No. 847,411. PATENTED MAR. 19, 1907.

G. HOLMES.

AUTOMATIC CAR LIFT.

APPLICATION FILED DEC. 5, 1906.

5 SHEETS—SHEET 1.

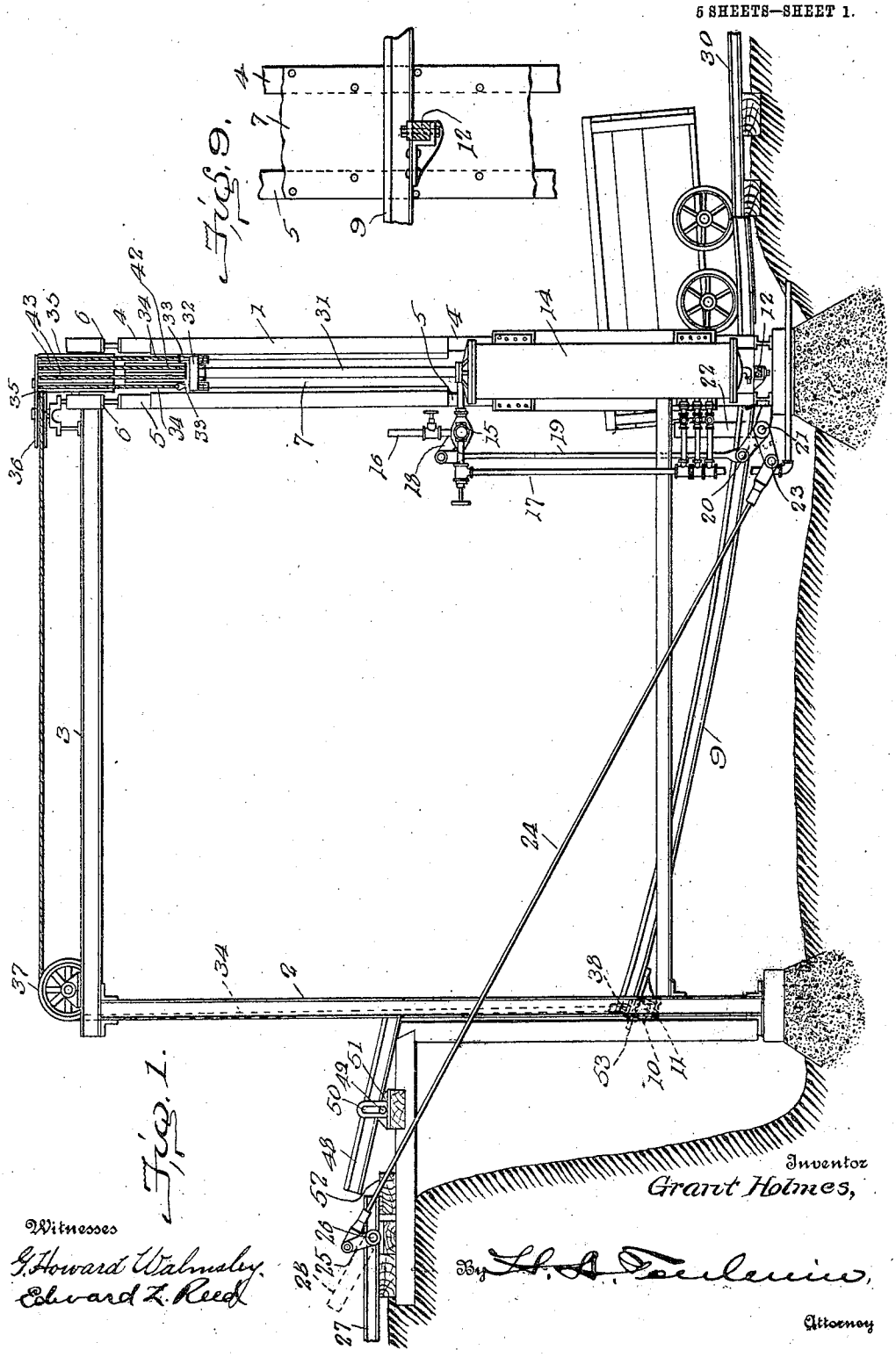

Fig. 2.

Witnesses

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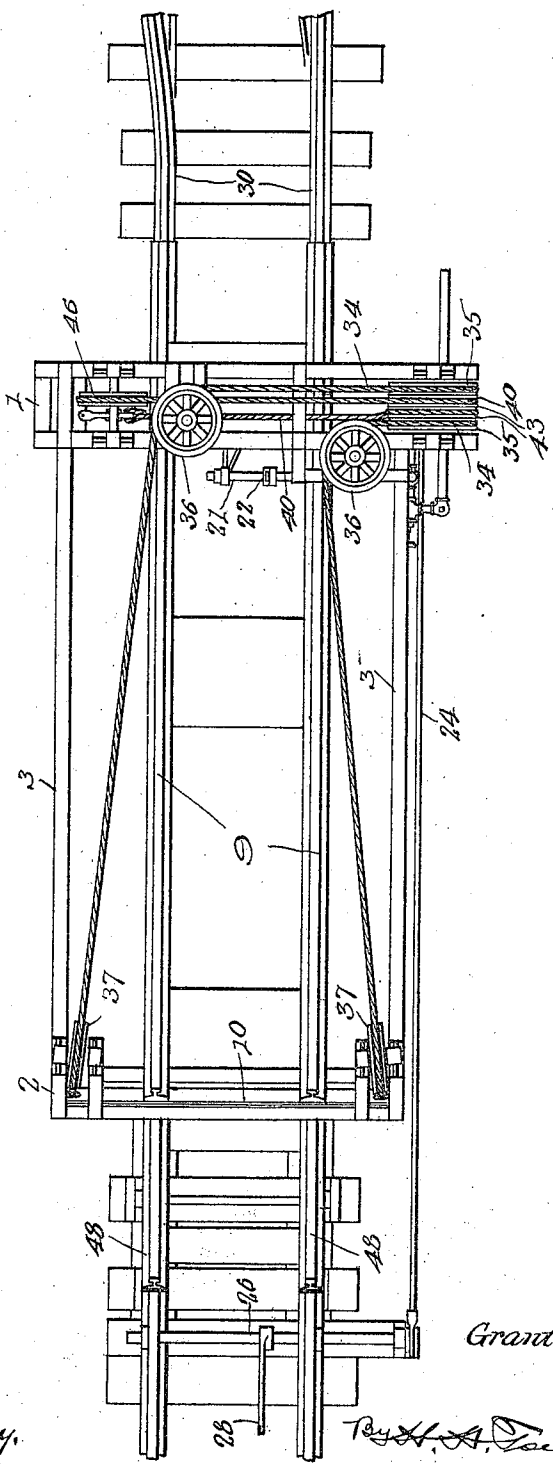
5 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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5 SHEETS—SHEET 3.

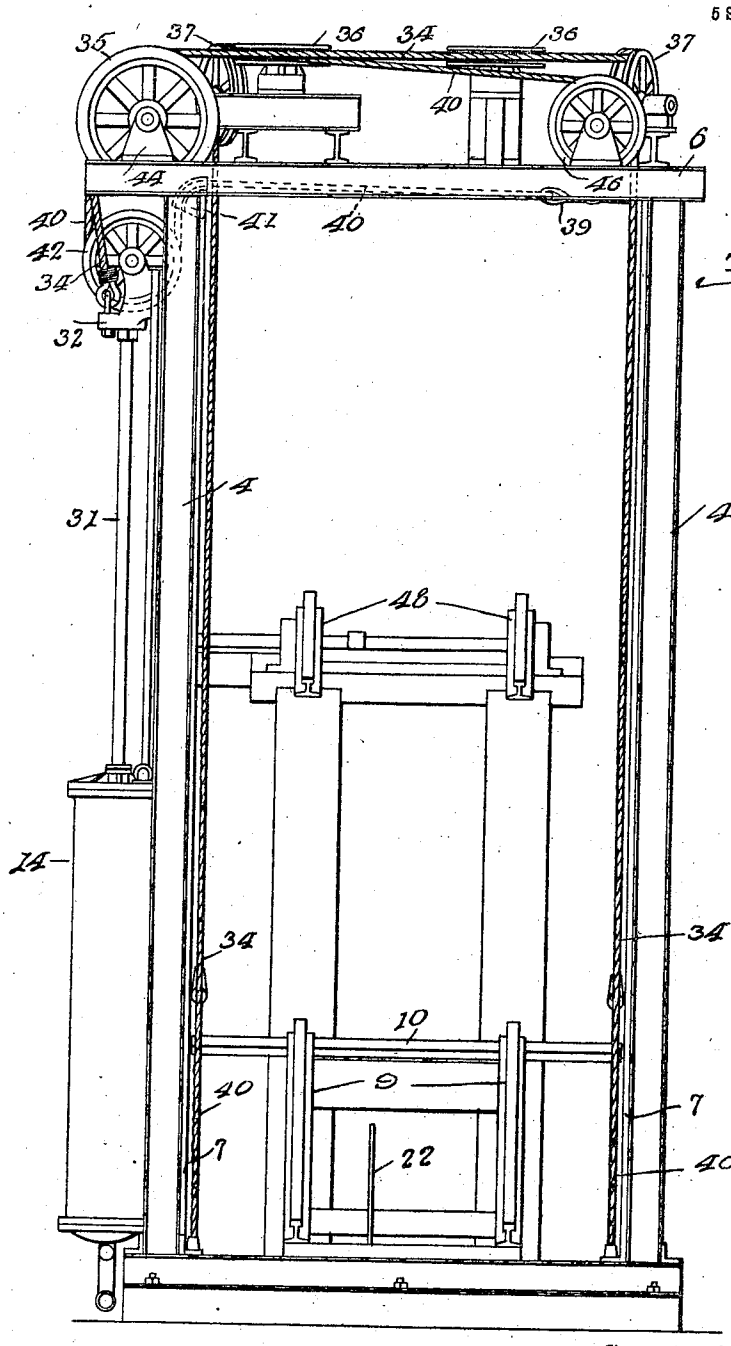

Fig. 3.

Witnesses

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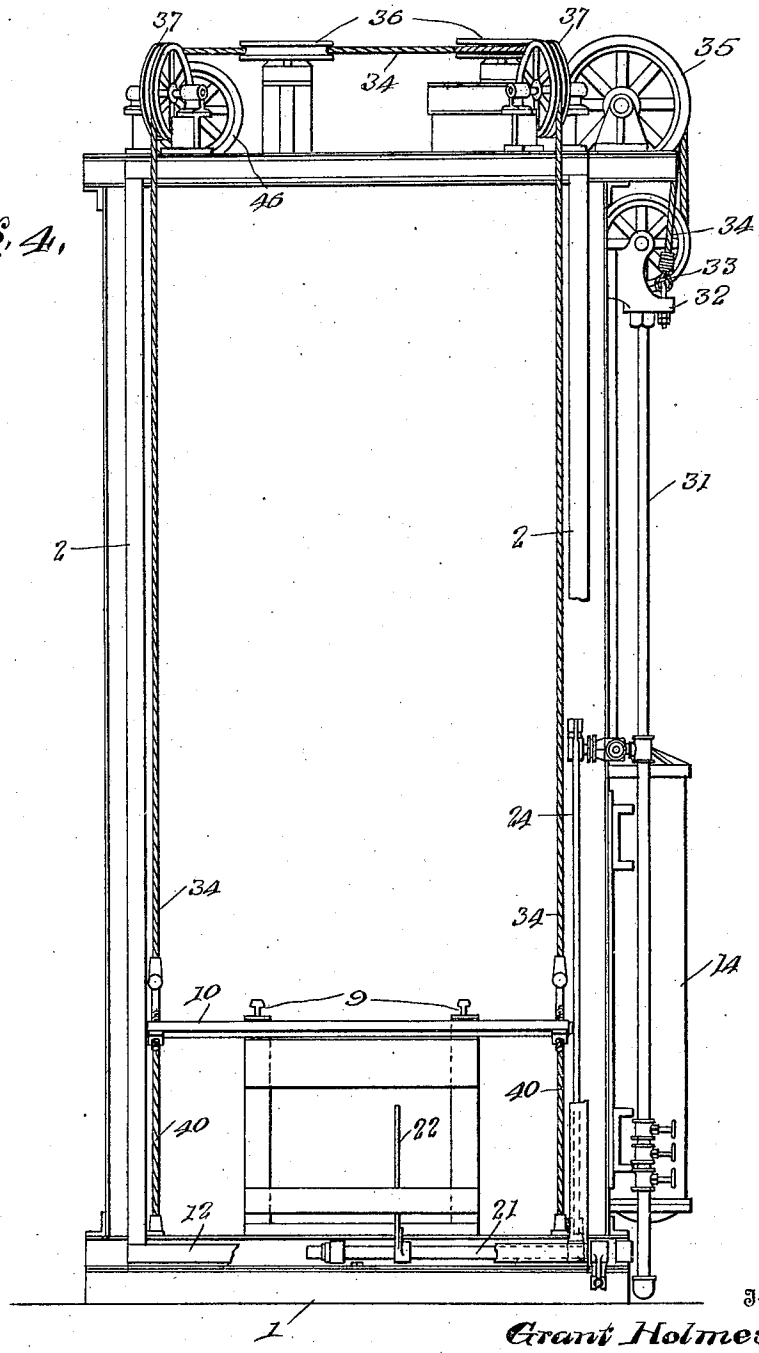
5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

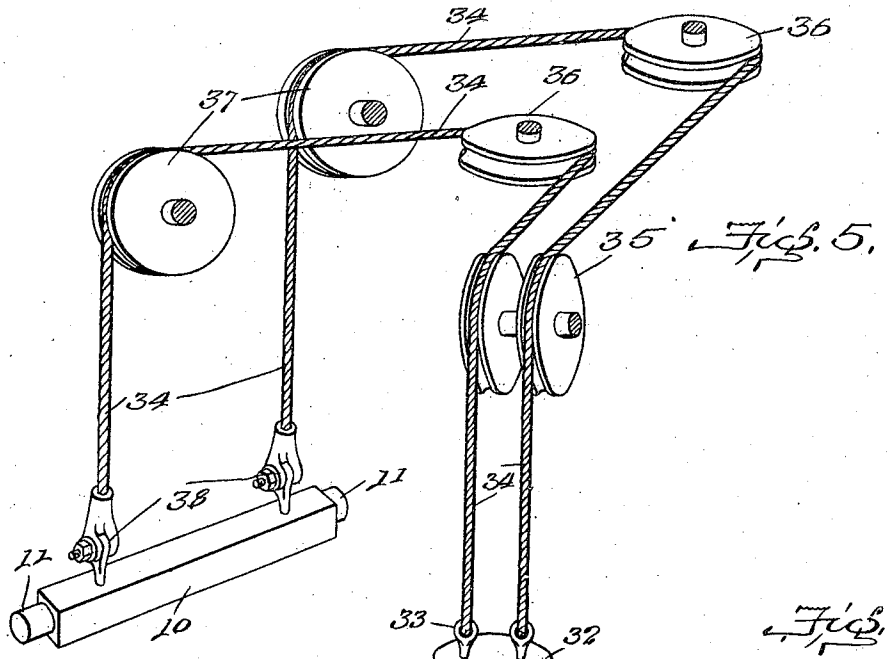


Fig. 5.

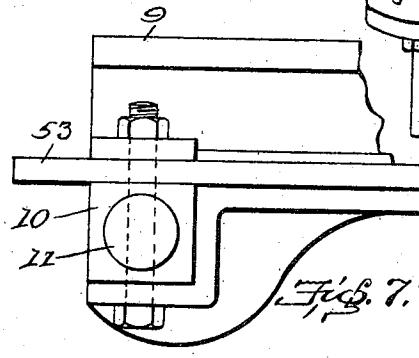


Fig. 7.

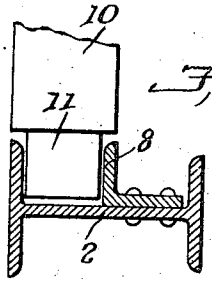
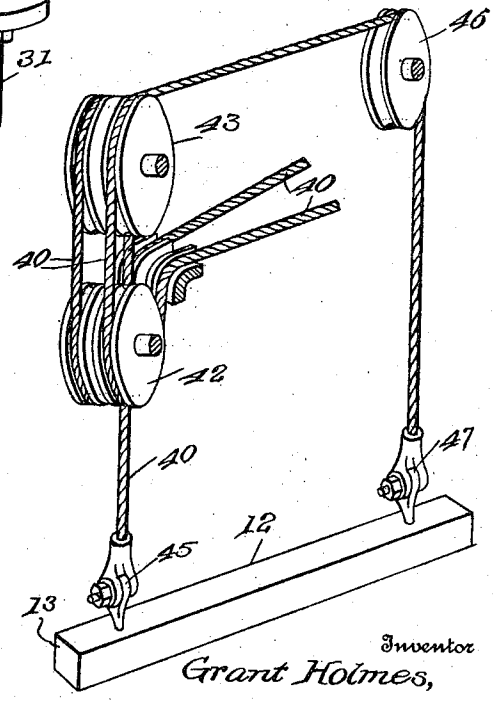


Fig. 8.

Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CAR-LIFT.

No. 847,411. Specification of Letters Patent. Patented March 19, 1907.

Application filed December 5, 1906. Serial No. 346,360.

To all whom it may concern:

Be it known that I, GRANT HOLMES, a citizen of the United States, residing at Danville, in the county of Vermilion and State of Illinois, have invented certain new and useful Improvements in Automatic Car-Lifts, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention relates to automatic car-lifts of the character employed in handling empty cars at the bottom of a mine-shaft, and is in the nature of an improvement upon the patent granted to me November 21, 1905, No. 804,950.

The object of the present invention is to provide a device of this character which will have a maximum vertical lift with a minimum length of movable track. To accomplish this object, I provide a floating track-section with means for raising and lowering the same and means for moving one end a greater distance than the other end, so that the track-section is tilted in one direction to receive the car and in the opposite direction to discharge the same.

A further object of the invention is to provide means for retaining the car upon the track-section as it is being elevated and also to provide means for alining the end of the floating track-section with the track upon which the car is to be discharged.

With these objects in view my invention consists in certain novel features of construction to be hereinafter described, and more fully pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a car-lift embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation of the same looking up the inclined track-section. Fig. 4 is an end view of the same looking in the direction opposite to that shown in Fig. 3. Fig. 5 is a diagrammatic view of the cable-hoists for the rear end of the track-section and their supporting-pulleys. Fig. 6 is a similar view of the cable-hoists for the front end of the track-section and their supporting-pulleys. Fig. 7 is an end view of the axle or supporting-bar for the rear end of the track-section. Fig. 8 is a plan view of the same, showing one of the guideways therefor in section; and Fig. 9 is an elevation of a portion of the front frame, showing the guide-plate.

As illustrated in these drawings, my invention consists of a substantially rectangular frame which is mounted in the mine near the bottom of the shaft where the cars are delivered from the cage. This frame comprises a front member 1 and a rear member 2, which are united at their upper ends by longitudinal beams or channel-bars 3. The front member consists, preferably, of two pairs of uprights 4 and 5, which are connected at their upper ends by suitable cross-beams 6. The two pair of uprights comprising the front member 1 of the frame are separated by a considerable space, the one being set in advance of the other, and are united by a suitable plate 7, preferably of metal, which is secured across the inner faces of the adjacent uprights of each pair, forming inwardly-facing guide-plates for the front end of the floating track-section, as hereinafter described. The rear member 2 of the frame comprises a single pair of uprights, as shown, which are provided on their inner faces with channels or guideways 8 for the purpose hereinafter described.

Extending between the uprights of the frame is a floating track-section 9, slightly greater in length than the distance between the front and rear frame members 1 and 2. This track-section is preferably curved downwardly or bent in such a manner that the lowest point thereof is intermediate its ends. The rear end of the track-section 9 is provided with a supporting bar or axle 10, which has its opposite ends reduced, as shown at 11 in Fig. 8, to enter the guideway 8, formed on the inner face of the uprights of the rear frame 2. The track-section is further provided with a supporting bar or axle 12, secured to the track-section where the same passes between the uprights of the front member 1 of the frame. This supporting-bar has its end squared, as shown at 13, to bear against the guide-plates 7 of the uprights of the front frame member 1. This construction holds the track-section against lateral movement, but allows the same a free longitudinal movement, whereby it can move through the arc of a circle transcribed about the supporting bar or axle 10 as a center. When the track-section 9 is in its lowermost position, its forward end is in alinement with the downwardly-inclined track-rails 30, which lead from the cage at the bot-

tom of the mine-shaft to the lifting apparatus. When the track-section is in its elevated position, the rear end of the track-section 9 is in alinement with the elevated tracks 27, upon which the car is to be discharged.

The power mechanism for the lift consists of one or more fluid-pressure cylinders 14, one being shown in the present construction. This cylinder 14 is provided at its upper end with a three-way valve 15, which connects the cylinder either with a source of fluid-supply by means of the pipe 16 or with the exhaust by means of the pipe 17. The valve 15 is provided with an arm 18, which is connected by a rod 19 with an arm 20, mounted on a rock-shaft 21, which is provided with a trip-arm 22, which when the three-way valve is connected with the exhaust is in a substantially vertical position. The rock-shaft 21 is further provided with an arm 23, which is connected, by means of a rod 24 and an arm 25, with a rock-shaft 26, mounted in the elevated track-section 27 and provided with a trip-arm 28. The relation of the trip-arm 28 with the trip-arm 22 is such that when the trip-arm 22 is in its vertical position the trip-arm 28 is depressed, or vice versa. The arrangement of the trip-arms and their connections with the three-way valve 15 is such that when the car passes from the track 30 onto the floating track-section 9 it comes in contact with the trip-arm 22, depressing the same and turning the valve 15 to connect the cylinder with the source of fluid-supply, which depresses the piston and elevates the track-section through the mechanism hereinafter to be described. When the track-section reaches its elevated position and the car is discharged therefrom to the elevated mine-track 27, the car comes in contact with the trip-arm 28, which is now in its vertical position, and depresses the same, thereby again moving the three-way valve 15 and connecting the cylinder 14 with the exhaust and allowing the track-section to drop to its normal position through its own weight.

In order to elevate the front end of the track-section 9 a greater distance than the rear end thereof to provide a sufficient incline to discharge the car therefrom, I have devised the following mechanism, which consists of a piston-rod 31, connected with the piston of the cylinder 14 and provided at its upper end with a cross-head 32, which carries at its outer end bolt-eyes or rings 33, to each of which is secured one end of a pair of cables 34, which extend over the sheaves or pulleys 35, mounted on the upper end of the frame member 1, and thence around the horizontal sheaves or pulleys 36, then to the rear of the frame and over the pulleys 37, thence downwardly to the axle 10, to which they are connected by means of suitable supports 38.

Secured to the cross-bar 6 of the front member of the frame by means of suitable connections 39 is a second pair of cables 40, which extend over the guides 41 at the side of the frame member 1, thence downward and around the sheaves or pulleys 42, which are carried by the cross-head 32 between the bolt-eyes 33. The cables then pass upward and over the pulleys 43, which are mounted between the pulleys 35 in the brackets 44 on the cross-bar 6 of the end frame member 1. Then one of the cables 40 passes directly downward and is connected to the cross-bar or axle 12 by means of a pivotal connection 45, while the other cable passes to the opposite side of the frame and over the pulley 46 and thence downward, where it is similarly connected to the cross-bar by means of a similar pivotal connection 47. From this arrangement of the cables it will be seen that the rear end of the track-section 9, which is directly connected to the cross-head 32 of the piston-rod 31 by means of the cables 34, will be moved a distance equal to the distance the cross-head is moved, while the front end of the track-section is connected to the cables 40, which pass around the pulleys 42 on the cross-head and are then connected to a fixed part of the frame and is moved through a distance twice that through which the cross-head is moved as a double portion of that cable is moved downward with the cross-head.

In order to insure the proper alinement of the rear ends of the track-section 9 with the rails of the mine-track 27 when the track-section is in its elevated position, I have provided a short section of track 48, which is provided with trunnions 49 at a point slightly in the rear of its longitudinal center, which trunnions are journaled in vertical slots 50, provided in bearing-brackets 51. A suitable support or abutment 52 is provided to support the rear end of the track-section 48 when it is in its horizontal position; but inasmuch as the trunnions are in the rear of its longitudinal center the front of the track-section is the heavier and holds the same normally in a forwardly-inclined position. The rear end of the floating track-section 9 is provided with lugs or lips 53, which project rearwardly therefrom and are adapted to engage the forward end of the pivoted track-section 48 as the floating track-section 9 moves into its elevated position. The position of the track-section 48 is such that when the floating track-section 9 reaches its normal elevated position the said track-section 48 will be in longitudinal alinement with the end of the track-section 9 and with the elevated mine-track 27. The slotted bearings 50 for the trunnions 49 of the track-section 48 allow of a sufficient vertical movement of said track-section to prevent breakage in case the floating track-section 9 should be

carried beyond its normal position. When the pivoted track-section 48 is in its normal or forwardly-inclined position, the rear end of said track-section is elevated a sufficient distance above the mine-track 27 to engage the body of a car and act as a buffer to stop the same should the car for any reason be allowed to return on the track 27.

The operation of the device will be readily understood from the foregoing description. When the car is discharged from the cage, it moves down the inclined track-section 30 onto the floating track-section 9, and as the lowest point of the floating track-section is located approximately between the uprights of the forward frame member 1 the car by force of gravity immediately seeks that position and in doing so comes in contact with the trip-lever 22, thereby moving the three-way valve 15 and admitting the motor fluid to the cylinder 14, thus forcing the piston and piston-rod 31 downwardly and actuating the cables 34 and 40 to elevate the respective ends of the floating track-section. As the front end of the floating track-section moves upward at a greater rate of speed than the rear end thereof, the lowest point of said track-section gradually moves toward the rear, and the car likewise moves toward the rear. When the track-section has reached its elevated position, the lowest point of the track-section is the extreme rear end thereof, and the car consequently passes off the rear end of the track-section onto the pivoted track-section 48, which has been engaged by the lugs on the rear end of the track-section 9 and moves into alinement with both the track-section 9 and the mine-track 27. The downward inclination of the tracks is such as to give the car sufficient momentum to move it well onto the mine-track 27, which is inclined rearwardly. As the car passes onto the mine-track 27 it engages the trip-lever 28, thereby again moving the valve 15 and connecting the cylinder with the exhaust and allowing the floating track-section 9 and its coöperating parts to return to their normal position.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A car-lift of the character described, comprising a track-section, means for raising and lowering said track-section, and controlling means actuated by the car for causing said raising and lowering means to raise said track-section when the car enters the same and to lower said track-section when the car leaves the same, substantially as described.

2. A car-lift of the character described comprising a floating track-section and means for raising and lowering said track-section and for causing one end of said track-section to travel a greater distance than the opposite end thereof, substantially as described.

3. A car-lift of the character described comprising a floating track-section, means controlled by the movement of the car for raising and lowering said track-section, and means for causing one end of said track-section to travel a greater distance than the opposite end thereof, substantially as described.

4. A car-lift of the character described comprising a floating track-section, means for raising and lowering said track-section and for causing one end of said track-section to travel a greater distance than the opposite end thereof, and controlling means actuated by said car for causing said raising and lowering means to raise said track-section when the car enters the same and to lower said track-section when the car leaves the same, substantially as described.

5. A car-lift of the character described comprising a floating track-section inclined in one direction to receive a car, means for raising and lowering said track-section, and means for tilting the same in the opposite direction to discharge said car, substantially as described.

6. In a car-lift of the character described, the combination, with a frame and a floating track-section, of a cross-head adapted to reciprocate vertically of said frame, means for actuating said cross-head, means actuated by said cross-head for moving one end of said track-section a distance equal to the distance traveled by said cross-head, and means actuated by said cross-head for moving the opposite end of said track-section a greater distance than the distance traveled by said cross-head, substantially as described.

7. In a device of the character described, the combination, with a frame, a floating track-section and pulleys carrried by said frame, of a cross-head adapted to reciprocate vertically of said frame, a cable directly connecting said cross-head with one end of said track-section and extending around certain of said pulleys, idle pulleys carried by said cross-head, and another cable secured to the opposite end of said track-section and extending over other pulleys on said frame and around the idle pulleys on said cross-head and having the other end secured to a fixed part of the frame, substantially as described.

8. A car-lift of the character described comprising a floating track-section having one end confined by a vertical guideway and its opposite end free, and means for raising and lowering said track-section and for causing the free end thereof to travel a greater distance than that traveled by the end con-

fined by the guideway, substantially as described.

9. A car-lift of the character described, comprising a frame and a floating track-section, guideways at one end of said frame adapted to control the movement of the corresponding end of the track-section, and guideways at the opposite end of said frame adapted to prevent lateral movement of the corresponding end of the track-section but to allow the same free longitudinal movement, substantially as described.

10. A car-lift of the character described comprising a frame having vertically-extending guideways at one end thereof and guide-plates at the opposite end thereof, a floating track-section, a supporting-bar for one end of said section engaging said guideways to cause the corresponding end of the track-section to move in a vertical plane, a supporting-bar for the opposite end of said track-section having its ends in engagment with said guide-plates to prevent lateral movement of the corresponding end of said track-section but to allow the same free longitudinal movement, and means connected with said cross-bars for raising and lowering said track-section, substantially as described.

11. A car-lift of the character described comprisıng a floating track-section having its lowest point intermediate the ends thereof when in its normal position, and means for raising and lowering said track-section, substantially as described.

12. A car-lift of the character described comprising a floating track-section having its lowermost point intermediate the ends thereof when in all positions except its uppermost position, and means for raising and lowering said track-section, substantially as described.

13. A car-lift of the character described comprising a floating track-section having a downwardly-curved portion, and means for raising and lowering said track-section, substantially as described.

14. A car-lift of the character described comprising a floating track-section downwardly curved throughout its length, and means for raising and lowering said track-section, substantially as described.

15. A car-lift of the character described comprising a downwardly-curved floating track-section, means for raising and lowering said track-section, and means for causing one end of said track-section to travel a greater distance than the opposite end thereof, substantially as described.

16. A car-lift of the character described comprising a forwardly-inclined floating track-section having its lowest point near the forward end thereof, means for raising and lowering said track-section, and means for causing the forward end thereof to travel at a greater rate of speed than the rear end thereof, thereby causing the lowest point of said track-section to be moved toward the rear end thereof, substantially as described.

17. In a car-lift of the character described, the combination, with a floating track-section, and means for raising and lowering the same, of a pivoted track-section near the upper limit of travel of said floating track-section and adapted to be engaged by said floating track-section and moved into alinement therewith, substantially as described.

18. In a car-lift of the character described, the combination, with a floating track-section, and means for raising and lowering the same, of a pivoted track-section near the upper limit of travel of said floating track-section having its pivotal center in the rear of the longitudinal center of said track-section, and means carried by said floating track-section for engaging said pivoted track-section for moving the same into alinement therewith, substantially as described.

19. In a car-lift of the character described, the combination, with a floating track-section, means for raising and lowering said floating track-section, a pivoted track-section near the upper limit of travel of said floating track-section, trunnions secured to said pivoted track-section, bearing-brackets having vertical slots adapted to receive said trunnions, and means carried by said floating track-section to engage said pivoted track-section and move the same into alinement therewith, substantially as described.

20. A car-lift of the character described comprising a forwardly-inclined floating track-section, means for retaining the car on said track-section, means for raising and lowering said track-section and for causing said forward end of said track-section to travel a greater distance than the rear end thereof, thereby tilting said track-section in the opposite direction, a pivoted track-section near the upper limit of travel of said floating track-section, and means carried by said floating track-section for engaging the pivoted track-section to move the same into alinement therewith when in its uppermost position, substantially as described.

21. In a car-lift of the character described, the combination, with a floating track-section, means for raising and lowering the same, and a fixed track near the upper limit of travel of said floating track-section, of a pivoted track-section adapted to connect said fixed track with said floating track-section and having its pivotal center intermediate its ends, and means for holding said pivoted track-section normally in a forwardly-inclined position, thereby causing the rear end thereof to extend above the fixed track and serve as a buffer, substantially as described.

22. A car-lift of the character described comprising a movable track-section having its lowermost point intermediate the ends thereof when in all positions except its uppermost position, and means for raising and lowering said track-section, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GRANT HOLMES.

Witnesses:
FRANK LINDLEY,
GERTRUDE C. KOCH.