the shaft, in front of the level, so arranged that it will prevent persons from walking, falling or pushing a truck, car or other conveyance into the shaft. All winzes and mill holes extending from one level to another shall be covered or surrounded with guard rails, to prevent persons from stepping or falling into the same.

Sec. 17. That when any shaft is sunk on a vein, ore shoot or body, a pillar of ground shall be left standing on each side of the shaft of sufficient dimensions to protect and secure the same, and in no case shall stoping be permitted up to or within such close proximity to the shaft as to render the same insecure, until such time as the mine is to be abandoned and said pillar withdrawn.

Sec. 18. That all abandoned mine shafts, pits or other excavations endangering the life of man or beast shall be securely covered or fenced.

Sec. 19. That any person or persons removing or destroying any covering or fencing placed around or over any shaft, pit or other excavation, as hereinbefore provided, shall be deemed guilty of a misdemeanor and, upon conviction thereof in any court of competent jurisdiction, shall be fined in the sum of not less than fifty dollars (\$50) nor more than three hundred dollars (\$300), or imprisonment in the county jail for six months, or by both fine and imprisonment.

Sec. 20. That any owner, person or persons operating any metalliferous mine, mill or metallurgical plant and employing two or more men shall report to the Bureau of Mines and state when work is commenced and when stopped, and mines working continuously shall report on or before November 1 of each year, together with the names of the owners and managers or lessee in charge of said work, together with the postoffice address; the name of the claim or claims to be operated; the

name of the county and mining district, together with the number of men employed, directly or indirectly, the same being classified into miners, trammers, timbermen, ore sorters, millmen, teamsters, etc. The necessary blanks to carry out the provisions of this section shall be furnished upon application by the Commissioner of Mines.

Sec. 21. That any owner, lessee, manager, superintendent or foreman in charge of any metalliferous mine, mill or metallurgical plant who shall wilfully misrepresent or withhold facts or information from any inspector or other officer of the Bureau of Mines regarding the mine, such as length of time timbers have been in place, or making any misrepresentations tending to show safety when the reverse is true, shall be deemed guilty of misdemeanor, and, upon conviction thereof in any court of competent jurisdiction, shall be fined in any sum not less than one hundred dollars, nor more than three hundred dollars.

Sec. 22. That strangers or visitors shall not be allowed underground in any mine, unless accompanied by the owner, official or employe deputized to accompany them.

Sec. 23. Notice of the maximum number of men permitted to ride upon or in the cage, skip or bucket, at one time, shall be posted at the collar of the shaft and each level. All men or employes riding upon or in an overloaded cage, skip or bucket as provided in notice so posted, shall be guilty of a misdemeanor, and, upon conviction in a competent court, shall be fined not less than five dollars nor more than fifty dollars for each and every offense.

Sec. 24. Any owner, agent, manager or lessee, whether individual, partnership or corporation, having charge or operating any metalliferous mine, mill or metallurgical plant, whenever loss of life or accident serious enough in character to cause the injured party to stop work for two consecutive days and connected with the workings of such metalliferous mine, mill or metallurgical plant, shall occur, shall give notice immediately and report all the facts thereof to the Commissioner of Mines. The refusal or failure of said owner, agent, manager or lessee to so report within a reasonable length of time shall be deemed a misdemeanor, and shall, upon conviction, be subject to a fine of not less than fifty dollars (\$50) nor more than three hundred dollars (\$300), or be imprisoned not less than one nor more than three months, or by both such fine and imprisonment. The Commissioner of Mines, upon receipt of notice of accident, shall investigate the causes and make or cause to be made a report, which report shall be filed in his office for future reference.

Sec. 25. The Commissioner of Mines of the State of Colorado, inspectors, or either thereof, shall have power to make such examination or inquiry as is deemed necessary to ascertain whether the provisions of this act are complied with; to examine into and make inquiry respecting the conditions of any

mine, mill or metallurgical plant, or part thereof, and all matters or things connected with or relating to the safety of persons employed in or about the same; to examine into and make inquiry respecting the condition of the machinery or mechanical device, and, if deemed necessary, have same tested; to appear at all coroners' inquests held respecting accidents, if deemed necessary, call, examine and cross-examine witnesses; to exercise such other powers as are necessary for carrying this act into effect.

Sec. 26. Any owner, agent, manager or lessee, whether individual, partnership or corporation, operating a metalliferous mine, mill or metallurgical plant in this State, who fails to comply with the provisions herein set forth, or either or any thereof, shall be deemed guilty of a misdemeanor, and when not otherwise provided shall be liable to a fine of not less than twenty-five dollars (§25) nor more than three hundred dollars (§300) for each provision not complied with, and each day after conviction of failure to comply with any provision hereof shall be deemed a separate offense and punished accordingly.

The district attorney of the district in which such mine, mill or metallurgical plant is situated is hereby empowered and directed to bring an action in the name of the people of the State of Colorado against such owner, agent, manager or lessee, whether individual, partnership or corporation, operating such metalliferous mine, mill or metallurgical plant when he is not complying with the provisions of this act, or any part thereof, or for the violation of any rule made in conformity with this act by the Commissioner of Mines of the State of Colorado. Such penalty when recovered shall be turned over by such district attorneys to the Treasurer of the State of Colorado for the benefit of the general school fund of the State of Colorado.

Sec. 27. Justices of the peace in their respective counties shall have jurisdiction in prosecutions for the violation of this act, subject to the right of appeal as now provided for in cases of assault and battery.

Sec. 28. All acts or parts of acts in conflict herewith are hereby repealed.

JAMES B. SANFORD,
Speaker of the House.

WARREN A. HAGGOTT,
President of the Senate.

Approved April 10, 1903. at 12:30 p. m.

JAMES H. PEABODY,
Governor.

Senate Bill 211.

An act to amend section three (3) of chapter one hundred and nineteen (119) of the session laws of 1899, regarding the appointment of mine inspectors, approved April 10, 1899.

Sec. 3. The Commissioner of Mines shall divide the State into three metalliferous mining districts and shall, with the consent of the Governor, appoint three (3) inspectors of practical experience in mining, citizens of the United States and legal voters of the State of Colorado, and having had not less than seven (7) years' practical experience in mining in the State of Colorado, who shall hold their office for the term of two (2) years. Immediately after such appointment of said inspectors the said Commissioner of Mines shall assign an inspector to each of said districts and said inspector so assigned shall maintain a branch office in one county of his district wherein extensive mining is carried on, and the said Commissioner of Mines shall have authority to require that said inspector shall, during his term of office, or such part thereof as he may determine, remain in the district to which he is appointed, wherein extensive mining is carried on, and whose additional duties shall be as hereinafter specified, and he shall appoint a clerk, who must have a general knowledge of mineralogy, and shall act as assistant curator for the State mineral collection; and before entering upon the discharge of their duties shall subscribe to the oath required by the Constitution, and each give bond to the State in the sum of \$5,000, to be approved by the Governor, conditioned upon the faithful performance of their duties, respectively; said bonds shall, together with the Commissioner's bond, be deposited with the Secretary of State. The Commissioner of Mines may appoint a stenographer, who shall act as assistant clerk, and such other competent assistants as he may deem necessary for the carrying out of the object of this act; Provided appropriation be made therefor, and shall have power, with the consent of the Governor, at any time, to remove the inspectors, clerks or other assistants for incompetency, neglect of duty or abuse of the privileges of his office.

In compliance therewith the State was divided as follows:

District No. 1.

Archuleta,
Conejos,
Costilla,
Custer,
El Paso,
Fremont,
Huerfano,
La Plata,

Mineral,
Montezuma,
Pueblo,
Saguache,
San Juan,
Rio Grande,
Teller.

District No. 2.

Chaffee,	Mesa,
Delta,	Montrose,
Dolores,	Ouray,
Eagle,	Park,
Garfield,	Pitkin
Gunnison,	San Miguel,
Hinsdale,	Summit.
Lake,	

District No. 3.

Boulder,	Grand,
Clear Creek,	Jefferson,
Denver,	Larimer,
Douglas,	Rio Blanco,
Gilpin,	Routt.

The work in the field has been materially facilitated by these measures, for the increase of the force was very necessary, and the division of territory has produced greater efficiency in the individual inspectors.

ACKNOWLEDGEMENTS.

The department has been generally aided by the following railroads, who have issued transportation to the department, and to whom cordial acknowledgement is hereby given: Colorado & Southern, Denver Northwestern & Pacific, Colorado Midland, Denver & Rio Grande, Colorado Springs & Cripple Creek District, Florence & Cripple Creek, Midland Terminal, Rio Grande Southern, Silverton.

To the newspaper fraternity of the state, acknowledgement is due for their universal co-operation and support.

NUMBER ENGAGED IN MINING, MILLING AND SMELTING.

County	1896	1897	1898	1899	1900	1901	1902	1903	1904
Arapahoe	1,152	1,583	1,604	2,032	2,092	1,810	1,615	1,382	1,904
Archuleta	45	76	23	10	6	6	18	7	10
Boulder	1,353	1,653	1,687	1,539	1,597	1,610	1,556	1,310	1,087
Chaffee	482	707	722	938	944	792	725	470	680
Clear Creek.....	1,312	1,712	1,816	1,981	2,012	1,975	2,010	1,748	1,936
Conejos	27	46	7	35	15	23	18	20	15
Costilla	18	28	85	62	44	25	35	30	32
Custer	189	318	363	340	419	325	350	566	625
Delta .....	....	....	....	....	....	5	5	10	12
Denver .....	....	....	....	....	....	....	....	....	1,175
Dolores	356	354	414	485	497	415	352	325	378
Douglas	135	77	86	43	5	6	7	5	7
Eagle	162	182	241	316	302	391	305	240	265
El Paso.....	3,575	5,386	5,764	....	85	162	830	792	742
Fremont	477	384	395	410	495	500	725	630	768
Garfield .....	....	27	12	10	6	8	15	12	20
Gilpin	2,160	2,473	2,517	3,017	3,124	2,664	2,322	1,985	1,860
Grand .....	....	48	53	24	35	26	75	90	100
Gunnison	704	787	624	560	585	450	630	537	687
Hinsdale	432	493	397	576	538	516	580	332	420
Huerfano	23	26	11	8	37	40	35	10	12

Jefferson	35	45	37	57	45	26	85	52	115
Lake	3,984	3,519	3,780	6,736	7,470	6,420	5,772	6,340	6,380
La Plata.....	410	544	419	360	307	387	475	545	784
Larimer	86	147	92	110	86	74	45	82	85
Las Animas.....	....	26	17	12	10	....	....	....	....
Mineral	336	485	807	1,040	992	1,075	920	918	1,010
Montrose .....	....	....	22	162	115	204	152	110	132
Mesa .....	....	....	12	55	28	70	65	35	146
Montezuma	45	52	55	125	109	85	143	190	185
Ouray	1,167	1,185	1,214	1,878	1,897	1,918	1,609	1,465	1,586
Pueblo	1,690	1,685	1,712	2,054	2,084	1,975	1,485	1,500	1,945
Park	381	467	374	448	374	360	406	420	635
Pitkin	1,560	1,242	1,363	1,635	1,560	1,692	1,375	900	1,552
Rio Blanco.....	....	32	14	5	6	8	55	12	10
Rio Grande.....	75	194	156	186	75	110	145	110	131
Routt	128	247	124	191	115	138	135	200	233
Saguache	268	264	247	315	378	425	310	280	385
San Juan.....	1,351	996	1,087	1,347	1,405	1,688	1,545	1,647	1,820
San Miguel.....	1,105	1,289	1,344	1,612	1,723	1,840	1,625	1,250	1,190
Summit	412	426	474	568	574	532	623	570	814
Teller .....	....	....	....	7,925	7,920	6,484	5,940	5,200	5,667
Total	25,545	29,215	30,231	39,210	40,111	37,260	35,118	32,267	35,376

EMPLOYEES ABOVE AND UNDERGROUND.

	1896	1897	1898	1899	1900	1901	1902	1903	1904
Number of men engaged in mining, milling and smelting.....	25,545	29,215	30,231	39,210	40,111	37,260	35,118	32,267	35,376
Number of men engaged above ground.....	9,621	11,686	12,032	15,684	16,040	14,904	14,047	12,907	14,150
Number of men engaged underground.....	15,924	17,529	18,139	23,526	24,071	22,356	21,071	19,360	21,226

ACCIDENTS.

CAUSE OF ACCIDENT.

Above Ground	1903		1904	
	Fatal	Non-Fatal	Fatal	Non-Fatal
Machinery accidents		7	..	15
Mill accidents		6	3	9
Smelter accidents	3	44	2	27
Overwinding cage or bucket.....		2	..	..
Falling from gallows frame or staging.....		3	..	2
Gravity tram		3	..	6
Tramming or dumping cars.....	2	13	1	6
Handling loose rock or ore.....		9	1	15
Falls while carrying tools or material.....		4	..	5
Falling down shaft from surface.....	1	..	..	..
Getting on or off cage or bucket at surface.....		1	..	2
Material falling down shaft from surface.....		1	2	2
Falls in chute or bin or caught with running ore.....		2	..	2
Falling into uncovered prospect hole.....		..	..	1
Suffocation, burning of building over shaft or tunnel.	..	..	2	1
Operating hydraulic machine.....		..	1	..
Came in contact with live wire.....		..	1	..
Miscellaneous .		14	..	22
Total.....	6	109	13	105

Shaft Accidents	1903		1904	
	Fatal	Non-Fatal	Fatal	Non-Fatal
Getting on or off cage or bucket in motion or at station		1	1	4
Falls from bucket or cage while being hoisted or lowered	3	3	2	1
Caught in shaft while being hoisted or lowered.....	1	2	1	7
Falls from ladder.....	1	..	1	1
Material falling from level or side of shaft.....	3	5	1	1
Struck by descending cage or bucket.....		2	1	3
Pushing car into open shaft, going down with same..	1	1	2	..
Falls of rock or earth in shaft.....		9	1	4
Falling down shaft from level.....	3	2	3	7
Material falling from overloaded bucket.....		..	..	1
Cable becoming detached, letting cage down shaft...		..	14	..
Miscellaneous .		3	..	9
Total.....	12	28	27	38

ACCIDENTS, Concluded.

Underground Accidents	1903		1904	
	Fatal	Non-Fatal	Fatal	Non-Fatal
Falls of rock.....	18	135	13	142
Falls of timber while timbering.....	1	16	3	24
Falls from ladder.....	1	3	1	9
Falls from overloaded staging.....	2	7	2	12
Falls in chute, winze, upraise or manway.....	4	10	5	16
Caught in chute with running ore.....	1	6	3	6
Injured by tram car.....	1	20	2	28
Struck by flying rock or steel from hammer or pick..	1	23	..	30
Struck with hammer by helper or by self.....	..	13	..	10
Injured handling loose rock.....	1	22	1	18
Falls while carrying tools or material in mine.....	..	18	..	13
Suffocation, burning shaft house or tunnel building..	1	..	..	..
Suffocation, bad air or powder smoke.....	3	1	3	6
Operating machine drill.....	..	40	1	51
Contact with live wire.....	..	..	1	..
Miscellaneous ..	..	26	1	12
Total.....	34	340	36	377

Explosives	1903		1904	
	Fatal	Non-Fatal	Fatal	Non-Fatal
Thawing powder over candle, in stove, hot water or sand	3	..	2	..
Picking out missed shot.....	3	1	7	2
Drilled into hole that missed fire.....	3	4	6	8
Blast exploded while loading.....	2	3	4	3
Remained too long after lighting fuse.....	..	..	3	2
Returned before blast exploded.....	..	2	1	..
Struck unexploded powder or caps with pick or shovel while cleaning away muck.....	..	3	1	3
Hit with flying rock from blast, not being in place of safety	1	2	1	..
Explosion, cause unknown.....	3	2	..	1
Total.....	15	17	25	19
Grand total	67	494	101	539

SUMMARY OF ACCIDENTS, 1896-1904, INCLUSIVE

	1896	1897	1898	1899	1900	1901	1902	1903	1904
Number of men engaged in mining, milling and smelting, 25,545	29,215	30,231	39,210	40,111	37,260	35,118	32,367	35,376	
Number of accidents investigated.....	210	279	292	584	633	754	561	640	
Number of non-fatal accidents.....	107	169	181	481	526	623	494	539	
Number of fatal accidents.....	103	110	108	103	107	121	82	101	
Number of non-fatal accidents above ground.....	10	27	12	150	156	181	106	105	
Number of fatal accidents above ground.....	8	7	9	15	15	11	13	13	
Number of non-fatal accidents underground.....	97	162	172	341	360	452	455	434	
Number of fatal accidents underground.....	95	103	99	88	92	110	69	88	
Proportion non-fatal accidents per 1,000 men employed...	4.48	5.77	6.09	12.26	13.11	17.00	15.97	15.24	
Proportion fatal accidents per 1,000 men employed.....	4.03	3.76	3.57	2.62	2.66	3.24	2.30	2.86	
Per cent. non-fatal accidents per 1,000 men above ground	1.04	2.31	.99	9.56	9.72	12.14	7.55	8.45	
Per cent. fatal accidents per 1,000 men above ground.....	.83	.60	.74	.96	.93	.74	.92	.92	
Per cent. non-fatal accidents per 1,000 men underground..	6.09	9.24	9.48	14.53	14.95	20.22	21.59	20.45	
Per cent. fatal accidents per 1,000 men underground.....	5.96	5.87	5.45	3.71	3.82	4.92	3.27	4.15	

ORDERS.

DURING THE FISCAL YEARS OF 1903 AND 1904 THE FOLLOWING ORDERS
WERE ISSUED BY THE DEPARTMENT

	1903	1904
Regarding timbers and timbering.....	7	36
Regarding explosives	14	34
Regulating amount of powder kept in storage.....	3	4
Use of steel or iron tamping bar.....	6	12
Removing old timbers from mine.....	2	5
Regarding employment of hoisting engineer.....	1	..
Regarding indicator on hoisting machinery.....	1	10
Posting uniform code of signals.....	11	29
Regarding fire protection.....	4	7
Prohibit riding on skip or cage with tools, or upon loaded bucket...	9	8
Giving false signals.....	4	..
Partitioning shafts, or dividing into compartments.....	..	4
Placing ladders in shaft and repair same.....	..	24
Provide or repair ladders in upraise, winze or manway.....	..	22
Making exit to the surface.....	..	6
Provide tunnel or adit, with connection to surface, with suitable ladders	13	11
Provide chain ladders in shaft or incline while sinking.....	4	3
Provide shaft collar, with cover, bonnet or doors.....	5	5
Equip cage with safety clutches, or repair same.....	..	16
Provide rails at shaft stations.....	3	17
Cover winzes or mill holes, or surround with guard rails.....	..	17
Leave pillar ground standing on side of shaft.....	6	1
Cover or fence abandoned mine shafts or pits.....	9	7
Shall report to the Bureau of Mines.....	4	4
Notice of number of men permitted to ride upon cage, skip or bucket	5	2
Failure or refusal to report accidents.....	2	..
Repair cable, or replace, or test cable.....	1	5
Repair machinery .....	..	3
Place fire doors at mouth of tunnel.....	2	10
Sanitary .....	..	1
Provide chairs or overwinding device.....	3	15
Miscellaneous .....	..	5



VIEW OF STALL, SHOWING OUTSIDE MOUNTING OF COLORADO'S MINERAL EXHIBIT AT ST. LOUIS, MO.



LOUISIANA PURCHASE EXPOSITION.

The work devolving on the department in connection with Colorado's mineral exhibit, at the Louisiana Purchase Exposition, was taken up December 1, 1903, and the plans adopted by the Colorado Board of World's Fair Managers was a very complete and beautiful exposition of Colorado's mineral resources.

Colorado mineral exhibit at the Louisiana Purchase Exposition, St. Louis, Mo., occupies a space forty-three feet by eighty feet, in the Mines and Metallurgical building.

The exhibit was collected, arranged and installed, by the Bureau of Mines of the State of Colorado, under the direction of Hon. E. L. White, Commissioner of Mines, and J. C. Langley, Chief Clerk and Assistant Curator, assisted by Professor Horace B. Patton, of the Colorado School of Mines; J. S. Randall, of Georgetown; Harry C. Smith, M. E., of Denver, and presided over at the Exposition by John A. Wayne, Hon. Frank Frewen and Hon. D. W. Fall.

The space is enclosed by a base, or counter, about thirty inches high, built of onyx, marble and stone. On each side of the front entrance is constructed a base, on which is mounted two sets of columns; the columns in turn are mounted with caps and relief work, all made of onyx, which takes a very high polish, is beautiful and attractive, and came from Steamboat Springs. Between the sets of columns are placed cases, and on each side much the same installation is employed. Every seven feet a base and column of rhyolite is placed, while the space between the bases is paneled with Beulah marble, highly polished. The contrast gives a pleasing effect. Between these columns is placed a five-foot mahogany case, with plate glass on both sides; there are twenty of these cases used, in which are displayed the economic ores of the State.

In one of the front cases is displayed a nugget of native silver from the Mollie Gibson mine of Aspen, which weighs three hundred and ninety seven pounds, 90% silver; this is claimed to be the largest piece of native silver in existence. The other front case, contains a large specimen of sylvanite ore, from the Independence mine, Victor, Colorado.

The economic ores are arranged in the double side cases, mounted on the enclosing counter of marble. A systematic arrangement of the ores has been employed, which groups them under the head of the metal prominent in their constitution, and this method of grouping mineral species according to their basic element, has been followed throughout.

The ore displayed in the first case on each side, is the acidic division, which includes native sulphur, tellurium, molybdenum, tellurium-oxide, bismuth and telluride. The carbon group is represented by the graphite. These two cases are principally composed of the tellurides of gold and silver from Boulder county, the La Plata mountains and Cripple Creek district. Each specimen is mounted on a white block, marked by hand, giving the name of the mine, locality, value of the ore per ton, and the exhibitor's name. This system of mounting and marking, is carried out through the entire collection.

The basic division is next taken up, and in the second case on each side, is displayed the gold ores of the State, and is represented by very fine specimens of free gold, and milling gold ore, including about every district of the State, in which mining is carried on. Especially noticeable, is the large amount of free gold in ore from the Sunnyside mine, Silverton, the Gold Nugget mine, Boulder, the Smuggler Union mine, of San Miguel county, and the wire gold in sulphide, from the Cashier mine, of Breckenridge.

Next in order, are the silver ores, or ore where silver is most prominent in their make up. The value of these specimens, make these two cases very attractive, and are studied with much interest by mining men. The ores of Custer County, Aspen, and Leadville, are largely represented.

The lead ores occupy a case on each side, and the specimens are large and attractive—bright galena predominating, with the lead carbonates of Leadville, and exceptionally fine specimens of cerussite from the Terrible mine, but the display of ore that attracts the visitor, is the copper sulphide, copper carbonate and bornite, and they are arranged to the best advantage.

In the last two cases of this division, are represented the zinc, nickel, uranium, iron manganese, aluminum and calcium, which show the State to be rich in this class.

Following the minerals, is a case on each side, in which is exhibited the different rocks of the State, classified, and arranged for study of this branch of science.

Next to the side entrance, are displayed the clays, and clay products. The Denver Fire Clay Company have a well arranged exhibit of assayers' supplies now in general use. The Von Briggles Pottery Company, of Colorado Springs, have installed a very attractive display of crude clay, and manufactured pottery, representing the plastic clay from Golden, the crude ware, and at different firings, as well as the finished product; this industry is new, and the ware is of a high class.



VIEW OF COLORADO'S MINERAL EXHIBIT FROM THE ENTRANCE SHOWING INSIDE ARRANGEMENT ST. LOUIS MO.

The United Oil Company, at Florence, have a case of oil, produced in Colorado, put up in beautiful bottles, and instructively arranged—this case attracts attention, and adds much to the collection.

The coal is displayed in a very attractive and instructive manner, by dressing each sample into a cube six inches square, and mounting on white blocks. On each is printed the name of the vein, locality and analysis. The coal is placed in plate glass cases, extending across the end of the exhibit space. The coal collection includes the Lignite, Bituminous, and Anthracite, of the State. The coke occupies one case, and is shown in the same manner as the coal. The uniform arrangement, complete and detailed analysis, makes this a most valuable coal exhibit.

The building stone is put up in the same manner as the coal, and while this display is not large, it shows the varieties being worked at this time. The varied shades of granite, sandstone and rhyolite, attract the attention of builders and architects. There is probably no other state possessing so great a variety of building stone, as Colorado.

The front floor space of the exhibit, is occupied with sixteen, flat top, plate glass, highly polished mahogany cases, arranged with ample space to get around each case. The first eight cases, contain the classified minerals of the State, arranged according to Dana's system, each specimen being mounted on a block, with printed label giving the name of the mineral, composition and location. This collection represents nearly all the minerals occurring in Colorado, each specie represented by the finest specimen obtainable, and there is no question but that this scientific collection of Colorado's mineral species, is an exposition of itself, and is carefully studied by those interested in mineralogy.

The free gold ores in quartz are in a separate case, and include many sawed and polished specimens of exceeding richness and beauty. This exhibit is made up largely of ores from the San Juan district. In the next case is displayed the native silver ore from Aspen, and while this district is noted for its production of native silver, it is safe to say that a finer and more attractive collection of this class, was never before gotten together. The famous Mollie Gibson mine is represented by many choice specimens.

The gold and silver tellurides of the Cripple Creek district, are arranged in two flat cases, at one side, near the center of the exhibit. This display represents many of the characteristic occurrences of the telluride of gold and silver, of the Cripple Creek district. Some of the specimens have been roasted, which brings the gold to the surface, and gives one a good idea of their exceeding richness. This ore is classed as sylvanite, krennerite

and calaverite, and is associated with phonolite and granite, and gives one an excellent opportunity to study the telluride ore of the richest mining district in the world.

Beyond the center of the exhibit, are two cases, in which are displayed the radio-active minerals. One case is made up exclusively of carnotite, from southwestern Colorado, in what is known as the Paradox Valley. This mineral is of a bright yellow color, attractively mounted on dark green blocks, and carefully labeled. The other case contains uraninite-pitchblende, from the Wood mine of Gilpin county, and includes large and fine specimens of unusually high grade; from this class of ore, much of the radium is being produced. The Wood mine is operated by Dennison and Davis, of Central City, Colorado.

The chief attraction of the Colorado Mineral Exhibit, is the crystallized gold from Breckenridge, which is displayed in a circular case, six feet in diameter, situated in the middle of the exhibit. The gold is arranged on trays covered with green velvet. This exhibit consists of about one hundred ounces of highly crystallized gold. The collection was made up by seventeen contributors at Breckenridge, and is presided over by Hon. Wesley Fall. This display is pronounced by all to be the finest and most attractive case, and is certainly the trophy of the Colorado Mineral Exhibit.

There is one entire case devoted to Colorado gem stones, represented by the stones in crystallized state, and the cut and polished gem, the same finished and mounted in the highest perfection of the art. This case was installed by The George Bell Company, and is a thing of beauty.

The Portland Gold Mining Company, have a special exhibit of ore from their property, and represents the characteristic occurrence of the tellurides of gold and silver of the Portland mine of Victor. This exhibit is also an individual exhibit, made and installed by President James F. Burns.

The floor space in the rear portion of the exhibit, is taken up with the massive ores, showing the crude ore as broken in the mine, together with the different products as carried through to the refined metal. The ores are arranged in large cone shaped piles, on which is mounted the refined gold, silver, lead, copper and zinc, in glass cases.

AWARDS IN MINING DEPARTMENT.

State of Colorado, collective mineral exhibit; grand prize. Collaborators, I. N. Stevens, gold medal; E. L. White, gold medal.



CRYSTALLIZED GOLD SPECIMENS AS EXHIBITED IN COLORADO'S MINERAL EXHIBIT ST. LOUIS MO.

J. C. Langley, gold medal; Prof. H. B. Patton, silver medal;
J. S. Randall, silver medal.

Colorado World's Fair Board, sections and photos; gold medal.

Pueblo county, marble; gold medal.

Teller county, sylvanite gold ores; gold medal.

Fremont county, stone; gold medal.

Summit county, crystals of gold; gold medal.

Montrose county, carnotite; gold medal.

Collaborators, Copper Prince mine, silver medal; Yellow Bird mine, gold medal.

Portland Gold Mining Co., telluride gold ores; gold medal.

Collaborator, James F. Burns; gold medal.

Colorado Bureau of Mines; gold medal.

Colorado Fuel & Iron Co., ores and mineral paint; gold medal.

Rocky Mountain Coal & Iron Co., coal; gold medal.

Denver Fire Clay Co., gold medal.

San Juan county, gold quartz; silver medal

Collaborator, Golden Fleece mine; silver medal.

Boulder county, gold ore; silver medal.

Gilpin county, gold quartz; silver medal.

Pitkin county, silver ore; silver medal.

Chaffee county, marble; silver medal.

United Oil Co., Florence, oils; silver medal.

Beulah Marble Co., mottled marble; silver medal.

Van Briggles Pottery Co., pottery and clay; silver medal.

C. P. Hoyt, plastic fire clay; silver medal.

Rocky Mountain Coal & Iron Co., coal and coke; silver medal.

Denver & Northwestern Fuel Co., coal; silver medal.

Gold King Consolidated Mining & Milling Co., Silverton, gold ores; silver medal.

Percy Hagerman, Colorado Springs, silver nugget; silver medal.

Independence Limited mine, telluride of gold; silver medal.

Hazleton-Santiago Consolidated Mining & Milling Co., gold and silver ore; silver medal.

C. K. & N. Mining Co., Cripple Creek; silver medal.

Yampah Anthracite Co., coal; silver medal.

Colorado Onyx Co., Steamboat Springs; silver medal.

Atlas Mining and Milling Co., Ouray, gold ores; silver medal.

Wood mine, Gilpin county, uranium; silver medal.

El Paso Consolidated Mining Co., telluride ores; silver medal.

Woods Investment Co., free gold and sylvanite; silver medal.

Kerr Marble Co., marble; silver medal.

Commissioner of Mines, Denver; silver medal.

Geddes & Seerie, Denver, building stone; silver medal.

G. W. Parfet, Golden, pottery and clay; silver medal.

J. Fred Roberts, Denver, red sand stone; bronze medal.

Western Realty Co., Denver, red sandstone; bronze medal.

Grant & Frazier, Boulder, white sandstone; bronze medal.

Hugh Murphy, Boulder, red sandstone; bronze medal.

Hale & Brunton, Ft. Collins, red sandstone; bronze medal.

Bayha & Bohm, Denver, building stone; bronze medal.

Cresta Clay Co., Boulder county, clays; bronze medal.

S. T. Hathaway, Denver, rhyolite; bronze medal.

Pike's Peak Brick Co., Colorado Springs, brick; bronze medal.

Fremont county, stone columns; bronze medal.

Kerr Stone & Marble Co., stone columns; bronze medal.

Meadow M. & M. Co., crystal gold silver; bronze medal.

Big Five Mining Co., Denver, gold and silver; bronze medal.

Boston & Colo. Copper Co., Ft. Collins; bronze medal.

Lasalle Copper Co., native copper; bronze medal.

Golden Pressed and Fire Brick Co., clays; bronze medal.

APPOINTMENTS.

M. J. McCarthy was appointed mine inspector for a term of two years, beginning June 1st, 1903.

H. A. Canning was appointed mine inspector for a term of two years, beginning June 1st, 1903.

G. W. Schneider was appointed mine inspector for a term of two years, beginning June 1st, 1903.

S. B. Edwardes was appointed mine inspector February 15th, for the unexpired term of two years, vice H. A. Canning, resigned.

J. C. Langley was reappointed chief clerk and assistant curator, for a term of four years, beginning June 1st, 1903.

Mrs. A. M. Nickerson, was appointed stenographer, for a term of four years, beginning June 1st, 1903.



CONES OF COMMERCIAL ORE SURMOUNTED BY THE PRODUCTS FROM SAME AS SHOWN IN COLORADO'S MINERAL EXHIBIT, ST. LOUIS, MO.

STATEMENT OF DISBURSEMENTS OF THE BUREAU OF MINES
APPROPRIATION FOR THE FISCAL YEARS 1903-1904.

Appropriation		\$25,333.34
Commissioner of Mines H. A. Lee, salary	\$ 1,110.15	
Commissioner of Mines H. A. Lee, expense account.....	45.11	
Commissioner of Mines E. L. White, salary.....	3,889.85	
Commissioner of Mines E. L. White, expense account.....	1,531.41	
Inspector F. H. Nye, salary.....	750.00	
Inspector F. H. Nye, expense account.....	407.50	
Inspector M. J. McCarthy, salary.....	2,250.00	
Inspector M. J. McCarthy, expense account.....	1,536.48	
Inspector P. H. Clifford, salary.....	750.00	
Inspector P. H. Clifford, expense account.....	442.15	
Inspector H. A. Canning, salary.....	1,062.50	
Inspector H. A. Canning, expense account.....	702.05	
Inspector S. B. Edwardes, salary.....	1,187.50	
Inspector S. B. Edwardes, expense account.....	775.45	
Inspector G. W. Schneider, salary.....	2,250.00	
Inspector G. W. Schneider, expense account.....	1,301.92	
Clerk and Assistant Curator J. C. Langley, salary.....	3,000.00	
Stenographer A. M. Nickerson, salary.....	2,000.00	
Incidental and operating expenses.....	333.34	
Balance	7.93	
	<hr/>	<hr/>
	\$25,333.34	\$25,333.34

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1904.

COLORADO	County	GOLD		SILVER		LEAD		COPPER		ZINC		TOTAL
		Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Arapahoe....		12	\$248.04	.....	.....	.....	.....	.....	.....	.....	.....	\$248.04
Archuleta....		6	124.02	10	\$5.72	.....	.....	.....	.....	.....	.....	129.74
Boulder.....		19,912	411,581.04	57,424	32,858.01	62,111	\$2,670.77	36,115	\$ 3,348.73	.....	.....	450,458.55
Chaffee.....		3,113	64,345.71	69,045	39,507.55	652,228	28,046.23	203,229	33,755.14	294,440	\$15,016.44	180,671.07
Clear Creek.		30,799	636,615.33	873,949	500,073.62	3,961,976	170,364.97	401,180	51,443.31	906,705	46,241.95	1,404,739.18
Conejos.....		40	826.80	52	29.75	.....	.....	.....	.....	.....	.....	856.55
Costilla.....		42	883.14	151	86.40	.....	.....	.....	.....	.....	.....	954.54
Custer.....		2,586	53,452.62	87,373	49,994.83	126,593	5,443.50	15,068	1,932.17	.....	.....	110,823.12
Delta.....		17	351.39	9	5.15	.....	.....	.....	.....	.....	.....	356.54
Dolores.....		2,602	53,783.34	108,301	61,969.83	181,229	7,792.85	25,392	3,256.02	18,196	923.00	127,730.04
Douglas.....		14	289.38	5	2.86	.....	.....	.....	.....	.....	.....	292.24
Eagle.....		1,455	30,074.85	27,348	15,648.53	375,207	16,133.90	32,409	4,155.81	.....	.....	66,013.09
El Paso.....		15	310.05	.....	.....	.....	.....	.....	.....	.....	.....	310.05
Fremont.....		226	4,671.42	208	119.02	1,071	46.05	1,024	131.31	.....	.....	4,967.80
Gilpin.....		67,918	1,408,865.06	318,406	182,191.91	859,293	36,949.60	638,945	81,931.92	.....	.....	1,704,933.49
Garfield.....		25	516.75	14	8.01	.....	.....	.....	.....	.....	.....	524.76
Grand.....		31	640.77	13	13.16	.....	.....	1,114	142.85	.....	.....	796.78
Gunnison....		1,259	26,022.53	115,153	65,890.55	200,462	8,619.87	16,233	2,081.56	20,010	1,020.51	103,636.02
Hinsdale....		509	10,521.03	46,585	26,655.94	1,041,222	44,772.55	13,187	1,690.97	59,089	3,013.54	86,654.03
Jefferson....		17	351.39	12	6.87	.....	.....	528	68.99	.....	.....	427.25

Lake.....	57,419	1,186,850.73	5,085,151	2,909,723.40	47,180,865	2,028,777.20	3,724,593	478,886.86	58,254,353	2,970,972.00	9,575,210.19
La Plata.....	6,164	127,409.88	31,033	17,757.08	2,177	93.61	1,473	188.88	.....	.....	145,449.45
Larimer.....	57	1,178.19	11	6.29	.....	.....	23,028	2,952.88	.....	.....	4,137.36
Mineral.....	10,782	222,863.94	1,664,633	952,503.00	13,346,436	573,896.75	1,337	171.44	4,402,697	224,537.55	1,973,972.68
Montrose.....	72	1,488.24	1,067	610.54	.....	.....	7,476	958.05	.....	.....	3,057.43
Mesa.....	12	248.04	9	5.15	.....	.....	.....	.....	.....	.....	253.19
Montezuma..	135	2,790.45	53	30.33	.....	.....	.....	.....	.....	.....	2,820.78
Ouray.....	104,367	2,157,265.89	294,028	168,242.82	2,044,525	87,914.58	420,191	53,881.09	4,332	220.93	2,467,525.31
Park.....	9,433	194,980.11	50,013	28,617.44	757,703	32,581.23	5,920	759.12	.....	.....	256,937.90
Pitkin.....	113	2,335.71	2,129,618	1,218,567.42	18,882,901	811,964.74	9,862	1,264.60	583,661	30,276.71	2,064,409.18
Rio Grande..	194	4,009.98	2,281	1,305.19	.....	.....	650	83.35	.....	.....	5,398.52
Routt.....	1,172	24,225.24	181	103.57	.....	.....	.....	.....	.....	.....	24,328.81
Saguache....	267	5,518.89	60,506	34,621.53	699,312	30,070.42	48,722	6,247.62	15,585	794.83	77,253.29
San Juan....	67,569	1,396,651.23	1,042,044	596,257.58	9,288,613	399,411.65	3,467,124	444,589.31	317,254	16,179.95	2,853,089.72
San Miguel..	74,072	1,531,068.24	667,710	382,063.66	5,704,708	245,302.44	239,520	30,713.65	.....	.....	2,189,147.99
Summit.....	10,069	208,126.23	180,554	103,313.00	2,178,182	93,661.82	7,510	963.00	89,913	4,585.56	410,619.61
Teller.....	699,397	14,456,535.99	47,817	27,360.89	.....	.....	63	8.08	.....	.....	14,483,904.96
Total.....	1,171,892	\$24,223,007.64	12,960,777	\$7,416,156.60	107,546,854	\$4,624,514.73	9,401,913	\$1,205,607.31	64,976,235	\$3,313,787.97	\$40,783,074.25

NOTE.—In the above table the calculation is on the average market price of the metals for the year. Gold, 20.67; Silver, .5722; Lead, .043; Copper, .12823; Zinc, .051. The zinc is figured on actual spelter recovered.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1905.

COLORADO	County	GOLD		SILVER		LEAD		COPPER		ZINC		TOTAL
		Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Arapahoe	8	\$ 165.36	.....	.....	.....	.....	.....	.....	.....	.....	\$ 165.36
Archuleta	3	62.01	6	\$ 3.21	.....	.....	.....	.....	.....	.....	65.22
Boulder	20,879	431,568.93	61,833	33,049.74	115,100	\$ 4,876.79	6,154	\$ 814.48	.....	.....	470,309.94
Chaffee	8,192	169,328.64	129,900	69,431.55	249,308	10,563.18	79,581	10,532.55	3,099	\$ 162.00	260,017.92
Clear Creek	22,898	472,061.46	851,683	455,224.56	3,451,849	146,254.84	289,876	38,365.09	656,000	35,424.00	1,147,329.95
Conejos	59	1,219.53	46	24.59	.....	.....	.....	.....	.....	.....	1,244.12
Costilla	48	992.16	179	95.68	.....	.....	.....	.....	.....	.....	1,087.84
Custer	4,006	82,804.02	160,175	85,613.54	387,301	16,409.92	52,242	6,914.23	.....	.....	191,741.71
Delta	12	248.04	8	4.28	.....	.....	.....	.....	.....	.....	252.32
Dolores	2,093	48,262.31	103,096	55,104.81	143,417	6,076.58	147,588	19,533.27	.....	.....	123,976.97
Douglas	2	41.34	2	1.07	.....	.....	.....	.....	.....	.....	42.41
Eagle	776	16,039.92	27,054	14,480.36	677,730	28,715.42	32,863	4,319.42	.....	.....	63,565.12
Fremont	307	6,345.69	223	119.19	2,091	88.00	20,777	2,749.84	.....	.....	9,303.32
Garfield	5	102.35	3	1.60	.....	.....	.....	.....	.....	.....	104.95
Gilpin	65,124	1,346,113.08	375,238	200,594.71	945,975	40,080.96	611,988	80,396.61	.....	.....	1,667,765.36
Grand	69	1,426.23	12	6.41	.....	.....	.....	.....	.....	.....	1,432.64
Gunnison	2,348	48,533.16	65,447	34,981.42	127,661	5,409.00	15,000	1,985.25	55,090	3,002.40	93,911.23
Hinsdale	799	16,515.33	33,139	17,712.80	459,462	19,467.40	11,263	1,490.66	106,000	5,724.00	60,910.19
Jefferson	12	248.04	5	2.67	.....	.....	218	28.85	.....	.....	279.56
Lake	64,827	1,339,974.09	4,973,033	2,658,086.14	36,353,239	1,540,286.74	2,556,583	338,363.76	76,566,000	4,134,564.00	10,011,274.73

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1902.

COLORADO	County	GOLD		SILVER		LEAD		COPPER		ZINC		TOTAL
		Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Arapahoe	11	\$ 227.37	.....	.....	.....	.....	.....	.....	.....	.....	\$ 227.37
Archuleta	4	82.68	10	\$ 5.22	.....	.....	.....	.....	.....	.....	87.90
Baca	5	102.35	59	30.77	.....	.....	1,929	\$ 229.30	.....	.....	303.42
Boulder	26,062	538,701.54	82,710	43,141.54	13,493	\$ 549.03	11,690	1,318.27	.....	.....	583,710.38
Chaffee	20,199	417,513.33	114,155	59,543.25	456,889	18,500.81	173,538	20,428.46	220,560	\$ 10,672.20	526,948.05
Clear Creek	45,016	930,480.72	1,279,050	667,152.48	3,282,270	133,565.57	473,754	56,315.14	317,705	15,376.92	1,802,880.83
Conejos	61	1,260.87	81	42.25	.....	.....	78	9.27	.....	.....	1,312.39
Costilla	57	1,178.19	205	106.33	.....	.....	.....	.....	.....	.....	1,285.12
Custer	1,147	23,708.49	28,189	14,703.38	94,662	3,851.80	32,945	3,916.17	40,500	1,960.20	48,140.04
Delta	20	413.40	12	6.26	.....	.....	.....	.....	.....	.....	419.66
Dolores	2,296	47,458.32	121,311	63,275.32	388,806	15,820.52	15,054	1,789.47	248,680	12,030.11	140,380.24
Douglas	3	62.01	10	5.22	.....	.....	.....	.....	.....	.....	67.23
Eagle	1,546	31,955.82	45,336	23,647.26	832,846	33,888.50	150,134	17,846.43	.....	.....	107,338.01
El Paso	35	723.45	.....	.....	.....	.....	.....	.....	.....	.....	723.45
Fremont	357	7,379.19	515	268.62	2,836	115.40	22,300	2,650.80	22,825	1,104.73	11,518.74
Glavin	75,038	1,551,035.46	303,638	158,377.58	497,366	20,237.82	765,516	90,996.89	.....	.....	1,820,647.75
Garfield	8	165.36	5	2.61	.....	.....	.....	.....	.....	.....	167.97
Grand	63	1,302.21	24	12.52	.....	.....	.....	.....	.....	.....	1,314.73
Gunnison	5,009	138,536.03	123,138	64,228.78	728,935	29,660.37	28,686	3,409.90	131,975	6,387.59	207,222.67
Hinsdale	4,758	98,347.86	117,177	61,119.52	6,213,763	252,838.02	8,314	988.29	319,000	15,433.60	428,733.29

Huerfano	41	847.47	290	135.62	.....	.....	.....	.....	.....	983.09
Jefferson	25	516.75	3	1.56	.....	.....	2,978	353.99	.....	872.20
Lake	58,245	1,203,924.15	5,641,857	2,942,792.61	39,450,178	1,605,227.74	2,611,167	310,389.42	47,637,490	8,367,988.44
La Plata	6,630	124,640.10	7,387	3,853.06	2,166	87.73	3,143	373.61	.....	128,354.50
Larimer	39	806.13	49	25.56	.....	.....	24,888	2,968.44	.....	3,790.13
Mineral	5,459	112,837.53	1,923,973	1,003,544.32	9,291,358	378,066.36	.....	.....	2,947,555	1,593,548.87
Montrose	288	5,952.96	3,149	1,642.52	64	2.00	2,565	297.77	.....	7,895.85
Mesa	26	537.42	32	16.69	.....	.....	15,090	1,783.05	.....	2,337.16
Montezuma	123	2,542.41	29	15.13	.....	.....	.....	.....	.....	2,557.54
Ouray	117,115	2,429,725.71	789,855	411,988.37	4,292,063	173,423.34	526,541	62,589.93	.....	3,068,727.36
Park	6,892	142,457.64	49,968	26,063.31	261,046	10,621.90	8,113	964.39	.....	180,107.20
Pitkin	237	4,898.79	3,063,450	1,597,895.52	24,973,816	1,016,184.57	10,654	1,266.44	.....	2,620,245.32
Rio Grande	690	14,262.30	3,171	1,653.99	166	6.75	1,290	149.78	.....	16,072.82
Routt	783	15,151.11	136	70.93	.....	.....	.....	.....	.....	15,222.04
Saguache	243	5,022.84	10,486	5,469.50	454,995	18,513.75	13,659	1,624.83	267,100	43,558.53
San Juan	73,741	1,524,226.47	838,102	437,154.00	7,639,883	313,308.24	3,012,283	358,070.08	.....	2,632,758.79
San Miguel	97,129	2,697,656.43	1,053,640	551,143.42	4,296,849	174,838.79	454,790	54,060.89	.....	2,787,069.53
Summit	11,736	212,583.12	274,751	143,310.12	3,092,357	125,829.22	93,609	11,127.30	1,329,180	587,182.47
Teller	819,153	16,931,892.51	62,780	32,746.45	6,547	266.40	.....	.....	.....	16,964,904.96
Total	1,379,628	\$28,517,117.46	15,941,703	\$8,315,192.29	106,303,374	\$4,325,484.29	8,463,938	\$1,006,108.31	52,582,510	\$44,708,895.83

NOTE: In the above table the calculation is on the average market price of the metals for the year. Gold, 20.67; Silver, .5216; Lead, .0909; Copper, .1187; Zinc, .0484.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1901.

COLORADO	Name of County	GOLD		SILVER		LEAD		COPPER		TOTAL
		Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	
Arapahoe	16	\$ 330.72	.....	.....	.....	.....	.....	.....	\$ 330.72
Archuleta	6	124.02	18	\$ 10.61	.....	.....	.....	.....	134.63
Baca	4	82.68	80	47.16	.....	.....	590	\$ 97.67	227.51
Boulder	37,460	774,298.20	113,782	67,074.49	191,987	\$ 8,320.72	22,186	3,672.89	853,366.30
Chaffee	7,677	158,683.59	76,286	44,970.60	209,768	9,091.35	576,251	95,398.35	308,143.89
Clear Creek	26,172	540,975.24	1,271,227	749,388.32	3,890,216	168,601.96	374,534	62,004.10	1,520,969.62
Conejos	57	1,178.19	102	60.13	1,200	52.01	210	34.77	1,325.10
Costilla	47	971.49	153	90.19	.....	.....	235	38.90	1,100.58
Custer	538	11,120.46	50,394	29,707.25	400,481	17,356.85	40,528	6,700.41	64,893.98
Delta	25	516.75	10	5.90	.....	.....	.....	.....	522.65
Dolores	1,079	22,302.93	111,632	65,807.06	367,057	15,908.25	13,106	2,169.70	106,187.94
Douglas	5	103.35	10	5.89	.....	.....	.....	.....	109.24
Eagle	4,711	97,376.37	175,181	103,269.20	2,775,291	120,281.11	157,914	26,142.66	347,069.34
El Paso	78	1,612.26	15	8.84	.....	.....	.....	.....	1,621.10
Fremont	312	6,449.04	933	550.00	33,945	1,471.18	15,907	2,633.40	11,103.62
Gipin	79,292	1,638,965.64	271,638	160,130.60	670,018	29,038.58	731,194	121,049.17	1,949,183.99
Garfield	17	351.39	13	7.66	.....	.....	.....	.....	359.05
Grand	50	1,033.50	30	17.68	.....	.....	.....	.....	1,051.18
Gunnison	4,037	83,444.79	93,243	54,966.75	656,631	26,458.39	53,396	8,839.71	175,709.64
Hinsdale	3,684	76,148.28	152,122	89,675.92	7,588,675	328,883.17	12,532	2,074.67	496,792.04

Huerfano	4	82.68	10	5.90	.....	.....	.....	.....	88.58
Jefferson	15	310.05	20	11.80	.....	.....	.....	.....	321.85
Lake	85,928	1,770,131.76	6,820,084	4,026,334.51	56,359,708	2,442,629.74	1,930,556	319,693.56	8,564,666.56
La Plata	1,316	27,201.72	5,528	3,258.76	6,197	268.58	132	21.85	30,750.91
Larimer	45	930.15	73	43.03	.....	.....	18,140	3,003.08	3,976.26
Mineral	4,974	102,812.58	1,816,023	1,070,545.56	10,519,805	455,932.25	1,907	166.71	1,629,457.10
Montrose	75	1,550.25	101,359	59,751.13	.....	.....	55,944	9,261.52	70,562.90
Mesa	90	2,046.33	155	91.37	.....	.....	7,795	1,290.46	3,428.16
Montezuma	175	3,617.25	60	35.37	.....	.....	.....	.....	3,652.62
Ouray	74,810	1,546,322.70	1,633,725	963,080.98	7,904,724	342,590.74	652,937	108,063.72	2,960,088.65
Park	4,660	96,322.20	69,175	40,778.66	421,955	18,287.53	9,657	1,598.72	156,987.11
Pitkin	227	4,692.69	3,532,803	2,082,622.74	32,749,511	1,419,363.81	50,786	8,407.62	3,515,086.26
Pueblo	8	165.36	52	30.65	.....	.....	210	34.77	230.78
Rio Grande	1,503	32,927.31	6,926	4,082.88	677	29.34	65,603	10,800.58	47,900.11
Routt	215	4,444.05	239	140.89	2,193	95.04	500	82.77	4,762.76
Saguache	3,869	79,972.23	20,507	12,088.88	235,750	10,217.40	15,253	2,525.13	104,803.64
San Juan	46,588	962,973.96	784,218	462,296.51	15,473,187	670,607.92	2,740,042	453,613.95	2,549,492.34
San Miguel	99,152	2,049,471.84	916,245	540,126.43	3,309,517	142,434.47	308,322	51,042.72	2,784,075.46
Summit	16,387	338,719.29	368,887	217,458.89	4,342,437	188,201.22	17,062	2,824.62	747,504.92
Teller	833,705	17,932,682.35	89,545	52,786.78	.....	.....	.....	.....	17,955,469.13
Total	1,329,112	\$27,679,445.01	18,492,563	\$10,901,365.89	148,111,020	\$6,419,131.61	7,872,529	\$1,303,297.17	\$46,503,239.71

NOTE.—In the above table the calculation is on the average market price of the metals for the year. Gold, 20.67.
 Lead, .04234. Copper, .16669.

Silver, .5895.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1900.

COLORADO	Name of County	GOLD		SILVER		LEAD		COPPER		TOTAL.
		Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	
Arapahoe	12	\$ 248.04	.....	.....	.....	.....	.....	.....	\$ 248.04
Archuleta	7	144.69	.....	18.43	.....	.....	.....	.....	163.12
Baca	5	103.35	.....	62.64	.....	.....	8,900	\$ 1,470.28	1,636.27
Boulder	29,367	607,015.89	90,327	55,469.80	76,076	\$ 3,598.39	20,371	3,365.29	662,449.37
Chaffee	8,354	172,677.18	125,330	76,965.15	833,462	39,422.75	753,677	124,507.44	413,572.52
Clear Creek	22,518	465,447.06	1,358,143	834,035.62	4,994,263	236,228.64	244,092	40,324.00	1,576,035.32
Conejos	137	2,831.79	1,014	622.70	2,200	104.06	4,527	747.86	4,306.41
Costilla	100	2,067.00	314	192.83	.....	.....	107	17.68	2,277.51
Custer	1,008	20,835.36	82,605	50,727.73	708,349	33,552.22	2,301	380.13	105,495.44
Delta	47	971.49	97	59.57	.....	.....	.....	.....	1,031.05
Dolores	2,425	50,124.75	159,318	97,837.18	210,380	9,950.97	36,009	5,948.69	163,861.59
Douglas	3	62.01	24	14.74	.....	.....	.....	.....	76.75
Eagle	5,012	103,598.04	234,674	144,113.30	3,679,828	174,055.86	359,054	59,315.72	481,082.92
El Paso	95	1,963.65	.....	.....	.....	.....	.....	.....	1,963.65
Fremont	402	8,309.34	2,199	1,350.40	8,282	391.74	6,725	1,110.97	11,162.45
Gipin	80,092	1,655,501.64	236,400	145,173.24	735,773	34,802.06	799,478	132,073.77	1,967,550.71
Grand	182	3,761.94	21	12.90	.....	.....	.....	.....	3,774.84
Garfield	25	516.75	13	7.98	.....	.....	.....	.....	524.73
Gunnison	4,057	83,858.19	146,746	90,116.72	1,583,320	74,891.04	42,790	7,068.90	255,934.85
Hinsdale	2,732	56,470.44	155,485	95,483.34	9,377,062	443,535.03	29,180	4,820.54	600,309.35

Huerfano	6	124.02	20	12.28	.....	.....	.....	136.30
Jefferson	34	742.78	51	31.32	.....	.....	.....	724.10
Lake	122,376	2,529,511.92	6,907,279	4,278,696.03	62,599,654	2,969,963.63	2,728,553	10,219,838.54
La Plata	726	15,006.42	7,084	4,350.28	14,500	685.85	350	20,100.37
Larimer	79	1,622.93	126	77.38	.....	.....	13,806	3,991.06
Las Animas .....	.....	.....	.....	.....	.....	.....	.....	.....
Mineral	10,130	200,387.10	2,280,038	1,400,171.34	14,431,936	707,227.52	2,614	2,317,217.79
Montrose	79	1,622.93	19,652	12,068.29	.....	.....	32,026	18,691.92
Mesa	6	124.02	541	313.80	.....	.....	2,150	793.00
Montezuma	480	9,921.60	103	63.25	.....	.....	.....	9,984.85
Ouray	69,565	1,437,908.55	1,987,267	1,219,152.46	9,478,657	448,340.48	352,368	3,163,612.68
Park	5,629	116,588.13	43,138	26,491.05	682,107	32,263.66	15,000	177,790.84
Pitkin	651	13,456.17	4,419,116	2,529,549.14	27,452,260	1,298,491.90	6,082	3,842,591.96
Pueblo	42	248.04	9	5.53	.....	.....	.....	253.57
Rio Grande	5,297	107,628.69	3,675	1,888.36	26,260	1,242.10	8,599	112,179.70
Routt	150	3,280.53	477	292.93	.....	.....	5,765	4,531.81
Saguache	386	7,978.62	15,793	9,698.48	316,061	14,949.69	16,129	35,291.29
San Juan	36,623	757,294.44	681,317	418,396.77	17,579,177	834,495.67	1,972,087	2,332,884.72
San Miguel	88,406	1,827,352.02	1,136,692	698,042.56	3,373,425	158,617.00	341,045	2,735,394.21
Summit	16,394	328,181.87	403,336	247,684.95	5,610,710	265,386.58	53,030	860,013.96
Teller	877,972	18,147,681.24	80,792	49,614.37	.....	.....	134	18,197,317.75
Total	1,301,487	\$28,762,638.29	20,336,712	\$12,488,774.84	164,274,762	\$7,770,196.24	7,826,949	\$70,314,019.35

NOTE: In the above table the calculation is on the average market price of the metals for the year. See page 52.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1899.

COLORADO	GOLD			SILVER			LEAD		COPPER		TOTAL
	Name of County	Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value		
Arapahoe	13	\$ 268.71	2	\$ 1.19	.....	.....	.....	.....	\$	269.90
Archuleta	5	103.35	43	25.62	.....	.....	.....	.....		128.97
Boulder	26,505	547,888.35	75,371	45,501.84	28,043	\$ 1,253.52	78,816	\$ 13,879.50		608,493.21
Chaffee	10,482	216,602.94	147,339	87,784.58	1,193,074	53,330.41	696,736	122,695.21		480,473.14
Clear Creek	26,455	546,824.85	1,502,900	895,427.82	7,216,269	322,566.82	292,966	51,591.31		1,816,410.80
Conejos	303	6,203.01	22,987	13,695.65	.....	.....	.....	.....		19,958.66
Costilla	39	806.13	126	75.07	.....	.....	.....	.....		881.20
Custer	51	1,054.17	6,604	3,577.18	836,894	37,409.16	923	162.54		42,203.05
Delta	10	206.70	10	5.96	.....	.....	.....	.....		212.66
Dolores	3,224	66,846.78	257,052	153,151.59	2,046,232	91,466.57	44,509	7,838.03		319,302.97
Douglas	4	82.68	24	14.30	.....	.....	.....	.....		96.98
Eagle	2,230	46,094.10	44,393	26,449.35	1,187,930	53,100.47	5,876	1,034.76		126,678.68
Fremont	455	9,404.85	3,974	2,367.70	11,443	.....	.....	.....		127.00
Gilpin	96,588	1,996,060.56	340,652	202,960.46	1,312,312	511.50	6,698	1,179.52		13,463.57
Grand	6	124.02	13	7.75	.....	58,660.35	1,037,421	182,689.84		2,440,371.21
Garfield	35	723.45	17	10.13	.....	.....	.....	.....		131.77
Gunnison	3,392	70,112.64	132,983	79,231.27	1,399,336	.....	.....	.....		733.58
Hinsdale	1,855	38,342.85	155,902	92,886.41	10,572,353	62,550.32	46,186	8,133.35		220,027.58
Huerfano	6	124.02	5	2.98	.....	472,584.18	49,676	8,747.94		612,561.38
Jefferson	66	1,364.22	351	209.13	770	34.42	254	44.73		1,652.50

Lake	106,265	2,196,497.55	7,220,118	4,307,704.30	48,598,729	2,172,362.78	3,292,828	564,018.61	9,240,582.64
La Plata	1,242	25,672.14	3,162	1,882.92	3,176	141.97	211	37.16	27,735.19
Larimer	100	2,067.00	135	80.43	.....	.....	2,474	435.67	2,883.19
Las Animas	10	206.70	3	1.79	.....	.....	.....	.....	208.49
Mineral	4,425	91,671.45	3,796,899	2,262,192.42	5,677,162	253,769.14	29,223	3,561.27	2,611,194.28
Montrose	35	723.45	46,119	27,477.70	.....	.....	75,006	13,208.56	41,460.71
Mesa	6	124.02	4,120	2,464.70	.....	.....	4,650	818.87	3,397.59
Montezuma	746	15,419.82	227	135.55	.....	.....	.....	.....	15,555.07
Ouray	82,000	1,694,940.00	2,346,194	1,397,862.29	7,556,386	837,770.45	365,177	59,741.67	3,484,314.51
Park	7,404	153,040.68	72,137	42,979.22	540,849	24,175.95	7,903	1,391.72	221,587.57
Pitkin	2,527	52,223.09	4,158,708	2,477,758.23	25,458,380	1,137,989.59	19,351	3,407.71	3,671,388.62
Rio Grande	929	19,292.43	2,718	1,619.38	1,655	73.08	330	59.17	20,854.06
Routt	559	11,554.53	1,271	757.26	3,405	152.20	.....	.....	12,403.99
Saguache	188	3,885.96	14,306	8,523.51	441,095	19,716.95	35,319	6,219.68	38,346.19
San Juan	48,199	996,273.33	1,191,857	710,108.40	16,011,677	715,721.96	1,197,661	210,968.10	2,623,011.79
San Miguel	66,004	1,376,704.68	1,208,385	719,961.74	3,918,883	175,174.07	190,239	28,218.06	2,390,658.58
Summit	12,506	290,566.02	264,872	157,810.74	4,032,431	180,249.67	65,531	11,540.01	610,166.44
Teller	776,902	16,658,564.34	82,299	49,033.74	.....	.....	275	48.43	16,107,646.51
Total	1,282,471	\$26,598,675.57	23,114,688	\$13,771,731.10	138,048,446	\$6,170,765.53	7,357,245	\$1,295,610.85	\$47,746,753.95

NOTE.—In the above table the calculation is on the average market price of the metal for the year. See page 52.

Lake	100,292	2,073,035.64	7,068,727	4,117,533.48	35,945,096	1,204,803.72	5,543,954	685,274.48	8,160,647.32
La Plata	1,470	30,384.90	4,348	2,532.71	.....	.....	2,568	398.16	33,255.77
Larimer	540	11,161.80	60	34.95	.....	.....	24,484	2,938.08	14,134.83
Las Animas	6	124.02	.....	.....	.....	.....	.....	.....	124.02
Mineral	2,244	46,383.48	4,177,184	2,433,209.68	5,453,104	197,947.68	14,729	1,767.48	2,679,308.32
Montrose	131	2,707.77	6,290	3,663.93	.....	.....	34,664	4,159.68	10,531.38
Mesa	8	165.36	20	11.05	.....	.....	.....	.....	177.01
Montezuma	400	8,208.00	871	567.36	8,407	305.17	.....	.....	9,080.53
Ouray	41,246	852,554.82	1,420,330	827,342.23	2,799,936	101,637.68	1,035,562	124,267.44	1,905,802.17
Park	7,716	159,489.72	198,711	115,749.16	1,953,001	70,803.94	29,957	2,514.84	348,647.66
Pitkin	3,435	71,001.45	3,877,270	2,316,759.78	15,903,682	577,303.66	4,553	546.36	2,905,611.25
Rio Grande	180	3,720.69	1,568	913.36	2,393	86.87	9,794	1,175.28	5,896.11
Routt	617	12,753.39	2,173	1,265.77	15,477	561.82	600	72.00	14,662.98
Saguache	952	19,677.84	2,618	1,524.99	132,462	4,808.37	21,711	2,605.32	28,616.52
San Juan	54,794	1,132,591.98	1,048,499	610,750.68	14,659,999	532,157.96	2,252,421	270,200.52	2,545,791.14
San Miguel	76,085	1,572,676.95	2,129,082	1,240,190.27	6,639,712	243,199.55	300,831	43,299.72	3,000,368.49
Summit	16,624	343,824.78	415,687	242,137.68	4,889,294	177,478.11	9,825	1,179.00	764,619.57
Total	1,128,584	\$23,534,531.28	23,562,601	\$13,690,265.15	113,417,168	\$4,117,043.24	10,870,869	\$1,304,504.28	\$42,646,343.95

NOTE.—In the above table the calculation is on the average market price of the metal for the year. See page 52.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PREVIOUS METAL PRODUCTION BY COUNTIES FOR THE YEAR 1897.

COLORADO	GOLD		SILVER		LEAD		COPPER		TOTAL
	Name of County	Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value
Arapahoe	102	\$	2,108.34	14	\$	8.35	.....	.....	\$ 2,116.69
Archuleta	34		702.78	348		207.58	.....	.....	910.36
Boulder	24,802		512,657.34	138,715		82,743.50	\$ 10,448.09	58,474	\$ 6,139.77
Chaffee	10,979		226,935.93	53,859		32,126.89	57,000.02	172,891	18,153.55
Clear Creek	37,864		782,648.88	1,442,583		860,500.76	177,893.32	516,024	54,183.57
Conejos	51		1,054.17	98		58.46	.....	.....	1,112.63
Costilla	262		5,415.54	482		287.51	1,691.62	502	52.71
Custer	103		2,129.01	26,842		16,011.25	71,015.19	874	91.77
Delta	14		289.38	.....		.....	.....	.....	289.38
Dolores	2,103		43,469.01	179,901		107,310.95	36,971.79	39,654	4,163.67
Douglas	23		475.41	10		5.96	.....	.....	481.37
Eagle	1,682		34,766.94	46,046		27,466.44	38,667.64	2,200	231.00
El Paso	490,172		10,131,855.24	59,879		35,717.82	185.63	1,625	170.58
Fremont	623		12,877.41	1,525		909.66	.....	.....	13,787.07
Garfield	15		310.05	42		25.05	.....	.....	335.10
Gilpin	100,942		2,086,471.14	374,417		223,339.74	67,860.19	1,018,595	2,484,623.55
Grand	94		1,942.98	85		50.70	.....	.....	1,993.68
Gunnison	1,972		40,761.24	103,941		62,000.81	34,243.25	2,770	290.85
Hinsdale	8,136		168,171.12	248,437		145,210.17	187,591.96	8,085	848.93
Huerfano	35		723.45	167		99.62	36.06	92	9.66

Jefferson	399	8,217.23	1,614	962.75	10,093	341.14	1,692	168.21	9,719.43
Lake	99,818	2,063,858.16	5,451,317	3,251,710.59	23,700,908	801,090.69	3,146,802	339,414.21	6,447,073.65
La Plata	1,426	29,475.42	1,409	840.47	857	28.97	420	44.10	30,338.96
Larimer	144	2,976.48	97	57.86	.....	.....	.....	.....	3,034.34
Las Animas	31	640.77	9	5.37	.....	.....	.....	.....	646.14
Mineral	2,967	61,327.89	3,070,576	1,831,598.58	6,080,673	205,526.75	1,500	157.50	2,098,610.72
Montrose	317	6,552.39	851	507.62	.....	.....	.....	.....	7,060.01
Mesa . . . . .	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montezuma	371	7,668.57	105	62.63	.....	.....	.....	.....	7,731.20
Ouray	26,746	552,839.82	2,776,394	1,654,119.02	7,784,212	263,106.37	2,185,084	229,433.82	2,701,499.62
Park	7,432	153,619.44	199,945	119,297.19	4,517,614	152,695.35	58,092	6,090.21	431,672.19
Pitkin	7,955	164,429.85	4,599,946	2,743,867.79	4,456,478	150,628.96	8,360	877.80	3,059,804.40
Rio Grande	1,093	22,592.31	8,168	4,872.21	12,006	405.90	627	65.84	27,936.16
Routt	473	9,776.91	7,805	4,655.68	88,736	2,999.28	958	100.59	17,532.46
Saguache	665	13,745.55	2,482	1,480.51	9,266	313.19	2,975	312.38	15,861.63
San Juan	33,691	694,925.97	1,101,907	667,287.53	8,021,414	271,123.79	1,435,263	150,696.32	1,773,433.61
San Miguel	70,544	1,458,144.48	863,679	518,465.62	4,143,767	140,659.32	354,781	37,252.60	2,153,891.42
Summit	13,239	273,650.13	514,167	306,661.83	1,748,761	59,108.12	133,482	14,015.61	653,438.69
Total	947,249	\$19,579,636.82	21,278,202	\$12,692,447.47	80,799,778	\$2,731,032.49	9,151,562	\$ 960,917.13	\$35,964,033.92

NOTE.—In the above table the calculation is on the average market price of the metal for the year. See page 52.

THE BUREAU OF MINES OF THE STATE OF COLORADO.

PRECIOUS METAL PRODUCTION OF COLORADO TO DECEMBER 31, 1904.

YEAR	GOLD			SILVER			LEAD			COPPER			TOTAL
	Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Previous to 1870	1,316,550	\$27,213,081.00	250,000	\$ 330,000.00	.....	.....	.....	.....	200,000	\$ 40,000.00	.....	.....	\$ 27,583,081.00
1870	145,864	3,015,000.00	500,000	600,000.00	.....	.....	.....	.....	97,088	20,000.00	.....	.....	3,695,000.00
1871	175,808	3,633,451.00	779,590	1,029,058.00	.....	.....	.....	.....	90,909	30,000.00	.....	.....	4,693,009.00
1872	128,094	2,646,463.00	1,524,207	2,015,001.00	80,000	\$ 5,000.00	155,172	45,000.00	.....	.....	.....	.....	4,711,464.00
1873	88,788	1,895,248.00	1,683,370	2,185,014.00	112,000	7,078.40	28,172	65,000.00	.....	.....	.....	.....	4,092,340.42
1874	99,932	2,065,595.00	2,415,435	3,086,996.00	624,000	37,502.40	400,876	90,197.00	.....	.....	.....	.....	5,280,220.40
1875	112,291	2,321,055.00	2,306,253	2,873,591.00	1,636,000	35,706.00	428,571	90,000.00	.....	.....	.....	.....	5,380,352.00
1876	131,897	2,726,311.00	2,552,125	2,950,256.00	1,334,000	81,774.20	376,244	70,000.00	.....	.....	.....	.....	5,828,341.20
1877	145,138	3,000,000.00	3,480,548	4,180,138.00	1,794,000	98,490.60	504,283	93,796.64	.....	.....	.....	.....	7,372,425.24
1878	162,864	3,366,404.00	4,172,744	4,807,001.00	13,338,000	481,501.80	539,393	89,000.00	.....	.....	.....	.....	8,743,906.80
1879	156,023	3,225,000.00	9,049,424	10,162,503.00	47,348,000	1,960,207.20	766,082	131,000.00	.....	.....	.....	.....	15,478,710.20
1880	154,814	3,200,000.00	13,148,735	15,055,302.00	71,348,000	3,595,939.20	915,422	184,000.00	.....	.....	.....	.....	22,035,241.20
1881	159,652	3,300,000.00	13,272,488	15,104,092.00	81,094,000	3,900,621.40	889,503	161,000.00	.....	.....	.....	.....	22,465,713.40
1882	162,554	3,360,000.00	12,707,866	14,486,136.00	110,000,000	5,401,000.00	1,494,000	276,330.00	.....	.....	.....	.....	23,473,526.00
1883	198,355	4,100,000.00	13,434,915	14,912,756.00	141,114,000	6,096,124.80	1,153,000	182,750.50	.....	.....	.....	.....	25,291,631.30
1884	205,612	4,250,000.00	12,375,280	13,984,066.00	126,330,000	4,724,742.00	2,013,000	278,800.50	.....	.....	.....	.....	23,237,608.50
1885	203,193	4,200,000.00	12,220,589	13,014,927.00	111,000,000	4,345,000.00	1,146,000	127,435.20	.....	.....	.....	.....	21,687,362.20
1886	215,288	4,450,000.00	12,375,280	12,313,404.00	118,000,000	5,463,400.00	409,000	44,990.00	.....	.....	.....	.....	22,271,794.00
1887	193,517	4,000,000.00	11,600,826	11,345,608.00	126,000,000	5,670,000.00	2,012,000	226,350.00	.....	.....	.....	.....	21,241,958.00
1888	181,809	3,758,000.00	14,695,645	13,813,906.00	131,000,000	5,790,200.00	1,621,000	270,053.60	.....	.....	.....	.....	23,632,164.60

1889	.....	187,898	3,883,859.00	18,375,519	17,139,486.00	138,000,000	5,423,400.00	3,100,000	426,250.00	26,922,965.00
1890	.....	190,774	4,150,000.00	18,800,425	19,665,245.00	109,000,000	4,883,200.00	6,000,000	945,000.00	29,643,445.00
1891	.....	222,545	4,600,000.00	21,160,180	20,906,554.00	128,000,000	5,568,000.00	7,000,000	883,400.00	31,957,954.00
1892	.....	226,110	5,300,000.00	26,350,000	23,082,600.00	123,000,000	5,030,700.00	7,250,000	837,375.00	34,250,675.00
1893	.....	364,151	7,527,000.00	25,838,600	20,205,785.00	84,396,000	3,147,970.80	7,121,157	765,555.13	31,646,290.93
1894	.....	462,009	9,549,731.00	23,236,025	14,638,696.00	97,264,000	3,200,000.00	6,528,214	624,697.26	28,012,524.26
1895	.....	656,021	13,559,954.00	17,891,626	11,683,232.00	91,477,214	2,854,714.00	6,125,000	659,650.00	28,856,950.00
1896	.....	738,618	15,267,234.00	21,547,743	14,458,536.00	82,018,000	2,321,109.40	7,539,245	830,269.86	32,867,149.26
1897	.....	917,249	19,579,637.00	21,278,292	12,692,448.00	80,799,778	2,731,032.49	9,151,592	960,917.13	35,964,034.62
1898	.....	1,138,584	23,534,531.28	23,502,601	13,690,265.15	113,417,168	4,117,043.21	10,870,869	1,304,504.28	42,646,343.95
1899	.....	1,282,471	26,508,675.57	23,114,688	13,771,731.10	138,048,446	6,170,765.33	7,357,245	1,295,610.85	47,746,783.05
1900	.....	1,391,487	28,762,036.29	20,336,712	12,488,774.84	164,274,762	7,770,196.24	7,826,949	1,293,011.98	50,314,019.35
1901	.....	1,339,112	27,679,445.04	18,492,563	10,901,365.89	148,111,029	6,419,131.61	7,872,529	1,303,297.17	46,303,239.71
1902*	.....	1,379,638	28,517,117.46	15,941,703	8,315,192.29	106,303,374	1,325,484.29	8,463,938	1,006,108.31	44,708,895.83
1903*	.....	1,045,252	21,695,358.84	13,245,433	7,079,710.66	101,513,414	1,301,123.35	7,809,920	1,033,642.90	38,373,099.75
1904*	.....	1,171,892	21,223,007.61	12,900,777	7,416,156.65	107,546,874	4,024,511.73	9,401,913	1,205,697.31	40,783,071.25
Total	.....	17,122,601	\$353,913,695.12	161,618,407	\$386,455,463.58	2,895,322,630	\$120,742,673.68	134,658,286	\$17,879,445.62	\$889,461,323.40
*Zinc 1902	.....	52,182,510	\$ 2,544,493.18							
*Zinc 1903	.....	80,616,000	1,333,264.00							
*Zinc 1904	.....	64,976,235	3,313,787.97							
Total	.....	198,174,745	\$10,212,045.15							

NOTE.—In the above table the calculation is on the average market price of the metal for each year. See page 50.

AVERAGE MARKET VALUE OF METALS PER ANNUM.

YEAR	Gold Per Ounce	Silver Per Ounce	Lead Per Pound	Copper Per Pound
Previous to 1870	\$ 20.67	\$ 1.32	.....	\$ 0.20
1870	20.67	1.32	.....	.206
1871	20.67	1.32	.....	.33
1872	20.67	1.322	\$ 0.0625	.29
1873	20.67	1.298	.0632	.232
1874	20.67	1.278	.0601	.225
1875	20.67	1.246	.0585	.21
1876	20.67	1.156	.0613	.186
1877	20.67	1.201	.0549	.186
1878	20.67	1.152	.0361	.165
1879	20.67	1.123	.0414	.171
1880	20.67	1.145	.0504	.201
1881	20.67	1.138	.0481	.181
1882	20.67	1.136	.0491	.185
1883	20.67	1.11	.0432	.1585
1884	20.67	1.13	.0374	.1385
1885	20.67	1.065	.0395	.1112
1886	20.67	.995	.0463	.11
1887	20.67	.978	.0450	.1125
1888	20.67	.94	.0442	.1666
1889	20.67	.936	.0393	.1375
1890	20.67	1.046	.0448	.1575
1891	20.67	.988	.0435	.1262
1892	20.67	.876	.0409	.1155
1893	20.67	.782	.0373	.1075
1894	20.67	.63	.0329	.0956
1895	20.67	.653	.0323	.1076
1896	20.67	.671	.0283	.1088
1897	20.67	.5965	.0338	.105
1898	20.67	.5825	.0363	.12
1899	20.67	.5958	.0447	.1761
1900	20.67	.6141	.0473	.1652
1901	20.67	.5895	.04334	.16555
1902	20.67	.5216	.04069	.1887
1903	20.67	.5345	.04237	.13235
1904	20.67	.5722	.04309	.12825

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