

C. W. HILL.  
 APPARATUS FOR MOVING MATERIAL.  
 APPLICATION FILED JUNE 10, 1909.

973,784.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.

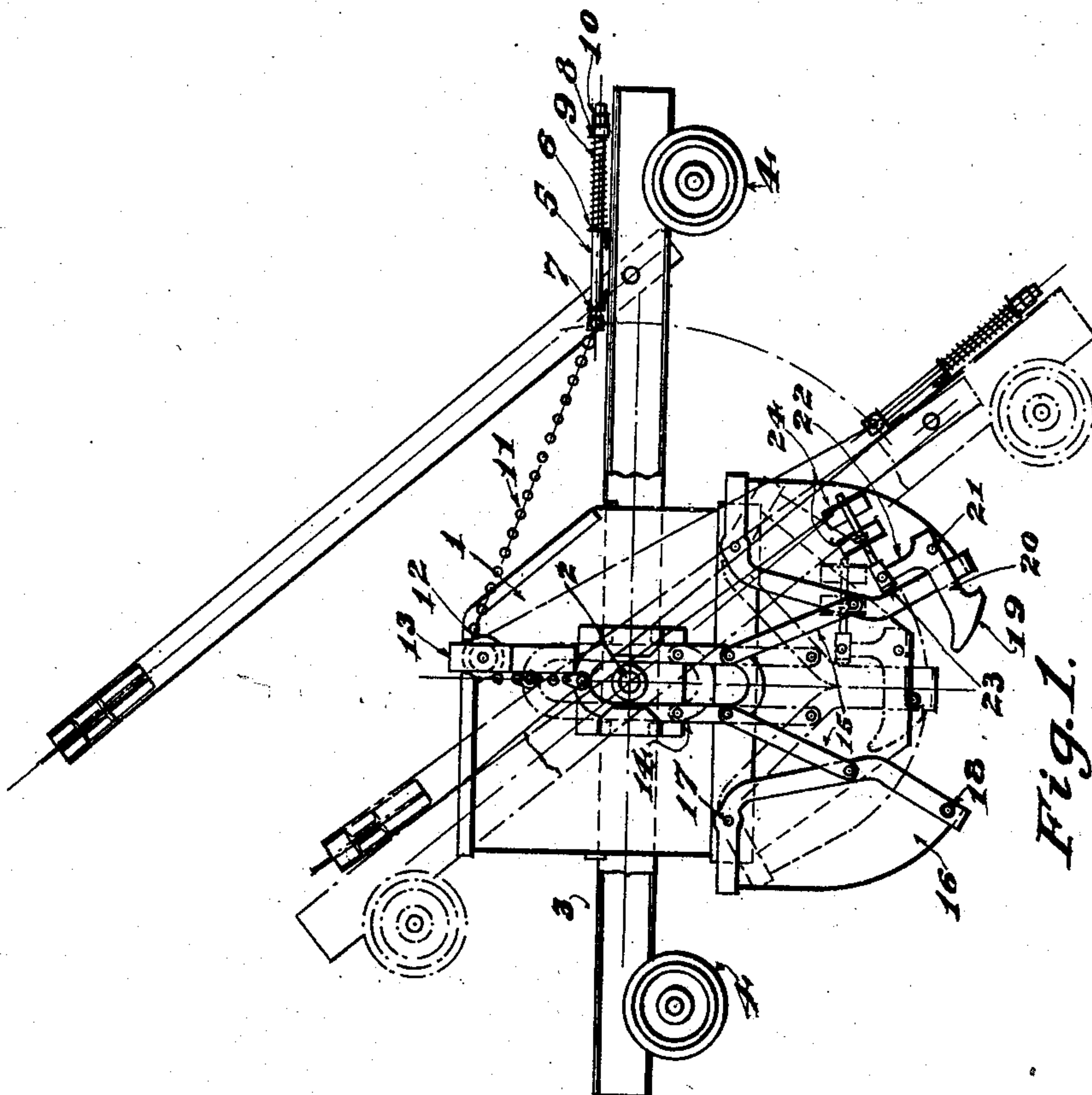


Fig. 1.

Witnesses

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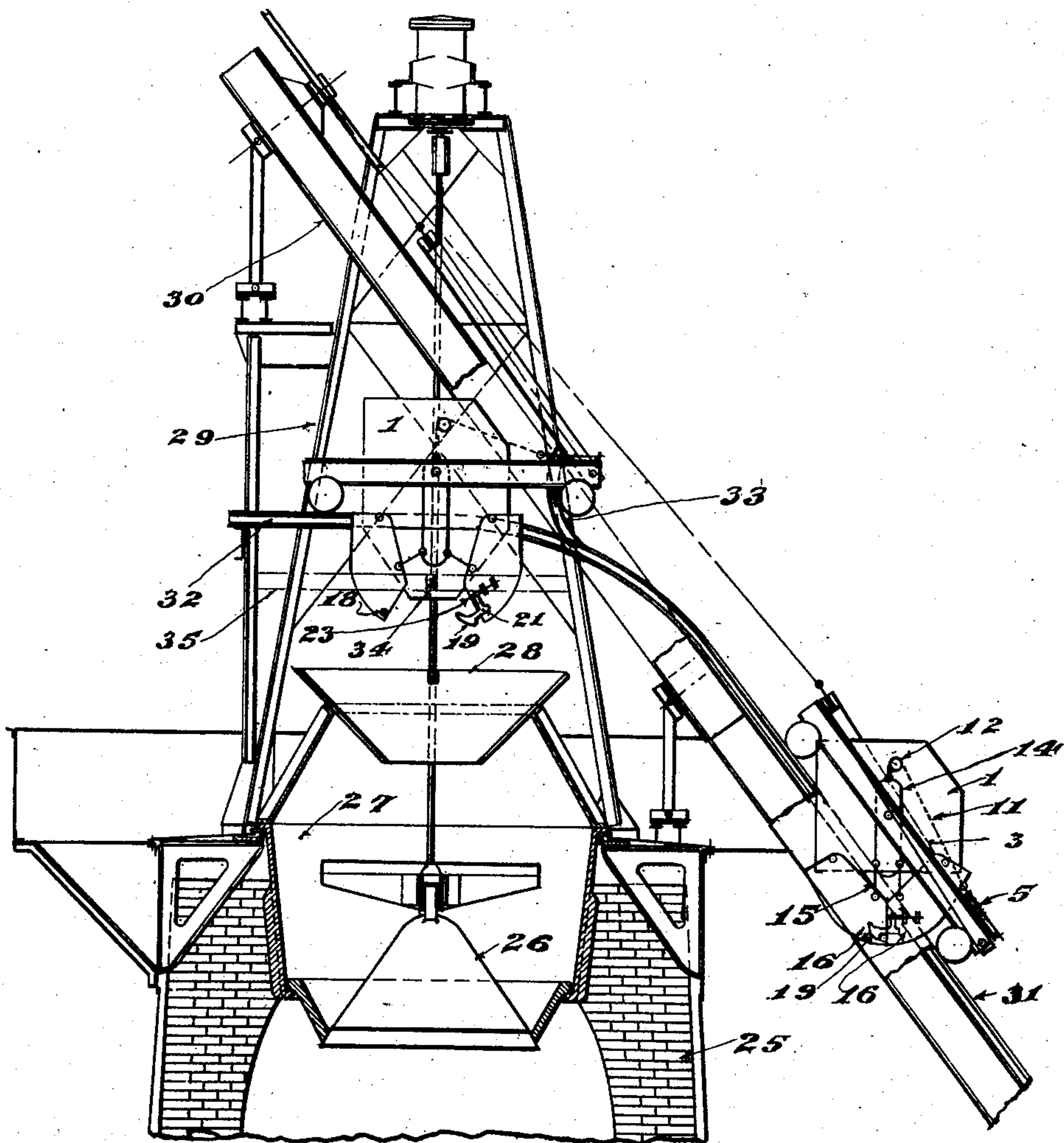


Fig. 2.

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# UNITED STATES PATENT OFFICE.

CHARLES W. HILL, OF BIRMINGHAM, ALABAMA.

## APPARATUS FOR MOVING MATERIAL.

973,784.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed June 10, 1909. Serial No. 501,372.

*To all whom it may concern:*

Be it known that I, CHARLES W. HILL, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Apparatus for Moving Material, of which the following is a specification.

My invention relates to an improvement in an apparatus for transferring material by means of a bottom dump bucket or receptacle provided with one or more closures which are controlled automatically by a relative change in position between the bucket and its supporting means.

The object of my invention is to provide a drop bottom receptacle for transferring stock and material, the hopper or body portion of which is pivotally mounted in a movable frame, usually supported on wheels, and provided with means which act responsive to the pivotal movements of the frame about the receptacle which swings always vertically, to control the operation of the bottom doors.

A further object of my invention is to provide an improved skip hoist for furnace charging apparatus in which the skip car is mounted on trunnions in a wheel frame and has drop bottom doors which are adapted to be opened and closed by mechanism which is actuated by a change in relative position between the car and frame when the former reaches predetermined points, and, if desired, this apparatus may be further equipped with a latching means which will automatically hold the doors closed until tripped at a predetermined point of discharge for the stock.

My invention further comprises the features of construction and arrangement of parts hereinafter more particularly described, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of my improved apparatus showing in dotted and full lines the extreme relative positions assumed by the receptacle and its support. Fig. 2 is a side elevation of a furnace top illustrating one application of my invention as charging means, the charging car and its carriage being shown in both operating positions.

Similar reference numerals refer to similar parts throughout the drawings.

In the illustrated embodiment of my invention, I show a square metallic bucket or

receptacle 1, into which ore or other material to be handled is charged in any suitable manner and which is provided with trunnions 2 journaled in the metallic frame 3 from which the bucket is suspended. The trunnions are connected to the sides of the bucket above the center so that the latter will swing vertically between the side bars of the frame 3. The frame is mounted upon wheels 4 at each end thereof and at the rear end is provided with a sliding rod 5 mounted in guides 6 and 7 and provided at its outer end with a washer 8 between which and the bearing 6 is interposed a coiled spring 9, and which at its outer end has a nut 10 to hold the washer in place. At its inner end this sliding rod is connected to a chain or cable 11 which passes forward to the car and over a pulley 12 journaled in a bracket 13 fastened near the top of the bucket 1. This chain passes over the pulley and connects to the upper end of a sliding loop 14. The trunnions of the bucket work through this loop which loop can be raised or lowered by the application of pull on the chain 11, and which loop at its lower end is connected by links 15 to a pair of hinged drop bottom doors 16 pivotally connected to the body of the bucket at 17 and adapted to overlap and effectively close the hopped bottom opening of the bucket. One of the doors carries a pin 18 which, as the doors move together in closing, strikes the inclined face 19 of a latch 20 carried by the other door, which latch is pivoted at 21 and provided with an upwardly extending arm 22 which is connected to a trigger 23 which works in guides 24. The arrangement of the chains, loop, links and sliding rod may be used on both sides of the car or on only one as conditions may require.

Describing the operation of my invention in its simplest form and without the latch mechanism, I provide an inclined track or other support or way on which the wheels 4 run and which track at the top or discharge point changes its angle of inclination toward a horizontal position. I use the resulting change of position of the frame 3 with relation to the unchanged position of the suspended bucket 1 to control the operation of its dumping doors. In dotted lines, Fig. 1, I show the position of parts as the car moves on the inclined track. In this position it will be noted that the distance from the rod 5 to the pulley 12 is much greater



than the distance between those parts as shown in full lines when the frame is horizontal. It follows therefore that when the parts are in the position shown in dotted lines, the chain 11 will be drawn over the pulley until the loop 14 is raised to the highest position, *i. e.*, that shown in dotted lines. In this position the loop draws the links 15 upwardly and holds the doors tightly closed. The weight of the bucket tends to hold it on its trunnions in a vertical position, acting against the tension of the spring 9 and thereby holding the doors tightly closed. As the frame 3 moves onto the less inclined or horizontal portion of the way or track it swings around the trunnions toward the full line position, thereby gradually relaxing the pull on the chain 11 as the distance between its point of fastening and the pulley 12 shortens, which permits the loop 14 to move downwardly until it reaches the full line position, thereby relaxing the doors 16 and permitting them to open by gravity gradually and discharge the contents of the car. If it be desired to effect the discharge of the contents of the bucket at any prescribed point, it is then necessary to hold the doors latched in their closed position after the pull is off the chain 11. To this end I provide the latch 20 which, as the doors are drawn together, will engage the pin 18 and hold the doors closed even after the frame has assumed its full line position in Fig. 1, and until the trigger 23 is struck by a stop 34, thereby disengaging the latch from the pin 18 and permitting the doors to open suddenly.

In Fig. 2, I show an important application of my invention in blast furnace charging practice, the furnace 25 being provided with the usual bell 26, hopper 27, upper hopper 28 and superstructure 29 which supports the beams 30 of the incline upon which the rails 31 are placed. These rails 31 are bent over to horizontal position at 32, and short outside rails 33 on which the rear car wheels only are adapted to run, are bent upwardly in the usual manner. As the car rides up the incline the parts are in the dotted position in Fig. 1, and the loop 14 is drawn up and the doors held tightly closed, the latch and chains holding them in this position. As the car swings into the horizontal track portion 32, the tension on the chain is relaxed so that when the car gets immediately above the hopper 28, a stop 34 strikes the trigger 23 and the doors open by gravity and the stock is discharged into the center of the hopper. The stop 34 is mounted on a cross piece 35 connected to the frame work. It will be noted that any tendency of the haulage system to move the car past the discharge point will merely take effect in swinging the car up the vertically disposed rails 33 without moving the car past

its central discharging point above the hopper 28.

My invention, broadly considered, is applicable generally for loading and unloading purposes, particularly where automatic dumping is required. I do not therefore desire to be particularly limited to the application to the blast furnace. Also for the purposes of my invention, the way may be a track or roadway or other way which has portions which vary sufficiently in angular inclination to produce the requisite relative movement between the car and its carriage, or such relative movement may be produced in other equivalent ways by the means over which or the means by which the carriage is moved.

The reference to the bottom dump receptacle is meant to include all arrangements by which the contents of the receptacle may be discharged without tilting it. The terms horizontal and vertical are used relatively.

What I claim as new and desire to secure by Letters Patent, is:—

1. In an apparatus for transferring material, the combination with a way having inclined and substantially horizontal portions, of a receptacle, a support in which the receptacle is journaled and which moves over said way, closure means for a discharge opening in said receptacle, and means actuated by the relative change in position between said receptacle and its support, as the latter moves from the inclined to horizontal portions of said way, and vice versa to control the operation of said closure means.

2. In an apparatus of the character described, a carriage, a receptacle pivotally suspended from said carriage and having a discharge opening in the lower part thereof, means connected to said carriage and leading to the upper portion of the receptacle above its center of gravity, and closure means for said opening adapted to be actuated by said means connected to the carriage, as and for the purposes described.

3. In an apparatus of the character described, a carriage, a receptacle pivotally suspended therefrom, door means controlling the discharge opening in the lower part of the receptacle, a pulley mounted near the top of the receptacle, a yielding member mounted on said carriage near an end thereof, and a chain connected to said member and door means and passing over said pulley, as and for the purposes described.

4. An apparatus for transferring and dumping material comprising a receptacle having a discharge opening at or near the bottom, a carriage which supports said receptacle, trunnions on which said receptacle swings in a vertical position irrespective of the position of its carriage, a guide near the top of the receptacle, a flexible connection attached to said carriage and passed



over said guide, and means operated by said connection for closing the bottom opening of said receptacle when said frame assumes a predetermined position with relation to  
5 said receptacle.

5. An apparatus for transferring and dumping material comprising a receptacle having a discharge opening at or near the bottom, a carriage which supports said receptacle, trunnions on which said receptacle  
10 swings always in a vertical position irrespective of the position of its carriage, a guide near the top of the receptacle, a flexible connection from said carriage which  
15 passes over said guide, a closure for said opening, means operated by said connection to move said closure to close said opening when the frame assumes one predetermined position with relation to said receptacle, and  
20 which releases said closure for discharging the contents when said carriage reaches a second predetermined position with relation to said receptacle.

6. An apparatus for transferring and  
25 dumping material comprising a receptacle having a discharge opening at or near the bottom, a carriage which pivotally supports said receptacle, a closure for said opening, means to operate said closure comprising a  
30 pulley mounted near the top of the receptacle, a chain connected to said carriage and passing over said pulley, devices connected to said chain and closure, in combination with ways over which said carriage moves  
35 and so disposed as to bring said carriage into predetermined positions with relation to said receptacle, as and for the purposes described.

7. In an apparatus for conveying and  
40 dumping material, a carriage, a receptacle

mounted on trunnions in said carriage and having a bottom discharge opening, swinging doors for said opening, mechanism actuated by the relative change of position between the receptacle and carriage for moving  
45 said doors to closed positions and for releasing said doors so that they are free to open a catch to hold said doors in closed position irrespective of said operating mechanism, and means to trip said catch and  
50 release said doors at a predetermined point and after they have been released by said operating mechanism.

8. In a furnace charging apparatus, an inclined track leading to the furnace top  
55 and a substantially horizontal track portion above the furnace top, in combination with a frame mounted on wheels adapted to travel on said track, a charging car mounted on trunnions journaled in said frame and  
60 adapted by gravity to retain a vertical position irrespective of the position of said frame, door means to close a dumping opening in said car, latch means to hold said door means closed, a stop to trip and re-  
65 lease the door means when the car is in a predetermined discharging position, and means controlled by the relative movement of said frame with relation to the car, as the former moves onto the inclined track, 70  
which act to close said door means, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES W. HILL.

Witnesses:

NOMIE WELSH,  
ANNIE L. PEACE.