(No Model.) 3 Sheets—Sheet 1.

R. DINSMORE.

MECHANISM FOR LOADING AND UNLOADING MINE CAGES.

No. 438,612. Patented Oct. 21, 1890.

Fig. 1.

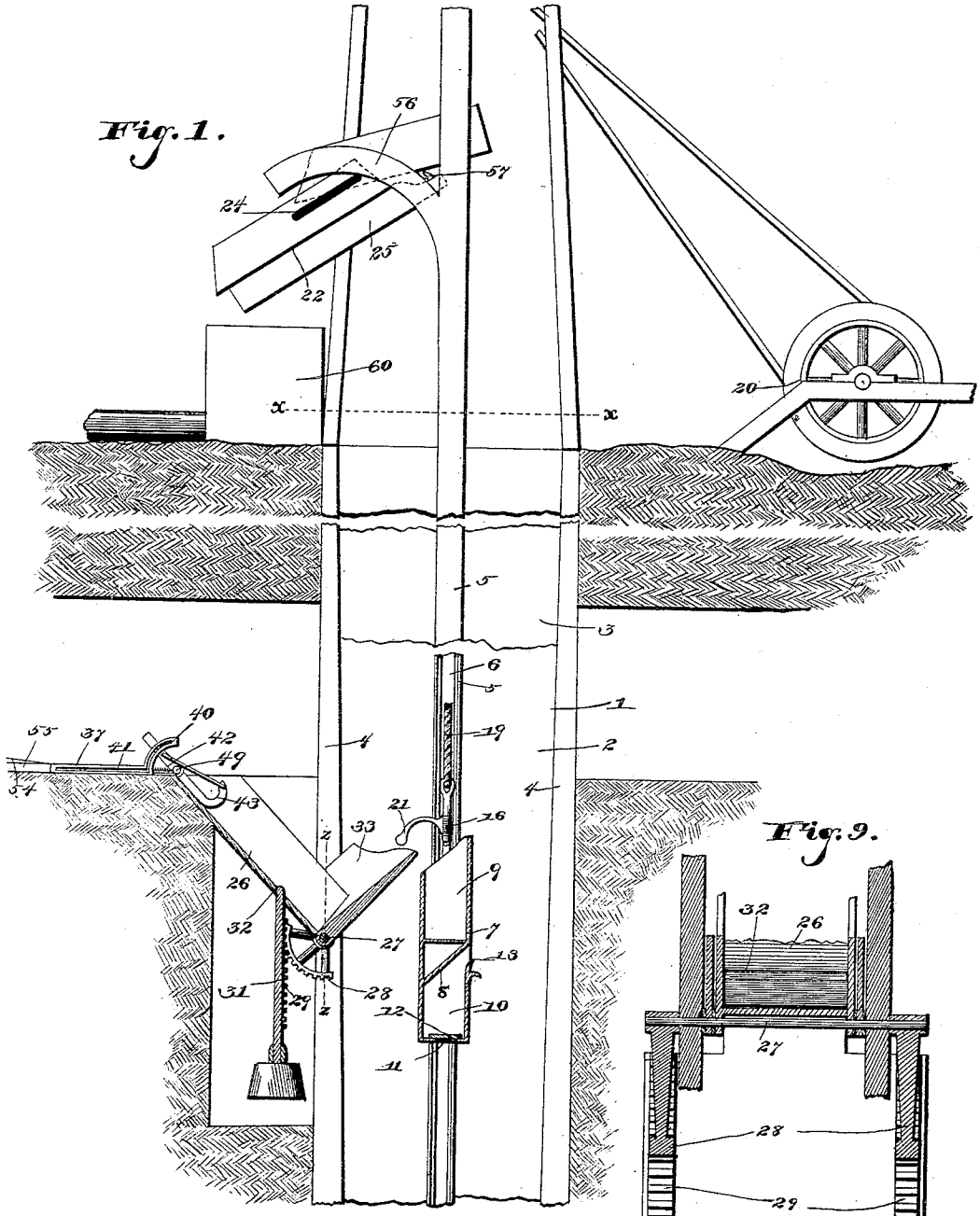


Fig. 2.

Witnesses:

Samuel Ker.

W. S. Duvall.

Inventor

Robert Dinsmore

By his Attorneys,

C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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R. DINSMORE.

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Fig. 2.

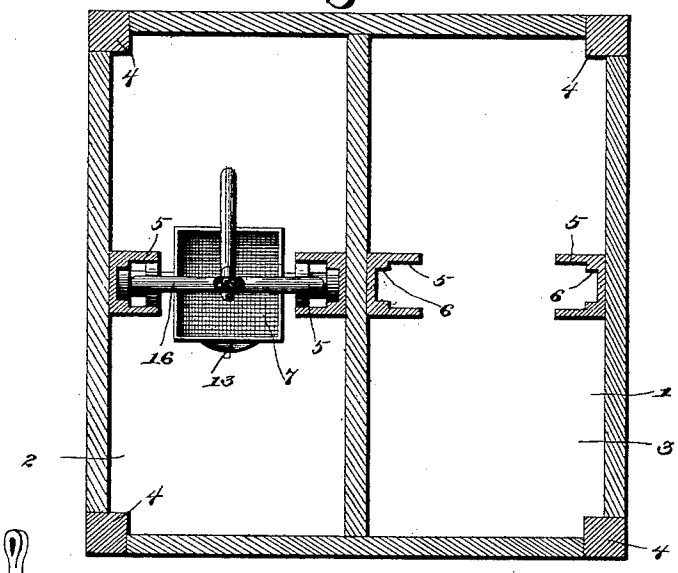


Fig. 3.

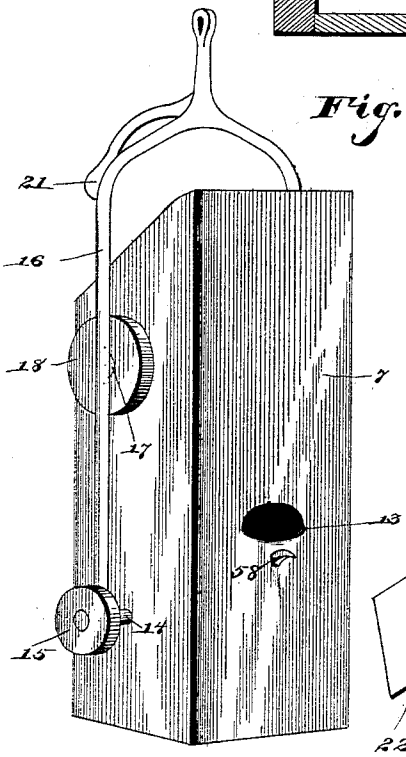
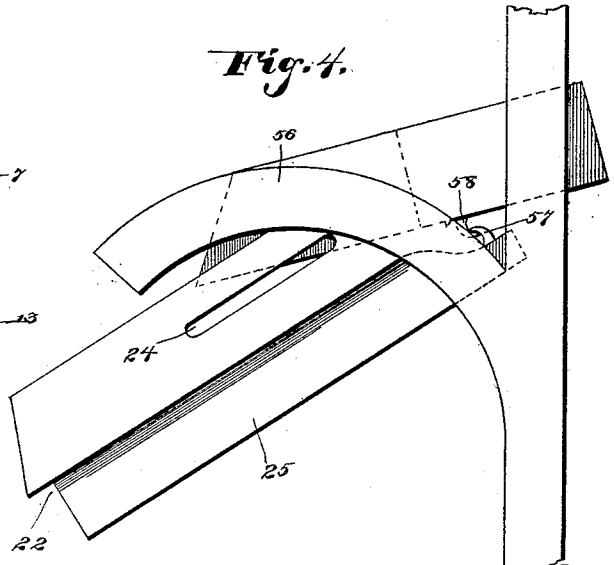


Fig. 4.



Witnesses:

Samuel Ker

W. S. Lwall.

Inventor

Robert Dinsmore,

By his Attorneys,

C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

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Fig. 5.

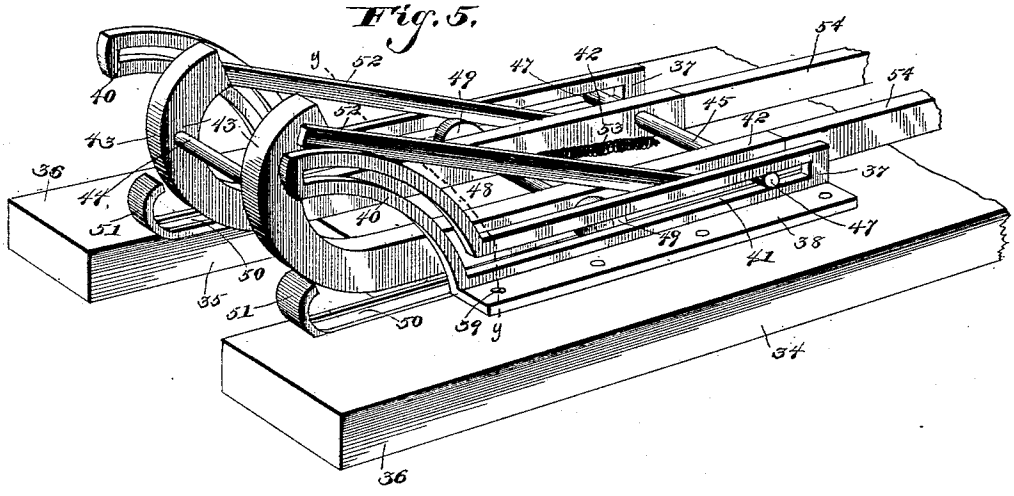


Fig. 6.

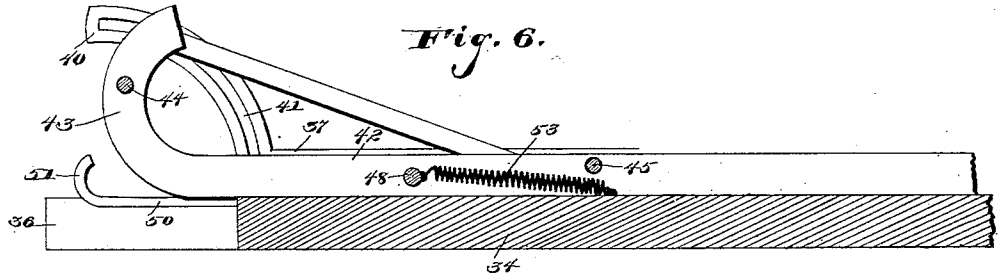


Fig. 7.

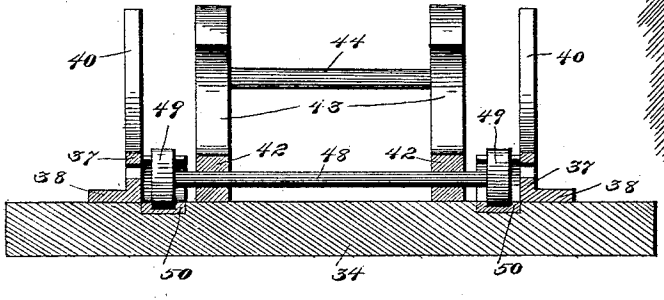
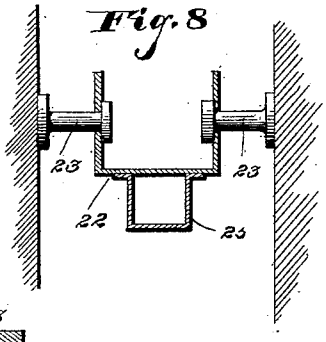


Fig. 8



Witnesses:

Samuel Kerr.

W. S. Duvall.

Inventor

Robert Dinsmore,

By his Attorneys,

C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT DINSMORE, OF WESTON, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO ADOLPH GREENSTEIN, OF SAME PLACE.

MECHANISM FOR LOADING AND UNLOADING MINE-CAGES.

SPECIFICATION forming part of Letters Patent No. 438,612, dated October 21, 1890.

Application filed July 11, 1890. Serial No. 358,367. (No model.)

To all whom it may concern:

Be it known that I, ROBERT DINSMORE, a citizen of the United States, residing at Weston, in the county of Lewis and State of West Virginia, have invented a new and useful Mechanism for Loading and Unloading Mine-Cages, of which the following is a specification.

This invention has relation to elevating mechanism for use in coal and other mines.

The objects of the invention are to provide a mechanism which will automatically load the cages, withdraw water from the sump, and deliver the contents of the cages at the top of the shaft.

Heretofore it has required a gang of three hands to load the cages with the products of the mine, and three more hands to deliver the contents of the cages after the same has reached the top of the shaft; also, heretofore it has required very expensive pumps and pipe-lines for raising and delivering the water from the sump at the bottom of the shaft, which, as is well known, drains all portions of the mine. Not only was this pumping mechanism of very great expense as to its construction, but also as to its maintenance. It is customary to employ two or three such pumps, whereby when one is withdrawn for repairs, which is necessary about every three months, one of the others is substituted. The cause of such frequent repairing is that the pumps and the pipe-lines become eaten out by the great amount of sulphur in the water. To avoid this frequent eating out, the pipes and pumps are lined with bronze, which is a success only so far as it postpones the necessary repairs for about three months at a time.

By my invention I propose to obviate the necessity of employment of any pumps or pipe-lines, and also to avoid the employment of the hands for loading and unloading the cages, thus saving all this expense, which, as is well known to all mining-men, is very great, as well as the trouble occasioned by such employment.

Various minor objects of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

Referring to the drawings, Figure 1 is a central vertical section and partial side elevation of the shaft of a mine, the same being provided with mechanism constructed in accordance with my invention. Fig. 2 is a transverse section on the line *x x* of Fig. 1. Fig. 3 is a detail in perspective of the cage and its suspension-bail. Fig. 4 is a detail enlarged in side elevation of the delivery-chute in the act of delivering. Fig. 5 is a detail in perspective of a tippler. Fig. 6 is a longitudinal section of the same. Fig. 7 is a transverse section on the line *y y* of the tippler. Fig. 8 is a transverse section of the delivery-chute. Fig. 9 is a vertical transverse section on the line *z z* of Fig. 1.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates the shaft of, for instance, a coal-mine; 2, the east chamber, and 3 the west chamber.

4 designates the usual vertical timbers comprising a portion of the frame-work of the shaft, and said shaft is divided, as usual, into opposite halves, in this instance the eastern and western halves. In each half is located a pair of vertical guides 5, the bottoms of which are provided with central guide-grooves 6. (See Fig. 2.)

7 designates a cage, which is divided by an inclined partition 8 into an upper and a lower compartment, designated as 9 and 10, respectively. The upper compartment 9 is designed to receive coal or the products of the mine, while the lower compartment 10 is designed to receive and elevate water from the sump at the bottom of the shaft. The bottom of the lower compartment 10 is provided with an opening 11, covered by an inwardly-opening clack-valve 12. The upper end of the compartment is provided with a discharge-spout 13.

14 designates a shaft, which passes through the compartment 10, and the same is provided with opposite rollers 15 some distance beyond the sides of the cage. A suspension-bail 16, of inverted-U shape, embraces the

cage and has its lower terminals connected to the shaft 14. The upper compartment 9 has passed therethrough a shaft 17 shorter than the shaft 14 and terminating within the bail-space and provided at its ends with large rollers 18. The small rollers 15 move in the small groove or track 6, while the large rollers 18 move in the large groove or track 5. The upper end of the bail is connected to the cable 19, which, as is usual, is, in connection with the cage, duplicated at the opposite side of the shaft, which cable is operated by any ordinary motor and passes down around over the drum 20. Below the point of connection between the cable and bail the latter is provided with a laterally-disposed curved arm 21.

Between each pair of the vertical timbers 4 there is pivotally mounted a tilting delivery-chute 22. These chutes are slotted at their sides, as at 24, and receive trunnions 23, which project from the said vertical timbers, whereby the chutes are adapted for pivotal as well as longitudinal movement. The inner ends of the slots 24 are slightly in rear of the exact center of the chutes, so that said chutes are nearly evenly balanced; but by reason of the slight preponderance of weight being in front of the pivot they are normally slightly inclined, as shown, when not otherwise influenced.

Beneath the chutes are located water passages or ways 25, which when in their normal position are at a point that will register with the discharges 13 of the cages.

26 designates an inclined discharge-spout leading from each of the chambers slightly in rear of the shaft to the shaft, and journaled in the lower end of the same is a transverse shaft 27. At each end of the shaft 27 is a toothed sector 28, which engages and operates a vertically-disposed and sliding rack-bar 29, terminating in weights 30. Each pair of rack-bars supports a gate 31, which extends through a transverse slot 32 in the bottom of a chute 26, and is adapted to move vertically and cut off the supply of coal from the lower end of the chute. Each of the shafts 27 carries a delivery-pan 33, rigid with the shaft and adapted to be rocked or tilted, and thus raised and lowered in unison with the shaft, sectors, rack-bars, and gate.

34 designates a platform, which is located at each side of the shaft 1 at the ends of the chambers 2 and 3, which platforms are at their inner ends recessed, as at 35, forming opposite abutments 36.

37 designates opposite guides secured to the platform near its opposite edges. These guides are provided with flanges 38, secured by bolts 39 to the platform, and at their front or inner ends are provided with arc-shaped arms 40. The arms and the guides are slotted, as at 41, from near one end to near the opposite end.

42 designates opposite parallel tipple-bars located between the guide-bars 37, and the inner ends of said tipple-bars are upwardly curved, as at 43, said curvature approximating in diameter that of a wheel of a coal-car. The tipple-bars are connected at their front ends by a tie-rod 44 and at their rear ends by a tie-rod 45, the opposite ends of which extend beyond the tipple-bars, forming trunnions 47, which ride in the slots 41. An axle 48 is journaled in the tipple-bars in advance of the tie-rod 45, and the ends of the axle project beyond said tipple-bars and are there provided with rollers 49, which are located between said tipple-bars and the guide-bars 37. In the above spaces are located tracks 50, upon which the rollers 49 ride, and the inner ends of the track extend beyond the guide-bars and terminate in curved abutments or stops 51. The arcs upon which the curved arms 40 are formed, together with their slots 41, are concentric with the center upon which the curved ends or stops 51 are formed, and the distance from the trunnions 47 to the curved portions of the slots is the same as from the beginning of the curved portions to the curved stops 51.

52 designates braces for strengthening the curved portions 43 of the tipple-bars, and 53 designates a pair of springs connected at their forward ends to the axle 48 and at their rear ends to the platform 34.

54 designates a track, which leads to the chambers from the tipplers just described, and is in alignment with the tipple-bars to form a continuation of said track.

55 designates an upper side track raised above the track 54 and inclined, so that a car coming to the tippler will be moved by gravity. The track 55 merges into a single track 54 some distance from the tipplers. The guides or tracks 5 at a point above the surface of the ground are curved, as shown at 56, while the guides or tracks 6 continue upwardly.

The tilting delivery-chutes 22 are provided at their upper rear ends with hooks 57, and the cages below their openings 13 are provided with hooks 58.

In operation the driver of a coal-train disconnects or uncouples the first car, and it runs down the inclined track 55 onto the tipple-bars, and continues said movement until its front wheels take into the curved front ends of said tipple-bars. The impetus of the car is so great that the tippler is moved within its guides until the rollers 49 are brought against the curved ends 51 of the tracks 50, where the movement of the tippler is suddenly arrested. At the time the movement is arrested the trunnions 47 have passed along the slot or guide 41 until they have reached the beginning of the curved portion of said slot. The momentum of the car and the tippler is so great that by the sudden arrest of the movement thereof the rollers and the axle 48 become a temporary fulcrum or pivot for the car and the tippler and the impetus is sufficient to make the car buck, so that the trunnions 47 travel up the curved

portions of the guide-slots 41, and thus one after another the cars are brought to the point of dumping and automatically throw their contents into the inclined feed-chute 26, which, together with the pivoted vibrating pan, becomes filled with the products of the mine. After the cars have been dumped of their contents the preponderance of weight at the rear sides of their pivots or fulcrums serves to lower the rear ends of the tipple-bars and the cars and the springs 53 serve to draw the tippler back to its normal position. The strength of these springs is sufficient to throw the car from the tipple-bars onto the lower track 54, so that the cars will run by reason of this force back into the chamber to be again filled.

The manner of automatically filling the cage is as follows: The pan 33, being filled and of a capacity about equaling that of the cage, is struck at its free end by the arm 21 as the cage descends and is in position to receive the contents of the pan. The free end of the pan is thus tilted downward so that its contents is delivered directly into the descending cage, and as said pan is tilted the sectors 28 are raised or locked, so that as they engage the rack-bars 29 said rack-bars are elevated and thus elevate or close the gate 31. This closes the supply of coal and prevents the same from running into the pan while the latter is tilted or in a delivering position. The forcing of the gate through the coal is permissible and not so greatly obstructed by reason of the gate moving in an upward direction as would be the case if the gate moved in an opposite direction. This is so by reason of the inclined disposition of the chute with relation to the gate. Continuing the operation, the cage passes down to the bottom of the shaft, and its bottom is immersed or plunged into the sump, which is at all times more or less filled with water from the various portions of the mine. The pressure of the water is sufficient to open the valve 12 and to fill the compartment 10. The engine being reversed, the cage begins its ascension, and continues in its movement while the opposite cage is descending or traveling in an opposite direction, and going through the operations just described. When the roller 18 of the cage whose movements we are following has reached the curved portion 56 of the track 5, said roller leaves the main track and follows the curved portion thereof. This tilts the upper end of the cage so that it passes over the rear end of the balanced discharge-chute 22, and the smaller roller 15, following the track 6, rises to a point above the roller 18, and in so doing retracts the cage, bottom end upward, so that its hook 58 engages the hook 57 of the balanced discharge-hopper, and the two—the hopper and the cage—are maintained in relative position during the emptying of the cage. The coal passes from the upper compartment of the cage into the hopper or chute, and is thus discharged, while the water passes from the discharge-opening 13 into the discharge-pipe at the under side of the chute, and thus the water may be delivered into a tank 60 and conducted to any point of discharge.

From the above construction it will be apparent that I have provided a very simple, comparatively cheap, and exceedingly convenient mechanism, whereby I am enabled to automatically dump the cars, deliver their contents to the cages, and dump the cages, thus saving the immense expense of the hand-labor usually required; furthermore, that I save the heretofore wasted power necessary to elevate the car itself, thus utilizing that power and space for the raising of the product, and, furthermore, that I entirely obviate the necessity of the employment and maintenance of the costly pumps and pipe-lines and the frequent necessary repairing of the same.

Each pair of tracks 5 at each side of the shaft is provided with the curved branches 56, those of one track being disposed opposite to each other. The water-tank 60 and its pipe are also duplicated.

Having described my invention, what I claim is—

1. A mine-shaft having a frame-work, and a cage mounted therein and having a trip-arm, in combination with an inclined chute leading from a chamber to the shaft, a pan pivoted at the lower end of the chute and adapted to be struck by the arm, and means for temporarily cutting off the supply from the pan while the same is tilted by the arm, substantially as specified.

2. A mine-shaft having a frame-work and a cage mounted therein and provided with a laterally-disposed arm, in combination with an inclined chute leading from a chamber, a shaft pivoted in the lower end of the chute and carrying a pan, toothed sectors mounted on the shaft, a gate mounted in the chute above the pan, and a rack-bar depending from the gate and engaged by the sector, substantially as specified.

3. The combination, with the frame-work of a mine-shaft and an inclined chute located at the upper end of the same and provided with a coal-receiving and a water-receiving way, of a cage mounted for vertical movement in the frame and subdivided to form an upper coal-receiving and a lower water-receiving compartment, the latter having a spout at that side thereof at which the discharge-chute is located, and means for raising said cage and tilting the same and bringing the coal and water discharges thereof opposite the coal and water discharges of the chute, substantially as specified.

4. The combination, with the frame-work of the shaft provided with opposite trunnions, of the chute mounted therein and having opposite slots for the reception of the trunnions, the inner ends of the slots occurring in rear of the centers of the chute, and a hook mount-

ed upon the rear end of said chute, a cage mounted in the frame-work and provided with a hook adapted to engage that of the chute, and means for raising and lowering the cage and for tilting the same upon the chute and raising the cage in an inverted position, substantially as specified.

5. The combination, with the opposite tracks 5, having the inner grooves 6, said tracks having curved branches near their upper ends, in which the grooves are continued, of the cage mounted between the tracks and having a long lower shaft and a short upper shaft, rollers mounted on the ends of the shafts outside the walls of the cage, those of the lower shaft taking in the grooves 6 and those of the upper shaft in the tracks 5, a U-shaped suspension-bail embracing the upper portion of the cage and loosely connected to the lower shaft between the wheels, and means for raising and lowering the cage, substantially as specified.

6. The combination, with the opposite guide-bars and the inner opposite tipple-bars terminating at their inner ends in curved portions or stops, of a trunnion-bar passing through the tipple-bars and bearing in slots formed in the guide-bars, opposite tracks arranged parallel to the tipple-bars, a shaft connecting the tipple-bars in advance of the trunnions and having rollers designed to ride on said tracks, said tracks terminating at their front ends in stops, whereby said rollers act as pivots for the tippler-frame, and means for retracting the frame, substantially as specified.

7. The combination, with the platform, the opposite guides bolted thereto, terminating at their front ends in arc-shaped portions and slotted nearly throughout their lengths, of opposite tippler-bars mounted between the guide-bars and having trunnions near their rear ends for riding in the slots, opposite track rails having their inner ends curved to form stops, and of the same distance from the slots in the guide-bars as the distance between the said trunnions, and a pair of rollers mounted on the tipple-bars in advance thereof, and a coiled spring connected at its inner end to the tipple-bars and at its rear end to the platform, substantially as specified.

8. The combination, with the platform 34, of the angle-bars 37, bolted, as at 39, to the platform and having the arc-shaped ends 40, and slotted, as at 41, the opposite tipple-bars 42, the tracks 54 and 55, leading thereto, and the latter elevated above the former and inclined, the opposite tracks 50, having their ends bent to form stops 51, the tipple-bars being bent at their front ends, as at 43, the bar 45, connecting the rear ends of the tipple-bars and terminating in trunnions 47 for riding in the slots, the rollers 49, mounted on the tracks 50, and the opposite springs 53, connected at their front ends to the shaft 48 and at their rear ends to the platform 34, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ROBERT DINSMORE.

Witnesses:
J. H. SIGGERS,
R. J. MARSHALL.