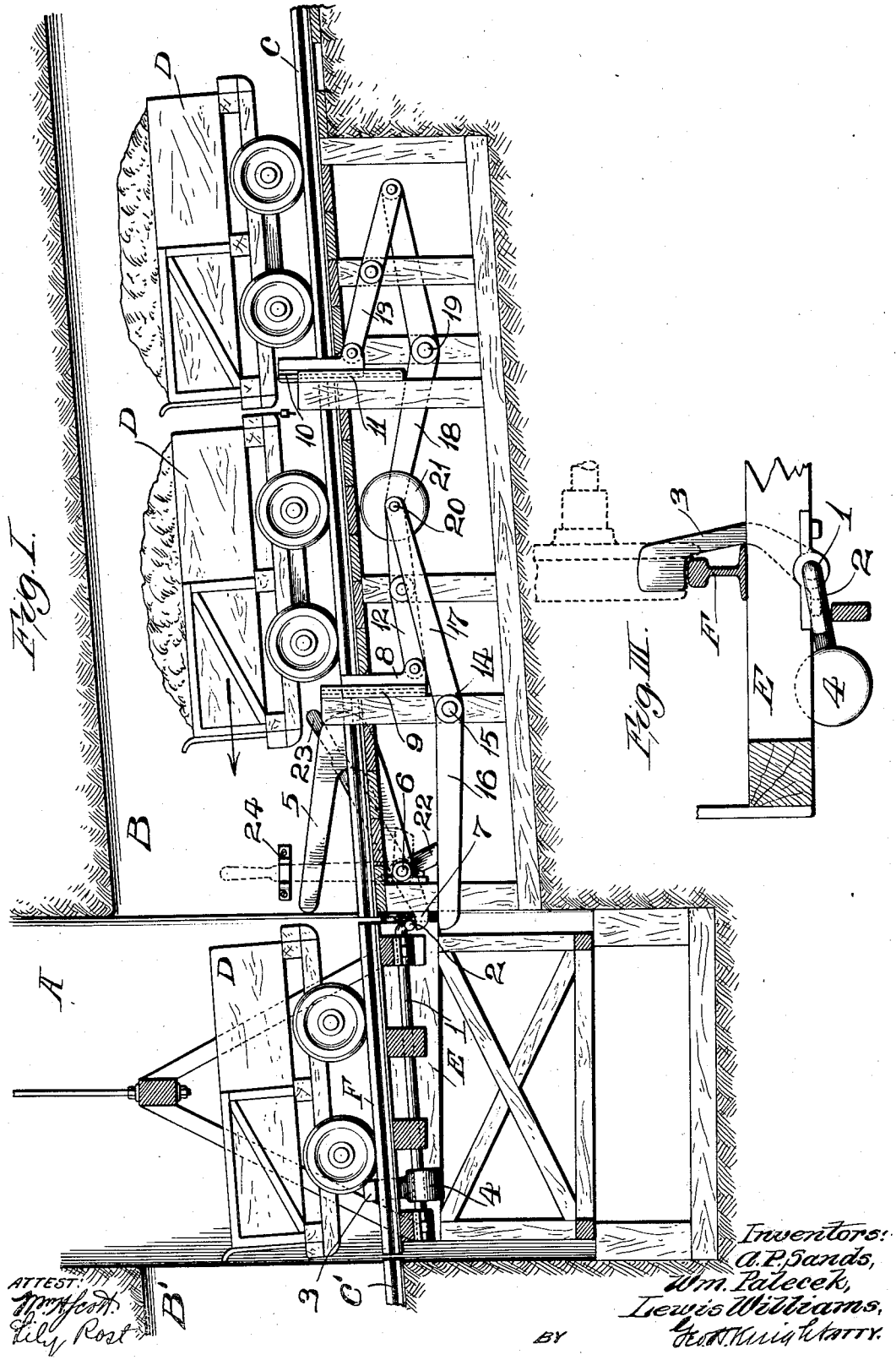
No. 896,467. PATENTED AUG. 18, 1908.

A. P. SANDS, W. PALECEK & L. WILLIAMS.

MINING APPARATUS.

APPLICATION FILED OCT. 14, 1907.

4 SHEETS—SHEET 1.



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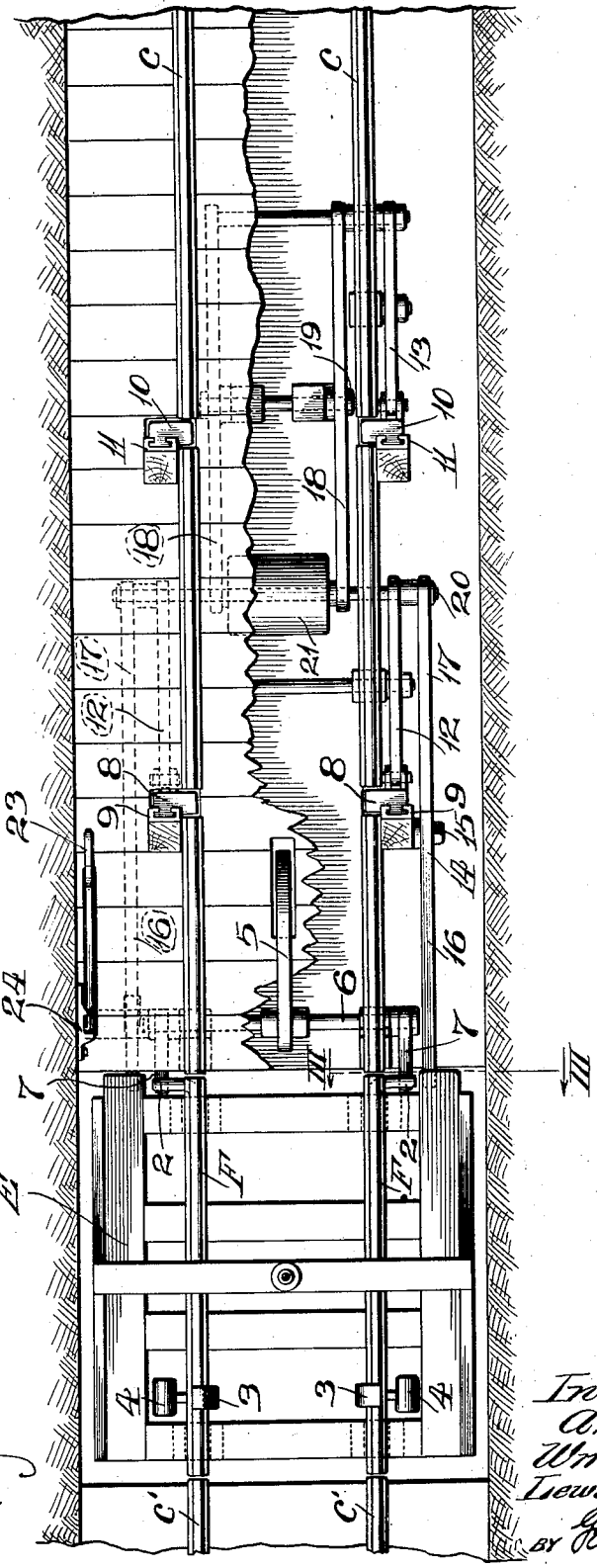
4 SHEETS—SHEET 2.

Fig. II.



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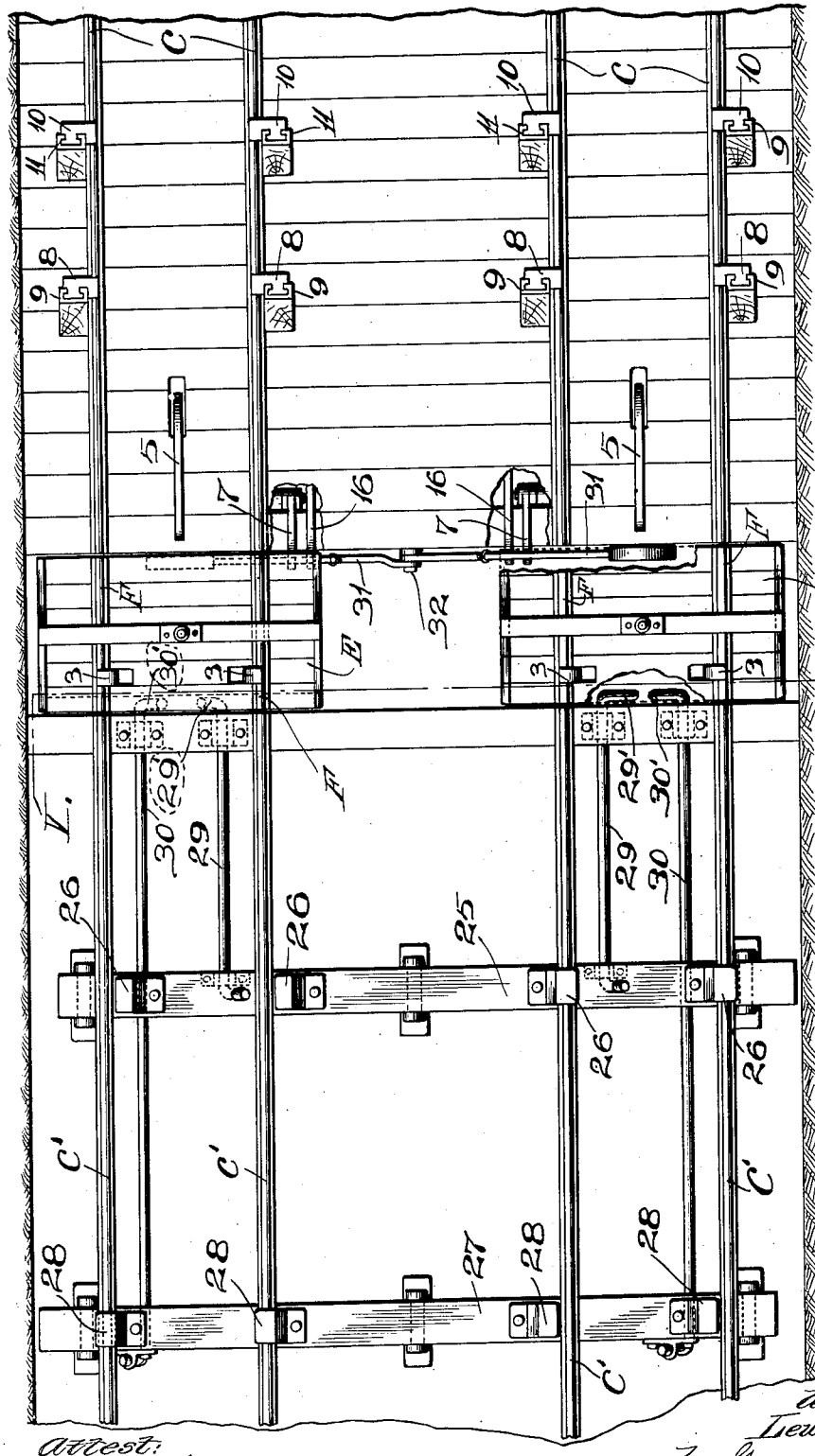

Fig. IV.

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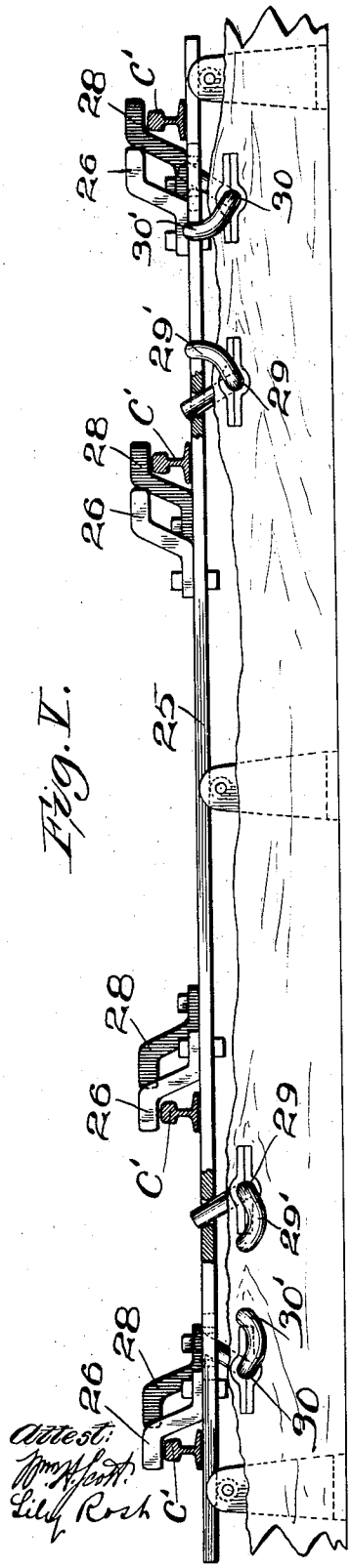

Fig. I.

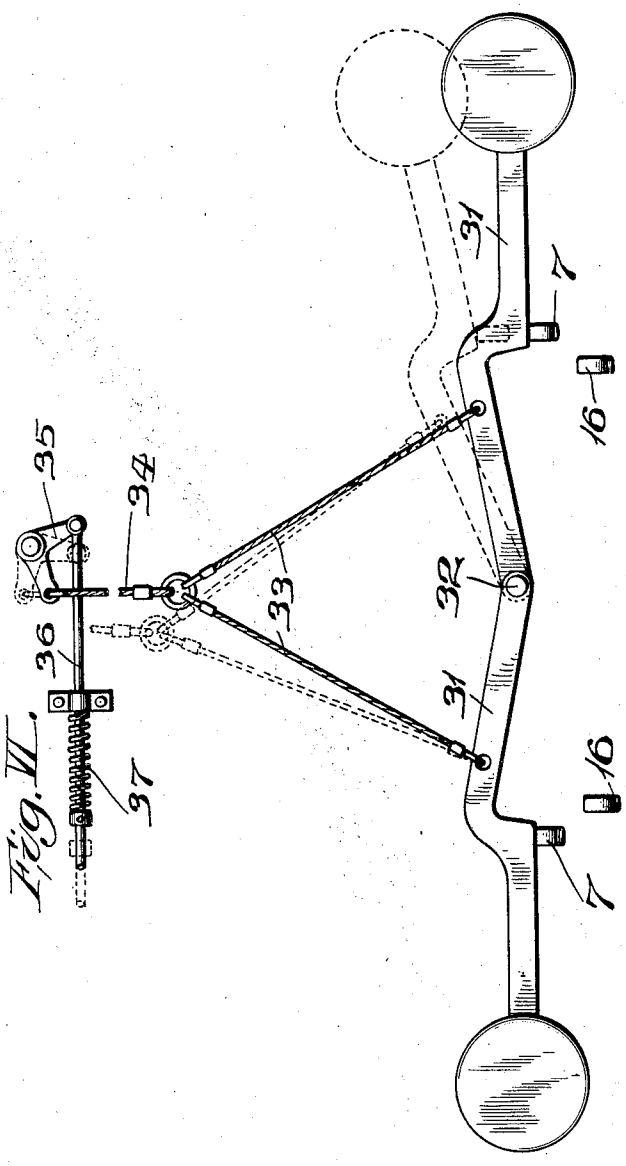

Fig. II.

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UNITED STATES PATENT OFFICE.

ALONZO P. SANDS, OF MARYVILLE, AND WILLIAM PALECEK AND LEWIS WILLIAMS, OF COLLINSVILLE, ILLINOIS.

MINING APPARATUS.

No. 896,467. Specification of Letters Patent. Patented Aug. 18, 1908.

Application filed October 14, 1907. Serial No. 397,312.

To all whom it may concern:

Be it known that we, ALONZO P. SANDS, a citizen of the United States of America, residing at Maryville, in the county of Madison and State of Illinois, and WILLIAM PALECEK and LEWIS WILLIAMS, citizens of the United States of America, residing at Collinsville, in the county of Madison and State of Illinois, have invented certain new and useful Improvements in Mining Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to a mining apparatus embodying means by which the cars that are used in mining operations may be effectually controlled previous to their delivery to a hoisting cage and after they are discharged from the cage within a mine.

The apparatus also embodies signal mechanism by which the operator in charge of the cage may be notified when a loaded car has been delivered onto the cage in the mine.

Figure I is a view partly in elevation and partly in vertical section of a shaft and drift in a mine with our apparatus. Fig. II is a plan view of the parts shown in Fig. I with the cars illustrated in said figure omitted and the flooring of the car track partly broken away. Fig. III is an enlarged cross section taken on line III—III, Fig. II with one of the dogs and actuating members therefor carried by the cage shown in elevation. Fig. IV is a top or plan view of the apparatus showing the car tracks at both sides of a pair of mine shafts. Fig. V is an enlarged vertical cross section taken on line V—V, Fig. IV. Fig. VI is an enlarged elevation of the signal operating members.

A designates a mine shaft and B and B′ drifts that have communication with said shaft. The drifts B and B′ are connected in the mine aside from the shaft to provide a continuous passageway through which cars may be conducted to receive substance being mined and carry it to the shaft in order that it may be hoisted with the cars therethrough.

C and C′ are car tracks located respectively in the drifts B and B′ and D are the cars adapted to travel on these tracks.

E is a hoisting cage provided with car receiving rails F and adapted to be lowered and raised in the shaft A in order that the cars, when in an empty condition, may be lowered to pass onto the track C′ and be received from the track C when in a loaded condition to be elevated to the top of the mine.

No invention *per se* is herein claimed for the parts thus far described.

1 designates rock shafts rotatably mounted in suitable bearings carried by the cage E and which terminate in crank arms 2 at the end of the cage which faces the track C when the cage is in a lowered position. We preferably employ two of said rock shafts but any other desirable number of them may be utilized.

3 are dogs fixed to the rock shafts and adapted to move into positions above the cage rails F for the purpose of serving as stops overhanging said rails which act to restrain a car upon the cage by opposing the track wheels of the car. Each rock shaft has fixed to it a counter-balance weight 4 that normally holds the dog 3 in a position to obstruct movement of a car from the cage E and which serves to return said dog to an obstructing position after it has been tripped in the manner to be explained.

5 designates a trip lever disposed in the track C in the path of travel of the cars while moving in the drift B and adapted to be struck by said cars. This trip lever, which is preferably of V-shape, has a free upper end that projects above the track C adjacent to the shaft A and its lower end is fixed to a rock shaft 6 that is mounted in suitable bearings secured to the supporting timbers of the track C, as seen in Fig. I. The rock shaft 6 extends transversely of the track and it has fixed to it a pair of trip arms 7 which project into the shaft A and are adapted to be engaged by the crank arms 2 of the rock shafts 1 carried by the cage E.

8 designates forward dogs and 10 rear dogs slidably fitted in guides 9 and 11 supported by timbers of the track C. These dogs are preferably arranged in pairs as shown and they are adapted to operate vertically within the rails of the track C in such manner that the forward dogs and the rear dogs will be alternately raised and lowered through the track rails to serve as stops for the cars D due to their presence in front of the car wheels. The two sets of dogs are disposed sufficiently apart from each other to provide for a car being restrained upon the track back of each set of dogs and the dogs are operated alternately by means to be described, in

such manner that the forward car may be released to approach the shaft A while a second car will be restrained from movement by the rear dogs, after which said rear dogs are lowered to permit forward movement of the second car and the forward dogs are elevated to arrest movement of the second car until such time as it is to continue its course toward the shaft of the mine. The means for operating the dogs 8 and 10 consist of levers 12 and 13 pivotally supported and connected to the dogs, main operating levers 14 pivotally supported at 15 and having forward arms 16 and rear arms 17, supplemental operating levers 18 pivotally supported at 19 and a connecting rod 20 uniting said operating levers and provided with a counterbalance weight 21. The rear arms of the main operating levers and the levers 12 connected to the forward dogs 8 are loosely fitted to the connecting rod 20 and the forward arms of the supplemental operating levers 18 are also loosely fitted to said rod. The levers 13 connected to the rear dogs 10 are pivoted to the rear arms of the supplemental operating levers. The forward arms 16 of the main operating levers 14 extend into the shaft A sufficiently to provide for their being engaged by the cage E when said cage is lowered in said shaft. When the cage is in an elevated position and being lowered in the shaft the forward ends of the lever arms 16 are held in an elevated position, due to the influence of the counterbalance weight 21 upon said levers and as a consequence the forward dogs 8 are upheld in car restraining position while the rear dogs 10 are maintained in lowered position by virtue of the operating parts connected thereto.

Referring now to the operation of the parts that have been described. It will be assumed that the cage E is being lowered with an empty car thereon and that loaded cars are in position upon the track C as shown in Fig. I and that the forward one of these cars is restrained from movement upon the track C by the dogs 8. In this connection it is to be noted that the dogs 8 and 10 would be in positions the reverse of those in which they are shown in said view; *i. e.*, the dogs 8 would be in elevated positions and the dogs 10 in lowered positions. As the cage descends to the bottom of the shaft it strikes the projecting ends of the main operating lever arms 16, thereby depressing said arms which at the time of descent of the cage were in elevated positions and elevating the rear arms of the levers so that they will act through the medium of the connecting rod 20 to move the levers 12 and lower the forward dogs 8 to the positions shown in Fig. I. The main operating levers also act at the same time to operate the supplemental operating levers 18 and cause them to operate the levers 13 with the result of effecting upward movement of the rear dogs 10 so that these dogs will be in the positions shown in Fig. I. The parts described will then be in the positions shown in Fig. I. At this time the forward car upon the track C is free to move toward the shaft A and the cage therein and the rear car is restrained from movement by the rear dogs. The forward car then moves toward the shaft and by striking the free upper end of the trip lever 5 depresses said lever with the result of rotating the rock shaft 6 to which the lever is fixed. Upon the rotation of the rock shaft the trip arms 7 carried thereby are moved upwardly beneath the crank arms 2 of the dog supporting rock shaft 1 carried by the cage E. The trip arms then act upon said crank arms to rotate the rock shafts 1 and move the free upper ends of the dogs 3 from positions in front of the wheels of an empty car D on the cage, thereby freeing said car and permitting it to ride from the cage onto the track C′ in the drift B′. Immediately after the empty car has moved off of the cage the car D that is approaching the cage on the track C passes onto said cage and having passed beyond the trip lever 5, said trip lever is freed so that its action upon the rock shafts 1 and the dogs 3 is discontinued. The counter-balance weights 4 are therefore permitted to immediately rotate said rock shafts and carry the free ends of the dogs 3 into obstructing positions above the rails on the cage with the result of causing them to hold the loaded car on the cage in order that it may be hoisted thereon. The cage is then hoisted and as it moves upwardly the main operating levers 14 are freed of restraint, due to the weight of the cage being removed from the ends of the lever arms that project into the mine shaft and the counter-balance weight 21 is permitted to act upon the levers 18, 12 and 13 in a manner to cause the forward dogs 8 to be elevated in the rails of the track C and the rear dogs 10 to be lowered in said rails. The next succeeding loaded car is therefore permitted to advance toward the mine shaft until it is stopped by the dogs 8 and restrained in a position back of these dogs until the cage is again lowered and the parts are again operated as before to permit the passage of this car onto the cage after the empty car lowered thereon has been discharged.

It is desirable to provide some means by which cars upon the track C may be kept in a position back of one set of the dogs 8 or 10 without said dogs being operated when the cage E is lowered and raised for other purposes than the hoisting and lowering of cars, such, for instance, as the conveyance of employees to and from the drifts of the mines. We therefore provide means for holding the mechanism by which the dogs 8 and 10 are operated so that the rear dogs may be up-

held in the path of travel of the car and be unaffected by the cage. The means shown for this purpose comprises a restraining arm 22 which is loosely fitted to the rock shaft 6 and is adapted to be thrown into engagement with the forward arm of one of the main operating levers 14, see Fig. I, and being carried by a sleeve that extends to the exterior of the track C and has fixed to it a hand lever 23 by which the sleeve and restraining arm may be actuated. When these parts are not in use the hand lever is placed in engagement with a keeper 24 suitably supported and which serves to so hold the hand lever as to prevent interference by the restraining arm 22 with the operation of the operating lever beneath it.

The parts of our apparatus herein before described are intended to be used in multiple, or in other words, it is intended that two tracks be utilized in both the drift B and drift B′ and the parts described associated with each track. It is also intended that two hoisting cages be employed in the shaft to be raised and lowered alternately and we have shown this multiple arrangement in Figs. IV and V.

It is desirable to provide means whereby the empty cars may be brought to rest after they have been discharged from the cages in order that they may be examined and oiled. To provide for the stoppage of the cars at such time we utilize the following mechanism. 25 and 27 are slidable top carrying bars suitably supported beneath the rails of the track C′ in the drift B′ and which are provided with stop pieces 26 and 28 adapted to be moved into positions over the rails of said tracks in order that they will be engaged by the wheels of the cars delivered onto the tracks. The stop pieces on each bar are so disposed thereon that they may be moved into positions over the rails of one track and be withdrawn from positions over the rails of the other track in each actuation of either bar. The two bars 25 and 26 are adapted to be shifted alternately through the medium of operating rods 29 and 30, the former of which are provided with crank arms loosely fitted to the bar 25 while the latter are provided with crank arms loosely fitted to the bar 27. Each of the rods 29 and 30 is provided with a crank arm 29′ and 30′ that is positioned in the mine shaft and is adapted to be engaged by a cage when said cage descends in the shaft. The last named crank arms are disposed oppositely relative to each other in each instance and when each cage descends it acts upon the crank arms to rotate the rods 29 and 30. These rods are so connected to the bars 25 and 27 that they will shift said bars alternately and cause the stop pieces of the bars to be carried to and away from the rails of the track C′ in a manner to provide for a double stoppage of each car after it has been discharged from the cage in order that it may be examined and oiled.

For the purpose of imparting information to the operator of the hoisting machinery at the top of the mine when a loaded car has been delivered onto the cages E we provide the following means: 31 are weighted arms the inner ends of which are pivotally supported at 32 intermediate of the tracks C. These arms are disposed above the trip arms 7 that operate the cage carried rock shafts 1. Each arm 31 has attached to it a flexible connection 33 preferably of rope and said connections are joined to a rope or other pull member 34 that leads to the top of the mine and is adapted to actuate a bell or other signal device. The pull member may be connected to a bell crank 35 that is in turn connected to a rod 36 which has applied to it a take-up spring 37 which serves to prevent slack in the pull member and connections 33. Each time that a mine cage descends and the parts of the apparatus are operated to discharge an empty car and permit the transference of a loaded car onto the cage a trip arm 7 beneath the weighted arms 31, acts to elevate one of said weighted arms, as illustrated in dotted lines, Fig. VI, while it is acting upon one of the rock shafts 1. Then, as the loaded car passes onto the cage and the trip lever 5 is released, the trip arm 7 descends and permits descent of said weighted arm with the result of causing it to exert a pull upon the connection 33 and the pull member 34 to actuate the signal mechanism at the top of the mine.

We claim:

1. In a mine apparatus, the combination with a car track and a hoisting cage, of car restraining means carried by said cage and comprising a rock shaft having a dog at its forward end adapted to control a car while upon said cage, and a crank arm at its rear end, and means associated with said car track adapted to be engaged by cars while moving on said track and engaging the crank arm so as to actuate said car restraining means, substantially as set forth.

2. In a mine apparatus, the combination with a car track and a hoisting cage, provided with car receiving rails, of car restraining means carried by said cage and comprising rock-shafts each having a dog at its forward end movable to and from the rails thereon, and crank arms at their rear ends and means associated with said car track adapted to be engaged by cars while moving on said track and engaging the crank arms so as to actuate said car restraining means, substantially as set forth.

3. In a mine apparatus, the combination with a car track and a hoisting cage, of a rock-shaft having a dog at its forward end and supported by said cage and adapted to re-

strain a car from movement while located upon said cage and a crank arm at its rear end, and means associated with said car track adapted to be actuated by cars while moving upon said track and engaging the crank arm so as to move said dog out of car restraining position, substantially as set forth.

4. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of rock-shafts having dogs at their forward ends and supported by said cage and adapted to restrain a car from movement on said cage and crank arms at their rear ends, and means associated with said track adapted to be actuated by cars while moving thereon and engaging the crank arms so as to move said dogs out of car restraining positions, substantially as set forth.

5. In a mine apparatus, the combination with a car track and hoisting cage, of a rock shaft having a dog at its forward end and supported by said cage for restraining a car while mounted upon the cage and a crank arm at its rear end, and means associated with said track adapted to be actuated by cars moving on the track and engaging the crank arm so as to move said dog out of car restraining position; said dog having associated therewith means whereby it is positively returned to car restraining position after it has been moved out of car restraining position, substantially as set forth.

6. In a mine apparatus, the combination with a car track and hoisting cage, of movable car restraining means carried by said cage and comprising a rock-shaft having a dog at its forward end, and a crank arm at its rear end, and a trip lever associated with said track adapted to be actuated by cars while moving upon said track and engaging the crank-arm so as to move said car restraining means out of operative position, substantially as set forth.

7. In a mine apparatus, the combination with a car track and a hoisting cage, of movable car restraining means carried by said cage and comprising a rock-shaft having a dog at its forward end and a crank arm at its rear end, a trip lever associated with said track adapted to be actuated by cars while moving upon said track, and a trip arm cooperable with said trip lever and engaging the crank arm whereby said dog may be moved from car restraining position, substantially as set forth.

8. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of rock-shafts having car restraining dogs at their forward ends and crank arms at their rear ends, carried by said cage, a trip lever associated with said car track and adapted to be operated by cars while moving upon said track, and a pair of trip arms coöperable with said trip lever and engaging the crank arms whereby said car restraining dogs may be moved from car restraining positions, substantially as set forth.

9. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of rock-shafts having car restraining dogs at their forward ends and crank arms at their rear ends and supported by said cage, a rock shaft associated with said car track, trip levers fixed to said rock-shaft and adapted to engage the crank arms so as to actuate said car restraining dogs, and a trip lever fixed to said rock shaft and arranged in the path of travel of cars while moving upon said car track, substantially as set forth.

10. In a mine apparatus, the combination with a car track and a hoisting cage, of a vertically movable car restraining dog operable in said car track, and means having connection with said dog adapted to be engaged by said hoisting cage whereby said dog is released, substantially as set forth.

11. In a mine apparatus, the combination with a car track and a hoisting cage, of a car restraining dog operable in said car track, means for moving said dog adapted to be actuated in one direction by the engagement of said hoisting cage, and a counterbalance for actuating said dog in the other direction, substantially as set forth.

12. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of car restraining dogs located one in advance of the other and operable in said car track, and means adapted to be actuated by said hoisting cage whereby said dogs are operated alternately into operative position and out of operative position, substantially as set forth.

13. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of car restraining dogs operable in said car track, and means adapted to be actuated by said hoisting cage whereby said dogs are operated alternately into operative position and out of operative position; said last named means including a counter-balance, substantially as set forth.

14. In a mine apparatus, the combination with a car track and a hoisting cage, of a pair of car restraining dogs located one in advance of the other and operable in said car track, leverage connections between said dogs, and a main operating lever united to said leverage connections and adapted to be actuated by said hoisting cage, substantially as set forth.

15. In a mine apparatus, the combination with a pair of car tracks, and a pair of hoisting cages, of a pair of shiftably mounted car restraining members extending transversely of said car tracks, stop members carried by said shiftably mounted members adapted to be moved to the rails of said car tracks, and means whereby said shiftably mounted members are actuated adapted to be engaged and moved by said hoisting cages, substantially as set forth.

16. In a mine apparatus, the combination with a car track and a hoisting cage, of car controlling means carried by said cage, means for actuating said car controlling means, and a signal operating device adapted to be actuated by the means which actuate said car controlling means, substantially as set forth.

17. In a mine apparatus, the combination with a car track and a hoisting cage, of car controlling means carried by said cage, a trip member for actuating said car controlling means adapted to be actuated by a car while moving upon said car track, a weighted arm adapted to be actuated by said trip member, and means having connection with said weighted arm for actuating a signal, substantially as set forth.

18. In a mine apparatus, the combination with a car track and a hoisting cage, of car controlling means carried by said cage, a pair of trip members for actuating said car controlling means adapted to be actuated by a car while moving upon said car track, a pair of weighted arms adapted to be actuated by said trip members, and means having connection with said weighted arms for actuating a signal, substantially as set forth.

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