No. 647,316 Patented Apr. 10, 1900.

R. P. MULOCK & H. W. WOOD.

APPARATUS FOR ELEVATING ORE FROM MINES.

(Application filed Nov. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

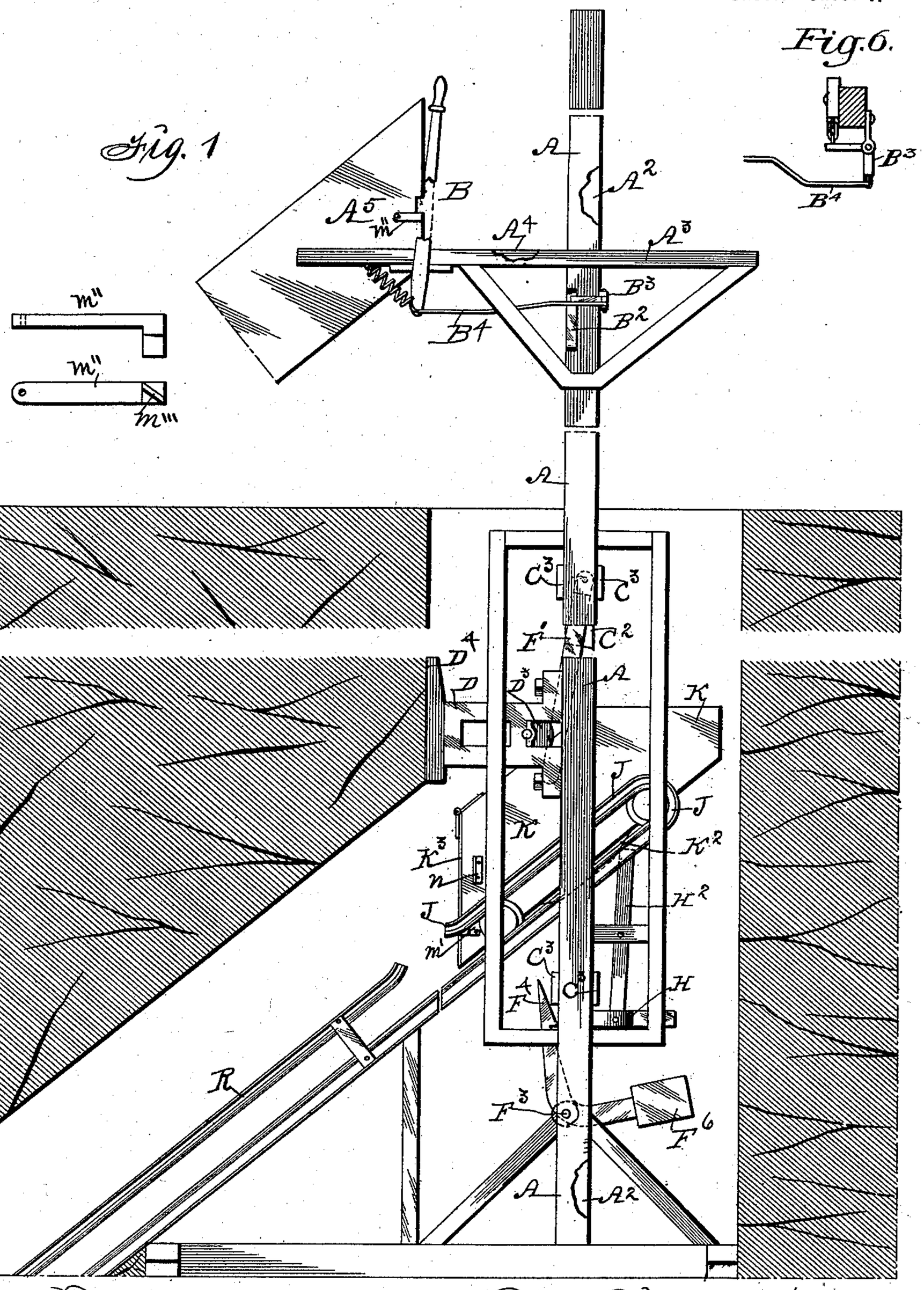

Fig. 6.

Witnesses:
R. S. Orwig.
F. C. Stuart

Inventors:
Robert P. Mulock
and Harry W. Wood,
By Thomas G. Orwig, Attorney.

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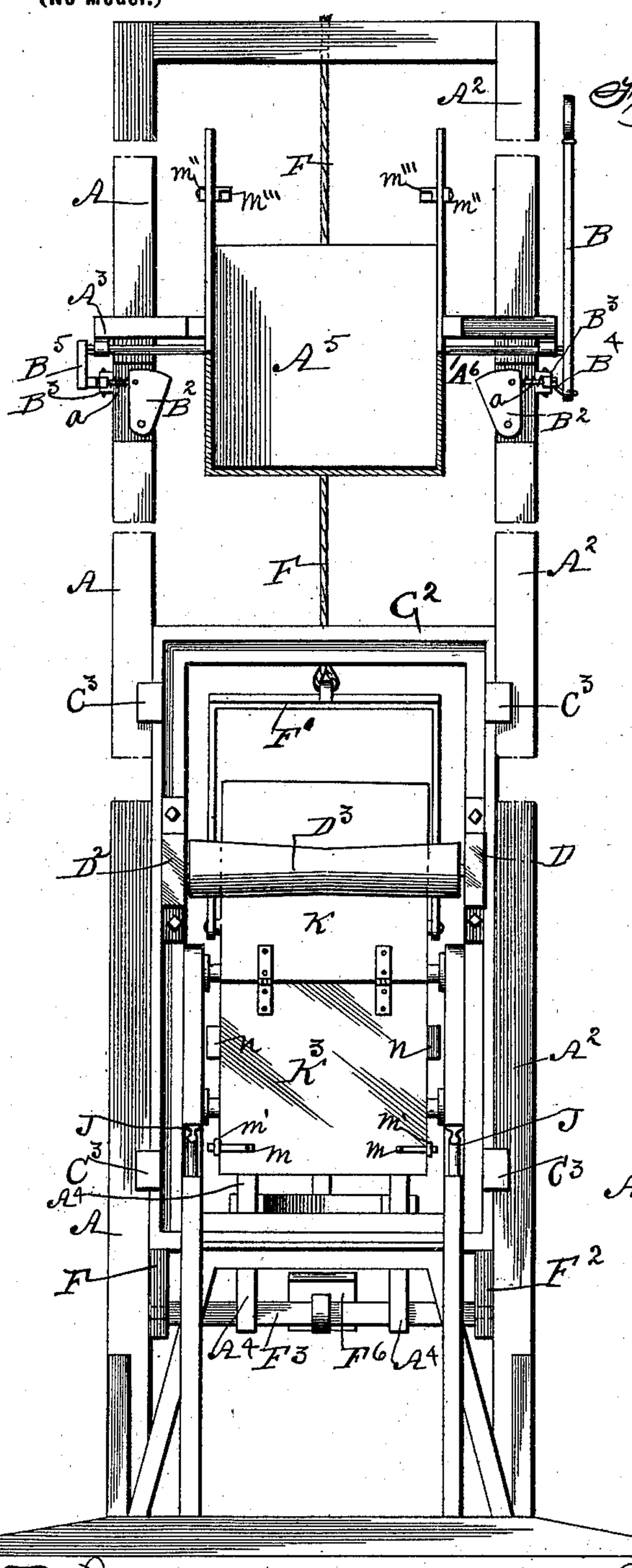


Fig. 2.

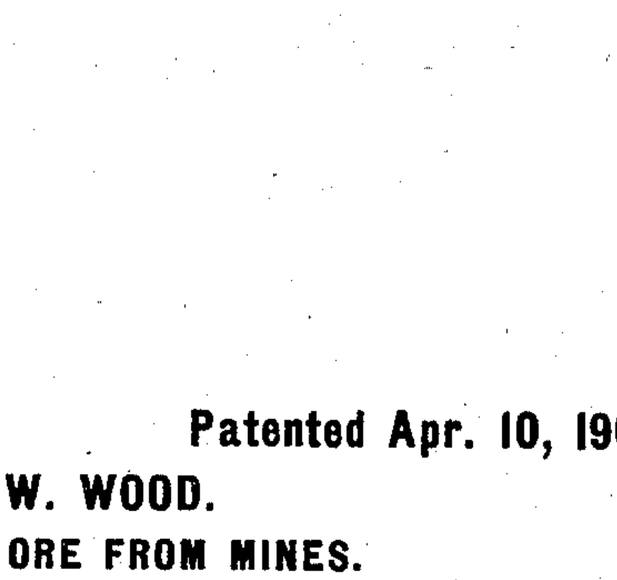


Fig. 3.

Fig. 4.

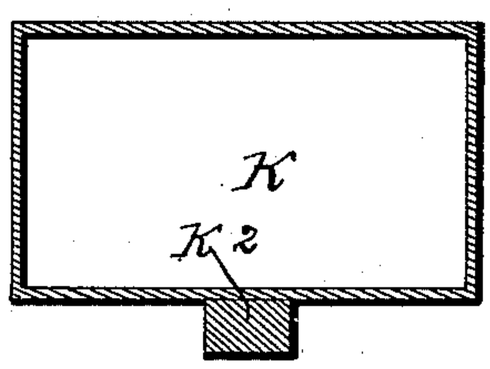
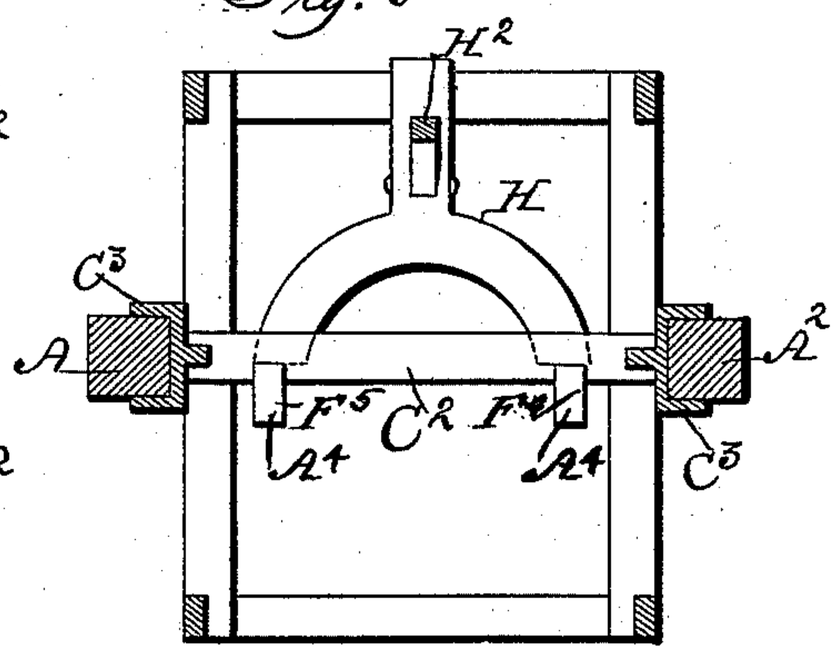


Fig. 5.



Witnesses:
R. S. Orwig.
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Inventors: Robert P. Mulock,
and Harry W. Wood,
By Thomas G. Orwig, Attorney.

UNITED STATES PATENT OFFICE.

ROBERT P. MULOCK AND HARRY W. WOOD, OF COLFAX, IOWA.

APPARATUS FOR ELEVATING ORE FROM MINES.

SPECIFICATION forming part of Letters Patent No. 647,316, dated April 10, 1900.

Application filed November 28, 1899. Serial No. 738,541. (No model.)

To all whom it may concern:

Be it known that we, ROBERT P. MULOCK and HARRY W. WOOD, citizens of the United States, residing at Colfax, in the county of Jasper and State of Iowa, have invented a new and useful Apparatus for Elevating Ore from Mines, of which the following is a specification.

Our object is to save labor and expense in forming connection between a vertical shaft and an inclined lead or lode of ore and to provide means for transferring and elevating loaded cars direct from the mouth of an inclined shaft at the point where it intersects the vertical shaft. Heretofore when a seam of ore extended downward from the surface through adjoining properties that part of the seam or lode nearest the surface could readily be mined and the ore elevated through the inclined shaft from which the ore was taken; but to mine the ore under an adjoining tract through which the inclined lode extended it has been necessary to sink a vertical shaft some distance below the inclined lode and then extend a horizontal drift to intersect the inclined lode at some distance from the bottom of the vertical shaft and convey the ore first from the inclined lode through the horizontal drift before elevating it through the vertical shaft.

Our invention consists in the construction, arrangement, and combination of elements and subcombinations in such a manner that the vertical shaft can terminate where it intersects an inclined lead and the ore taken therefrom carried direct from the inclined shaft in cars and the cars elevated in the vertical shaft and automatically dumped and returned to the inclined shaft from which the ore was taken, as hereinafter set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of our apparatus in position relative to the ground, as required for practical use in a mine, and a car in position, as required before it can descend into the inclined shaft or ascend to the surface through the vertical shaft. Fig. 2 is a view taken from a plane at right angles to Fig. 1 and shows the relative positions of the inclined track in the inclined shaft, the cage in the vertical shaft, the operative mechanism for retaining the carrier stationary while a car is on the inclined track, and the mechanisms for operating the cage. Fig. 3 is a detail view of that portion of the mechanism adapted to retain the cage in contact with a cam on the wall of the shaft, as required in transferring the car from the inclined shaft to the vertical shaft. Fig. 4 is an enlarged transverse sectional view of the car, showing a cam on its bottom adapted for releasing the cage from the automatic holder pivotally connected with the uprights of the frame with which the cage is slidingly connected. Fig. 5 is an enlarged view of the base of the cage and means for fastening it at the bottom of the vertical shaft. Fig. 6 is a horizontal sectional view showing the detents connected with the uprights in the shaft and the mechanism for operating them.

The letters A and A^2 designate the parallel uprights of a frame fixed in a vertical shaft to serve as a support and guide for a cage adapted to traverse the vertical shaft and also an inclined shaft that intersects the vertical shaft at its bottom.

A^3 and A^4 are the parallel pieces of a frame fixed to the uprights A and A^2 at the top of the shaft to serve as a platform.

A^5 represents a chute at the end of the platform, into and through which ore is dumped from the car.

A^6 is a rock-shaft in bearings fixed to the platform.

B is a spring-actuated lever fixed to the rock-shaft at the side of the chute A^5.

B^2 are spring-actuated detents pivoted in the recesses in the uprights A and A^2 in such a manner that they will in their normal position project inward to support the cage and also in such a manner that they can by suitable mechanism connected with the platform be simultaneously withdrawn from under the cage, as required, to allow the cage to descend.

B^3 are bell-crank levers connected with the detents by means of rods *a*, and B^4 is a rod pivotally connected with one of the bell-crank levers and the lever B, and an arm B^5 on the other end of the rock-shaft is connected with the other detent by a rod B^4 in such a manner that both detents can be simultaneously operated by means of the lever B, as required, to withdraw the detents from under the cage to allow the cage to descend after the car is unloaded.

C is the base of the cage in the form of a

four-sided frame, and C^2 is an oblong frame (preferably of metal) fixed on the top and center of the base, as shown in Fig. 5.

C^3 are lateral projections on the uprights of the frame C^2, adapted to overlie the edges of the uprights A and A^2, as required, to retain the cage in alinement with said uprights and to serve as guides in directing the up and down movements of the cage in the vertical shaft.

D and D^2 are auxiliary frames fixed to the uprights of the cage to support a roller D^3, journaled thereto. The ends of these frames are also adapted to engage projections D^4, fixed to the wall of the vertical shaft, as shown in Fig. 1, and, as required, to brace the cage when the car traverses the inclined shaft and causes the weight of the car and its load to pull laterally relative to the cage by means of a hoisting rope or cable F, fixed to a bail F', pivotally connected with the car and extended over the roller D^3, that has a concaved surface to retain the cable in a central position relative to the car and cage as they move up and down through the intersecting shafts.

F^2 are stops fixed to the inside faces of the uprights A and A^2, which the base C of the cage engages and rests upon, and F^3 is a rock-shaft journaled to said stops.

F^4 and F^5 are hooks fixed to the rock-shaft and adapted to engage the cross-bar C^2 of the base, as shown in Fig. 5, and, as required, to retain the cage stationary when the car descends into the inclined shaft.

F^6 is a weight fixed to an arm projecting laterally from the rock-shaft F^3 to normally retain the hooks in engagement with the cross-bar C^2 at the bottom of the cage. It is obvious that as the cage descends the cross-bar C^2 will engage the inclined faces of the hooks F^4 and F^5 and overcome the weight, as required, to allow the hooks to engage the cross-bar.

H is a semicircular frame adapted to engage the hooks F^4 and F^5 with its ends as it is actuated by a lever H^2, fulcrumed to the cage, as shown in Fig. 5, or in any suitable way in such a manner that a cam K^2 on the bottom of the car will engage the upper end of the lever and operate it, as required, to release the cage from the hooks whenever a car ascends the inclined shaft and enters the cage.

J and J^2 are track-rails bent double and fixed to the parallel uprights of the cage-frame in an inclined position.

K is a car mounted on wheels adapted to traverse the doubled track-rails, as required, in passing into and out of the inclined shaft. The upward motion of the car as it enters the cage is arrested by the bends at the upper ends of the doubled track-rails.

K^2 is a cam on the bottom of the car that engages the top of the lever H^2, as required, to release the cage preparatory to ascending and elevating the loaded car.

K^3 is a door hinged to the rear and lower end of the car, and m are latches on the door that engage keepers m' on the sides of the car, as required, to retain the door in a closed position.

Stops n, fixed to the outside faces of the rear end portions of the sides of the car, restrict the movement of the car when it is above the platform at the top of the vertical shaft by contacting with the edges of the chute A^5, as required, to retain the car stationary while the door K^3 is opened to dump the contents into the chute to be conveyed to some receptacle at the other end of the chute.

m'' are latch-lifting devices pivoted to the outside faces of the chute and adapted in form to serve as cams that will automatically lift the latches m when the car descends and the latches contact with the said lifting devices. These devices m'' are elbow-shaped and have inclined planes m''' on their ends, as shown in the view adjoining the chute in Fig. 1. When the car moves from the chute, the latches m contact with the under sides of the inclined planes m''' and lift the devices m'', as required, to allow the latches m to pass.

Double track-rails R, fixed in the inclined shaft to connect with the lower ends of the double rails J, support the car as it passes up and down in the inclined shaft and to and from the cage.

It is obvious the cable F must be extended to and connected with a winch or engine, from which power is transmitted for elevating the cage.

Having thus described the construction and function of each element and subcombination, the practical operation and utility of our invention will be understood by persons familiar with the art to which it pertains.

What we therefore claim as new, and desire to secure by Letters Patent therefor, is—

1. In an elevator, a cage slidingly connected with parallel uprights in a shaft, a fixed track extending laterally and downward from the shaft, a track for supporting a car fixed in the cage in an inclined position adapted to be alined with the said fixed track inclined laterally and downwardly from the shaft and means for raising and lowering the cage, arranged and combined to operate in the manner set forth for the purposes stated.

2. In an elevator, a cage slidingly connected with parallel uprights in a shaft, a fixed track extending laterally and downward from the shaft, a track for supporting a car fixed in the cage in an inclined position adapted to be alined with the said fixed track inclined laterally and downwardly from the shaft, means for raising and lowering the cage, a platform at the top of the shaft and means for supporting the cage on a level with the platform, all arranged and combined to operate in the manner set forth for the purposes stated.

3. In an apparatus for elevating ore from an inclined shaft intersecting a vertical shaft, a cage consisting of a four-sided frame, an

oblong frame fixed to the four-sided frame, projections at the parallel sides of the oblong frame adapted to engage parallel uprights in the vertical shaft, doubled rails fixed in the cage-frame in an inclined position, auxiliary frames fixed to the cage-frame, and a roller mounted in said auxiliary frames, all arranged and combined to operate in the manner set forth for the purposes stated.

4. In an apparatus for elevating ore from an inclined shaft intersecting a vertical shaft, a cage consisting of a four-sided frame, an oblong frame fixed to the four-sided frame, projections at the parallel sides of the oblong frame adapted to engage parallel uprights in the vertical shaft, doubled rails fixed in the cage-frame in an inclined position, auxiliary frames fixed to the cage-frame, and a roller mounted in said auxiliary frames, and means for fastening the cage at its bottom to the parallel uprights in the vertical shaft, all arranged and combined to operate in the manner set forth for the purposes stated.

5. A cage having fixed inclined track-rails, a car adapted to be supported on said rails and provided with a cam on its under side, hooks pivotally connected with parallel uprights in a vertical shaft and adapted to engage the bottom portion of the cage, a lever fulcrumed to the cage and adapted to be engaged by the cam on the bottom of the car and a frame connected with the lower end of said lever and adapted to engage said hooks and means for normally retaining the hooks in engagement with the cage, all arranged and combined to operate in the manner set forth for the purposes stated.

6. Parallel uprights in a vertical shaft, a rock-shaft journaled to the lower end portions of said uprights, hooks fixed to the rock-shaft to project upward and adapted to engage a cross-bar at the bottom of a cage and a weighted arm projecting from the shaft to normally retain the hooks in engagement with the cage, arranged and combined to operate in the manner set forth for the purposes stated.

7. Parallel uprights in a vertical shaft, a rock-shaft journaled to the lower end portions of said uprights, hooks fixed to the rock-shaft to project upward and adapted to engage a cross-bar at the bottom of a cage and a weighted arm projecting from the shaft to normally retain the hooks in engagement with the cage, an inclined track fixed in the cage, a car adapted to rest on said track, a cam on the bottom of the car, a lever fulcrumed to the cage and adapted to be engaged by said lever, and means for engaging and releasing the hooks from the cage said means being connected with the lever, arranged and combined to operate in the manner set forth for the purposes stated.

8. Two parallel uprights in a vertical shaft, a cage slidingly connected with the uprights, a platform fixed to the top portions of the uprights, a chute fixed to one end of the platform, a rock-shaft at the bottom of the upper end of the chute, a spring-actuated lever on one end of the rock-shaft and an arm at the other end, detents pivotally connected with the uprights, bell-crank levers connected with the detents and rods connected with the bell-crank levers and the short arm of the lever at one end of the rock-shaft and the arm at the other end of the shaft, arranged and combined to operate in the manner set forth for the purposes stated.

9. Two parallel uprights in a vertical shaft, detents pivotally connected with the uprights, a platform fixed to the uprights above the detents, a chute fixed to the platform, a rock-shaft under the platform and chute having an arm at one end and spring-actuated lever at the other end, bell-crank levers fixed to the detents, rods connected with the bell-crank levers and the arm and lever projecting from the rock-shaft, a cage fitted to the parallel uprights, an inclined track fixed in the cage, a car fitted to the track, a bail pivoted to the car, a cable fixed to the bail, a roller journaled to the cage to engage the bail and cable, and means for raising and lowering the cage connected with the cable, all arranged and combined to operate in the manner set forth for the purposes stated.

10. An apparatus for elevating ore from an inclined shaft intersecting a vertical shaft, comprising two parallel uprights in the vertical shaft, detents for supporting a cage pivotally connected with the upper portions of the uprights, a platform fixed to the uprights above the detents, a chute fixed to one end portion of the platform, a rock-shaft supported by the platform and under the chute, a lever for operating the detents connected with the rock-shaft, weighted hooks adapted to engage the cage, connected with the bottom portions of the uprights, the cage slidingly connected with the uprights, a car-track fixed in the cage in an inclined position, hook-releasing mechanism in the bottom portion of the cage, auxiliary frames fixed to the cage to engage projections fixed to the wall of the shaft and to support a roller, a roller mounted in said frames, a car fitted to the inclined track in the cage, a cam on the under side of the car to actuate the hook-releasing mechanism, a bail pivoted to the car, a cable fixed to the bail, a hinged door at one end of the car, a fixed car-track in an inclined shaft and in alinement with the track in the cage when the cage is in its lowest position and means for raising and lowering the cage connected with the cable, all arranged and combined to operate in the manner set forth for the purposes stated.

ROBERT P. MULOCK.
HARRY W. WOOD.

Witnesses:
C. O. McLAIN,
W. W. POORBAUGH.