

**Aug. 8, 1961**

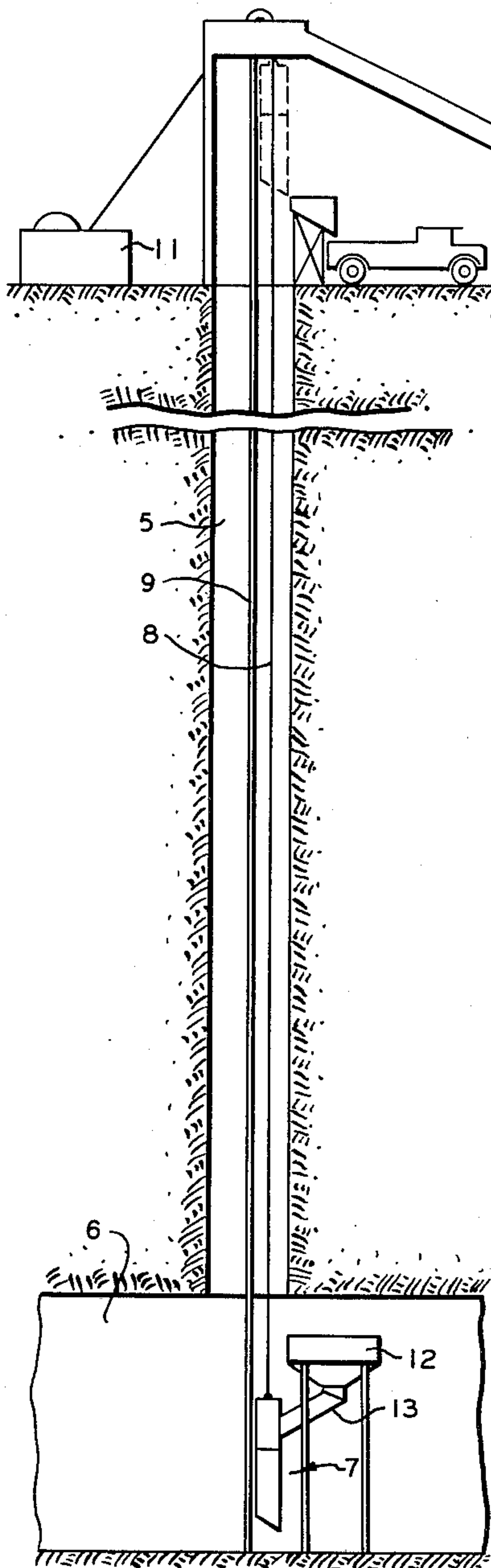
**L. H. THOMAS**

**2,995,264**

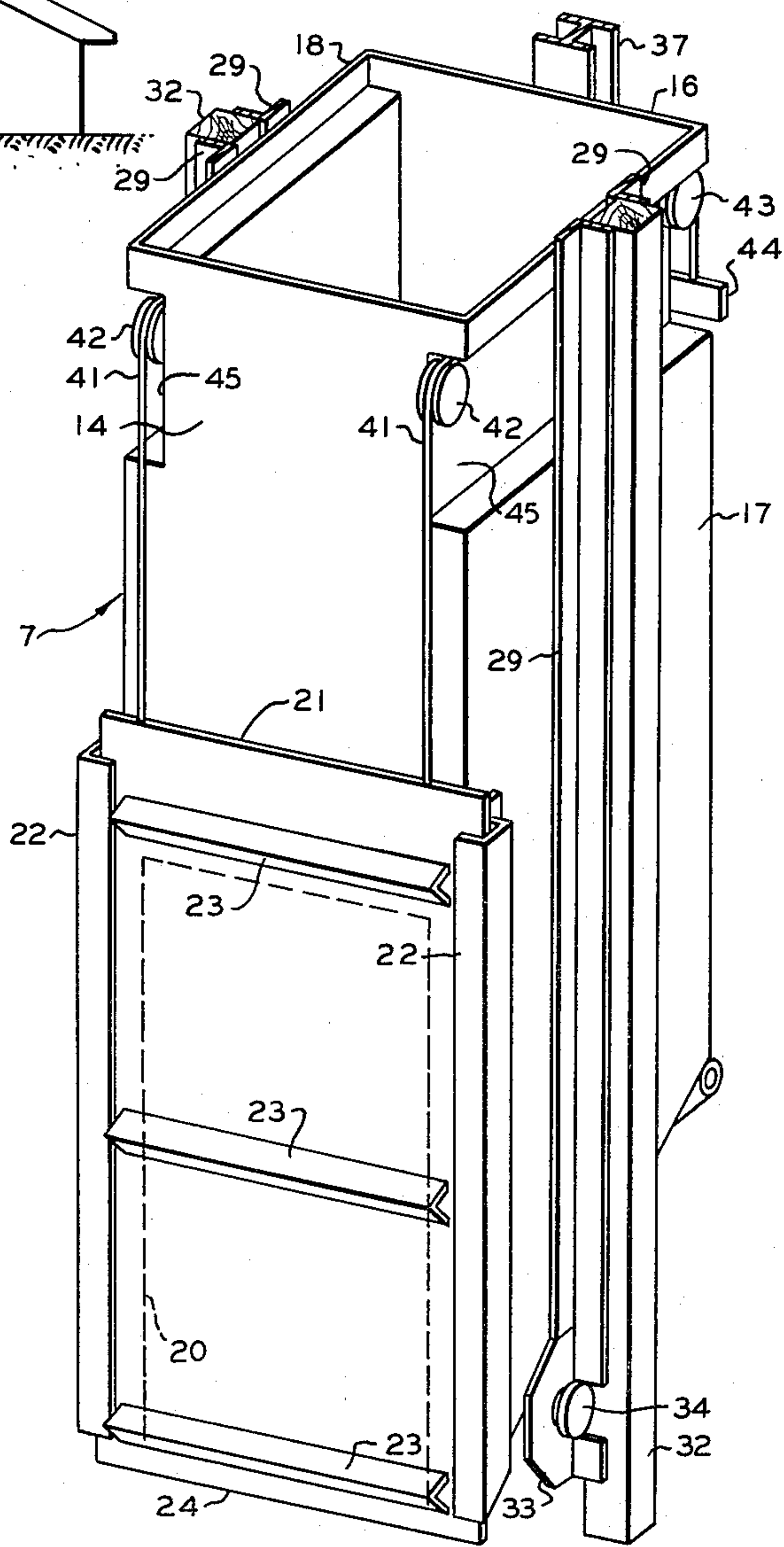
## SKIP DUMP HAVING AUTOMATIC DISCHARGE

Filed June 24, 1959

3 Sheets-Sheet 1



**FIG. 1**



**FIG. 2**

INVENTOR.  
L.H THOMAS

BY Hudson & Young

**ATTORNEYS**

Aug. 8, 1961

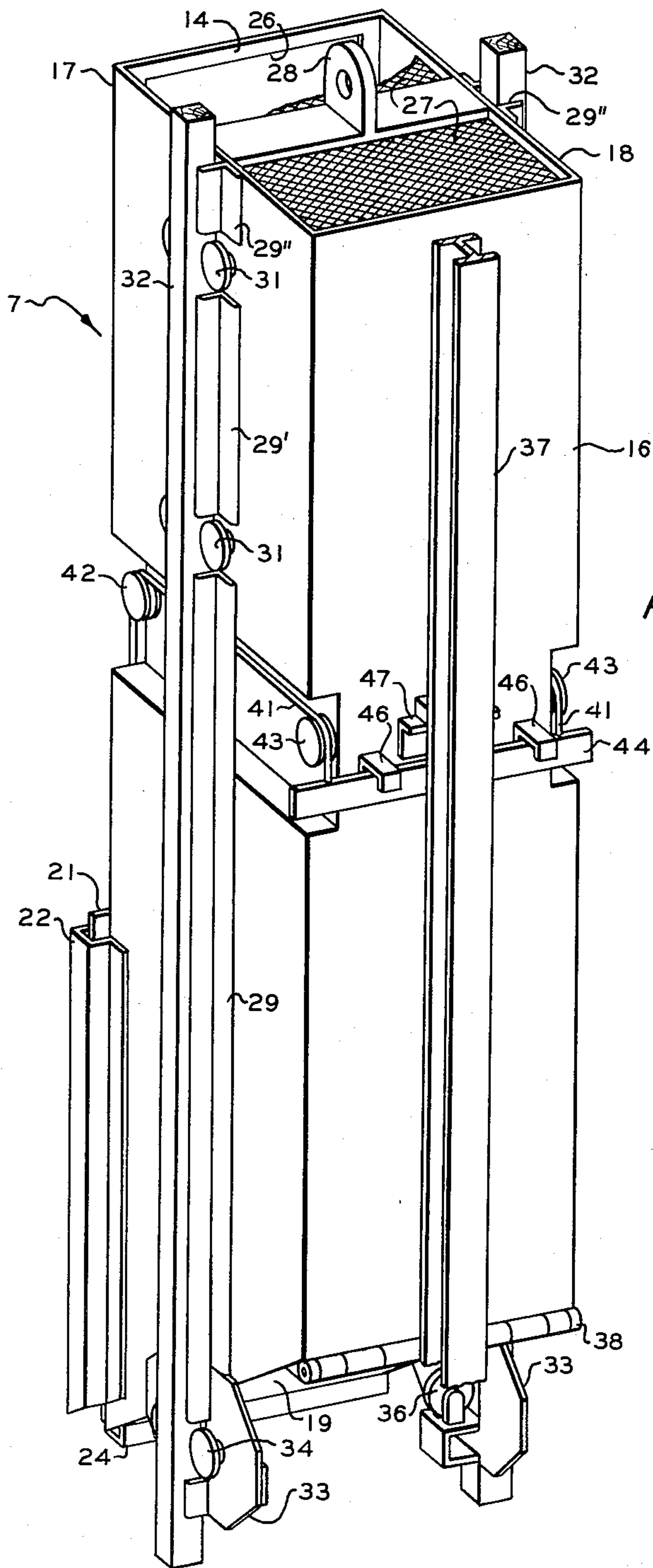
L. H. THOMAS

2,995,264

SKIP DUMP HAVING AUTOMATIC DISCHARGE

Filed June 24, 1959

3 Sheets-Sheet 2



INVENTOR.  
L.H. THOMAS

BY *Hudson & Young*

ATTORNEYS

**Aug. 8, 1961**

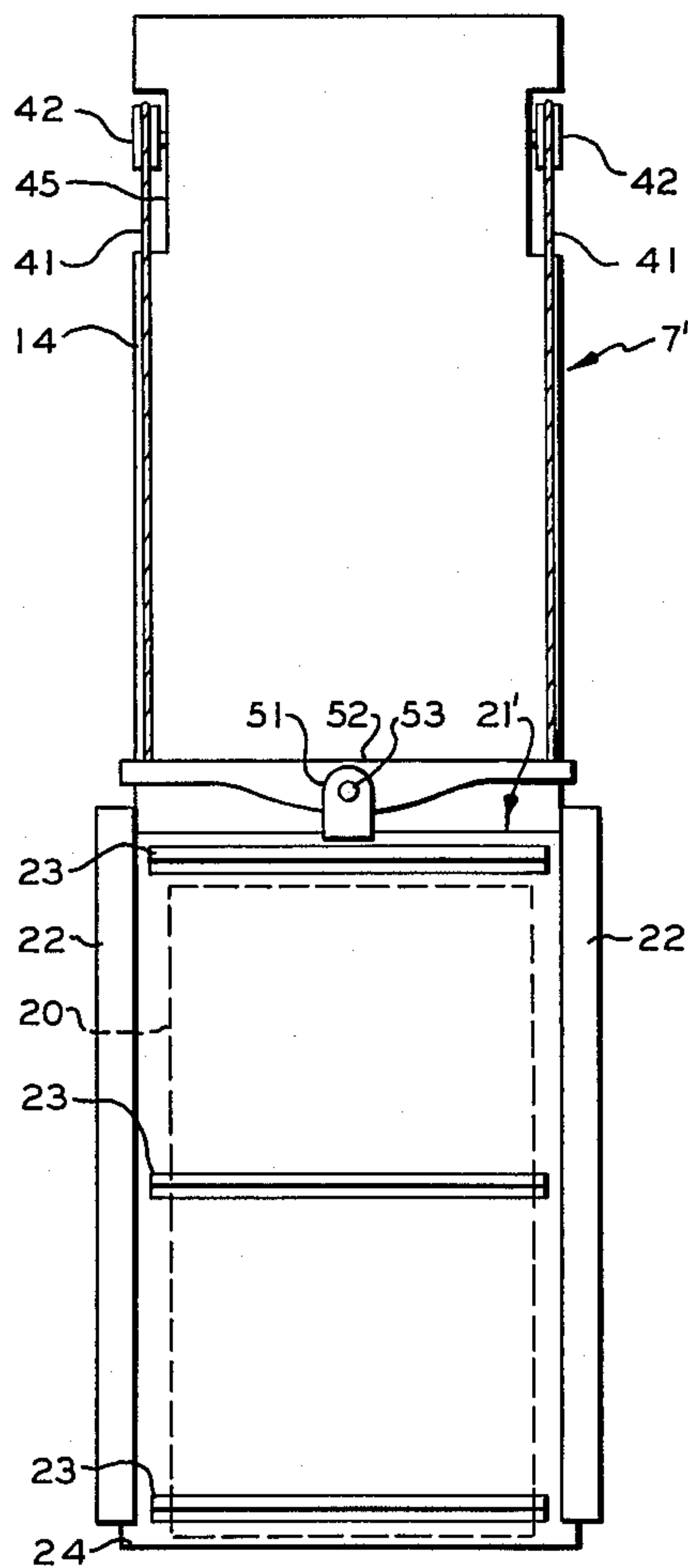
L. H. THOMAS

**2,995,264**

## SKIP DUMP HAVING AUTOMATIC DISCHARGE

Filed June 24, 1959

3 Sheets-Sheet 3



**FIG. 4**

INVENTOR.  
L. H. THOMAS

BY Hudson E. Young

ATTORNEYS



1

2,995,264

**SKIP DUMP HAVING AUTOMATIC DISCHARGE**  
Luther H. Thomas, Grants, N. Mex., assignor to Phillips  
Petroleum Company, a corporation of Delaware  
Filed June 24, 1959, Ser. No. 822,456  
5 Claims. (Cl. 214-741)

This invention relates to an improved skip dump having means to automatically discharge the same. In another aspect, this invention relates to a skip dump of the type which is vertically suspended and hoisted in a mine shaft or the like, said skip dump having means for automatically discharging the contents of the skip when it reaches a discharge or dumping station.

In the mining, quarrying and other industries, it is often necessary to vertically hoist materials, such as ore, coal, etc., by means of a skip or bucket and discharge the material from the skip into a hopper, truck, or the like. Many of these skips are discharged by automatically opening doors in such a manner as to eliminate the necessity of tipping or inverting the skip during the dumping operation. However, many of these automatic discharge means comprise complex systems of levers, cams, pulleys, rollers, etc., which are often subject to damage and misalignment, and require the application of forces which are actually much greater than that really necessary to open the skip door. The use of some of these complex systems often requires a sacrifice in the available confined shaft space. As such, these complex automatic discharge systems often break down, thereby presenting hazards, and require a good deal of surveillance and maintenance which adds to the expense of the mining and hoisting operation.

Accordingly, an object of this invention is to provide a skip dump having improved means for automatically discharging the same. Another object is to provide an improved skip of the type which is vertically suspended and hoisted in a mine shaft or the like, said skip having means for automatically discharging the contents of the skip when it reaches a discharge or dumping station. Another object is to provide an improved skip having a relatively simple automatic means to cause the discharge of the contents without requiring the tipping or inverting of the skip during the dumping operation. Another object is to provide an improved skip, the door of which is automatically opened and closed by means which require a minimum application of force, which means is relatively simple and not subject to misalignment or other damage. Another object is to provide an improved skip dump which is safe, reliable, and relatively inexpensive to build and operate. Other objects of this invention will become apparent from the following discussion, appended claims, and drawings in which:

FIGURE 1 is an elevational view of a mine having a shaft in which is vertically suspended the improved skip of this invention;

FIGURES 2 and 3 are diametric views of the improved skip dump of this invention; and

FIGURE 4 is a partial front elevational view of another and preferred embodiment of the skip dump of this invention.

Referring now to the drawings, in which like parts have been designated with like reference numbers, and initially to FIGURE 1, a mine is illustrated having a vertical shaft 5 which communicates from ground surface to an underground level 6. Vertically suspended within shaft 5 is the improved skip 7 of this invention, the skip being supported in a vertical position by means of cable 8 which extends to the ground structure 10 and is hoisted by means of suitable hoisting equipment 11. The loading of the skip 7 can be accomplished by means of a suitable elevated hopper 12 which conveys the ore or other material

2

by means of chute 13 to the skip during the loading operation.

It should be understood that this invention is not limited to mining operations, but broadly it finds utility in any place where there is a need in hoisting materials to an elevated position for discharge.

The improved skip of this invention will now be discussed in detail, reference being made to FIGURES 2 and 3. Skip 7 has the general form of an oblong rectangular box having a vertical front wall 14, back wall 16, and side walls 17, 18, and is provided with downwardly inclined bottom 19 which is disposed opposite the front wall 14, the skip generally having a rectangular cross-sectional area. The lower portion of the front wall 14 is provided with a discharge opening shown by broken line 20, this opening being normally closed by means of a vertically-sliding rectangular door or gate 21, which has a cross-sectional area larger than that of the discharge opening. The door 21 slides within suitable vertical door guides 22 which are mounted on the side walls 17, 18 of the skip adjacent the vertical edges of the door, these door guides being made of suitable angle iron. Door 21 can be suitably strengthened by means of a plurality of horizontally mounted angle irons 23, the bottom of the door resting on a bumper 24 or the like, made of rubber or other shock-absorbing material. The upper portion of the skip 7 can be provided with a suitable loading opening, such as opening 26 provided in the upper end of the front wall 14; alternatively, the loading opening can be located in the upper portion of the back wall 16 or in the top of the skip itself. The top of the skip 7 is preferably covered over by means of suitable grating 27 and the top is also provided with suitable housing means, such as a lug 28 which is connected to the hoisting cable 8 of FIGURE 1.

The side walls 17, 18 are provided with complementary, vertical spaced guide rails 29, 29', and 29'' which are welded or otherwise secured in place. These side walls 17, 18 are also provided with a plurality of pairs of rollers 31 which are preferably disposed between adjacent vertical guide rails. The guide rails 29, 29', and 29'' are adapted to slide on vertical masts or tracks 32 made of wood such as mahogany or the like, which masts are rigidly mounted in place within the shaft 5 of FIGURE 1. During upward or downward movement of the skip within the shaft 5, the skip 7 slides along masts 32 by means of guide rails 29, 29' and 29'', and rollers 31. The lower end portions of side walls 17, 18 are provided with suitable brackets 33 which are welded or otherwise secured to the side walls and depend a certain distance therebelow. These brackets are also provided with complementary pairs of rollers 34 which also aid the skip 7 in sliding along masts 32. The back of each of the brackets 33 can also be provided with a third roller 36, which slides along the mast 32.

The shaft 5 of FIGURE 1 is also preferably provided with a vertical backing rail or track 37 which can extend the entire depth of the shaft, or the upper portion thereof. This guide mast 37 is spaced a small distance from the back wall 16 of the skip. The lower end of the back wall 16 is provided with a horizontal roller 38 which projects a short distance beyond the back wall and allows the skip during its travel to roll along the guide masts 37.

The skip door 21 is suspended and vertically moved by a pair of cables or chains 41 which pass upwardly and over a pair of sheaves or pulleys 42 that are fastened to the side walls 17, 18 at their midportions adjacent the front wall 14. The cables 41 then extend horizontally across the side walls 17, 18 and pass downwardly and over another pair of sheaves or pulleys 43 which are also mounted on the side walls 17, 18 at midportion



thereof adjacent the back wall 16. The midportion 45 of the skip can be reduced in cross section to provide room for the sheaves 42, 43. The other ends of the door cables 41 are connected to and suspend a horizontal trip bar 44 which extends across the width of the skip. The upward movement of trip bar 44 beyond its position shown in FIGURES 2 and 3 (that is, beyond the point necessary to completely close the door) is prevented by means of a pair of stops or dogs 46 which are secured to the back wall 16 and project a small distance therefrom. The guide mast 37 is provided with suitable arresting means 47 which is located at a point adjacent the dumping or discharge station or level. The arresting means 47 projects from the guide mast 37 toward the back wall 16 of the skip and the trip bar 44 is adapted to slide between the arresting means and the guide mast upon the upward movement of the skip dump 7, the arresting means preventing the upward travel of the trip bar along with the skip when the skip has reached the discharge station.

In operation, with the skip 7 located at the bottom of the shaft 5, in its loading position, the skip door 21 is closed and occupies the position shown in FIGURES 2 and 3. In this position, the trip bar 44 occupies its uppermost position adjacent stops 46, as shown in FIGURES 2 and 3. Ore or other material is loaded in the skip 7 from chute 13 through the loading opening 26. When the skip is filled, it is hoisted upwardly by means of cable 8 and hoisting mechanism 11, the skip sliding along masts 32, 37. When the skip reaches the discharge station or level, the upward movement of the trip bar 44 is arrested by its engagement with the arresting means 47. Further upward travel of the skip 7 causes the door cables 41 to raise the door 21 at a faster rate than the continued upward travel of the skip, thus opening the door and allowing the material within the skip to slide through the discharge opening 20 into the waiting loading hopper or truck. The further upward travel of the skip, that is, above the point of discharge, can be prevented by any suitable means, such as stops or any other mechanism. After the material is discharged from the skip, the skip is then lowered back into the shaft, the weight of the door itself causing it to fall under the force of gravity back to its closed position. As the door 21 moves back to its closed position, the trip bar 44 moves back into contact with stops 46 and occupies the position shown in FIGURES 2 and 3.

If it is necessary to manually open the door for any purpose, e.g., for purposes of cleaning or maintenance, this can be done while the skip is in its stationary position by either pulling the trip bar 44 down by hand or grasping the door and lifting it up.

Referring now to the preferred embodiment of FIGURE 4, door 21' is provided at the top of both sides with a pair of complementary lugs 51 (only one of which can be seen in FIGURE 4), at the center thereof, these lugs being welded, bolted, or otherwise secured to the door and projecting from the top thereof. Horizontally disposed between lugs 51, and pivotally secured thereto by pin 53, is a pivot bar or singletree 52, the ends of which are secured to cables 41 and suspended thereby. This arrangement permits the yoke-mounted door 21' to freely vertically move both up and down without binding or sticking within door guides 22 should one of the cables 41 stretch or shrink more than the other. For example, when the skip dump 7' reaches its dumping station and trip bar 44 is actuated, if right-hand cable 41 is shorter than the left-hand cable 41, the pivot bar 52 will tilt slightly, sloping downward to the left, the pivot bar 52 pivoting on pin 53; however, the effective upward lifting force on door 21' will still be exerted at the center thereof, and the door will have no tendency to bind when moved upward. The same benefits are obtained when the door 21' is lowered.

Various modifications and alterations of this invention will become apparent to those skilled in the art without

departing from the scope and spirit of this invention, and it is to be understood that the foregoing description and illustrated embodiments do not necessarily limit this invention.

I claim:

1. A vertically moveable skip, comprising vertical side walls and an inclined bottom, a vertically slidable door mounted on one of said side walls and adapted to cover and uncover a discharge opening therein, cable means attached to said door, trip means disposed adjacent that one of said side walls which is opposite said discharge opening, said trip means being attached to said cable means and disposed to move in a solely vertical direction, guide means attached to said skip and adapted to slide along vertical mast means, and means attached to said mast means and adapted to arrest the vertical movement of said trip means when said skip is hoisted to a dumping station, whereby said door is pulled up to uncover said discharge opening.

2. A vertically moveable skip, comprising a generally oblong rectangular box having vertical side walls, a front wall, a back wall, and an inclined bottom opposite said front wall, a vertically slidable door mounted adjacent said front wall and adapted to cover and uncover a discharge opening therein, cable means attached to the upper end of said door to vertically suspend the latter, first and second sheaves mounted on said side walls adjacent said front and back walls respectively, said cable means adapted to pass over said sheaves, a horizontally disposed trip bar mounted adjacent said back wall and connected to and vertically suspended by the other ends of said cable means, the downward and upward vertical movement of said trip bar relative to the movement of said skip causing said cable means to open and close said door, vertical guide rails attached to said skip and adapted to slide along vertical masts, and arresting means attached to said masts and adapted to arrest the movement of said trip bar when said skip is hoisted to a dumping station without imposing any transverse force upon said arresting means, said vertical guide rails, and said masts, whereby said door is pulled up to uncover said discharge opening.

3. A vertically moveable skip, comprising a generally oblong rectangular box having vertical side walls, a front wall, a back wall, and an inclined bottom opposite said front wall, a vertically slidable door mounted adjacent said front wall and adapted to cover and uncover a discharge opening therein, cable means attached to the upper end of said door to vertically suspend the latter, first and second sheaves mounted on said side walls adjacent said front and back walls respectively, said cable means adapted to pass over said sheaves, a horizontal trip bar mounted adjacent said back wall and connected to and vertically suspended by the other ends of said cable means, the downward and upward vertical movement of said trip bar relative to the movement of said skip causing said cable means to open and close said door, arresting means attached to said back wall to prevent said trip bar from moving upward beyond a point necessary to completely close said door, and vertical guide rails attached to said side walls and adapted to slide along vertical masts when said skip is hoisted, said trip bar adapted to engage arresting means adjacent said back wall whereby the movement of said trip bar along with said skip is arrested when said skip is hoisted to a dumping station without imposing any transverse force upon said arresting means, said vertical guide rails and said masts, the continued upward movement of said skip when said trip bar is thus arrested causing said door to be pulled open by said cable means, said door adapted to fall by gravity and close when said skip is lowered to a point where said trip bar is not arrested by said arresting means.

4. A vertical moving skip, comprising vertical side walls and an inclined bottom, a vertically slidable door mounted on one of said side walls and adapted to cover and uncover a discharge opening therein, a singletree



5

secured to the top of said door, cable means attached to said singletree, trip means disposed adjacent that one of said side walls which is opposite said discharge opening, said trip means being attached to said cable means and disposed to move in a solely vertical direction, guide means attached to said skip and adapted to slide along vertical mast means, and arresting means attached to said mast means and adapted to arrest the vertical movement of said trip means when said skip is hoisted to a dumping station, whereby said door is pulled up to uncover said discharge opening.

5. A vertically moveable skip, comprising a generally oblong rectangular box having vertical side walls, a front wall, a back wall, and an inclined bottom opposite said front wall, a vertically slidable door mounted adjacent said front wall and adapted to cover and uncover a discharge opening therein, a normally horizontal singletree pivotally secured at its center to the upper end of said door, cable means attached to the ends of said singletree, first and second sheaves mounted on said side walls ad-

6

5 adjacent said front and back walls respectively, said cable means adapted to pass over said sheaves, a horizontally disposed trip bar mounted adjacent said back wall and connected to and vertically suspended by the other ends of said cable means, the downward and upward vertical movement of said trip bar relative to the movement of said skip causing said singletree to open and close said door, vertical guide rails attached to said skip and adapted to slide along vertical masts, and arresting means attached to said masts and adapted to arrest the movement of said trip bar when said skip is hoisted to a dumping station without imposing any transverse force upon said arresting means, said vertical guide rails and said means, whereby said door is pulled up to uncover said discharge opening.

## References Cited in the file of this patent

## UNITED STATES PATENTS

2,424,620	Korn	July 29, 1947
2,479,449	Woodward et al.	Aug. 16, 1949