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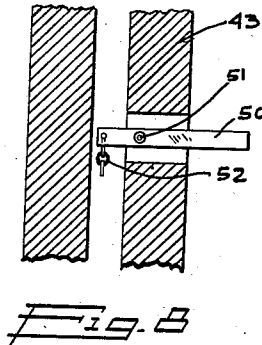
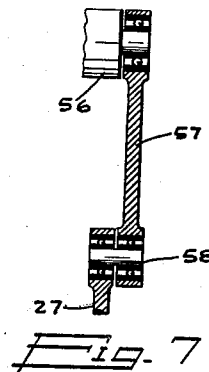
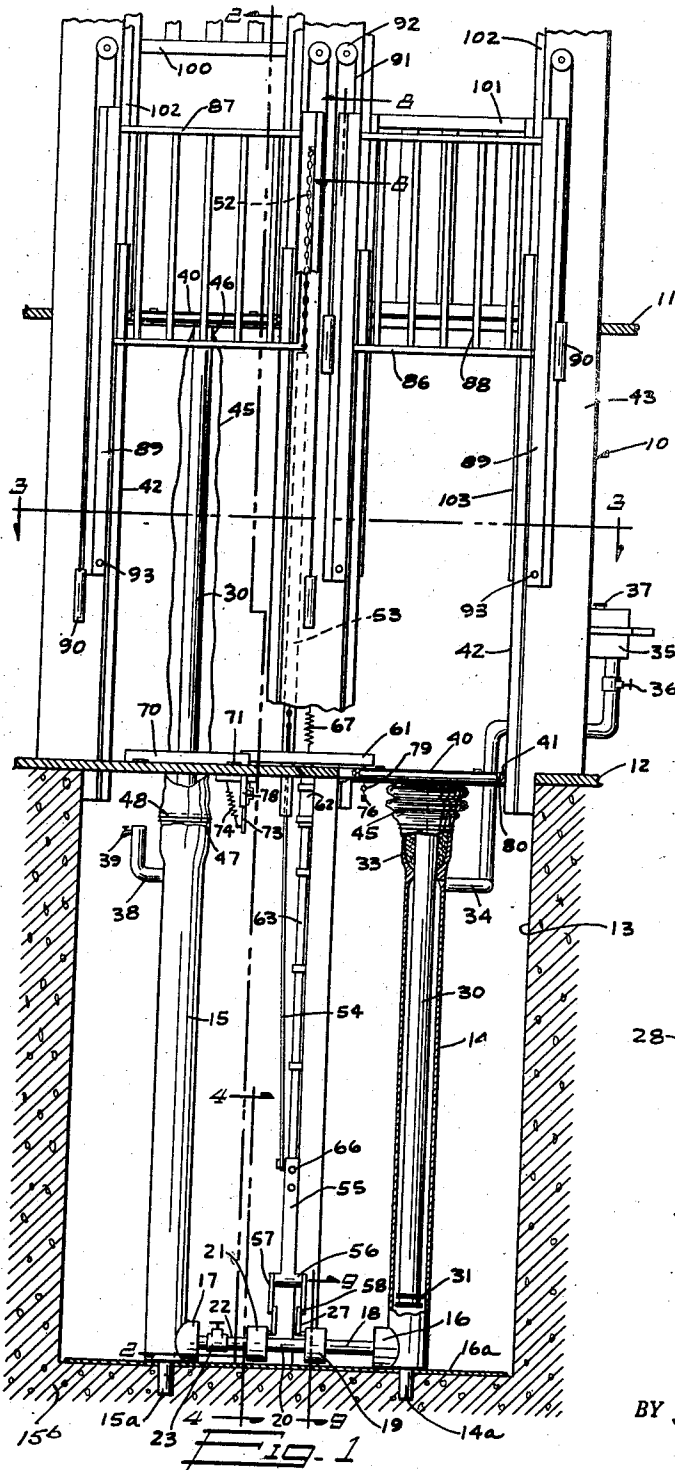
E. E. EVANS

2,362,809

ELEVATOR

Filed Sept. 18, 1943

2 Sheets-Sheet 1



Nov. 14, 1944.

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ELEVATOR

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2 Sheets-Sheet 2

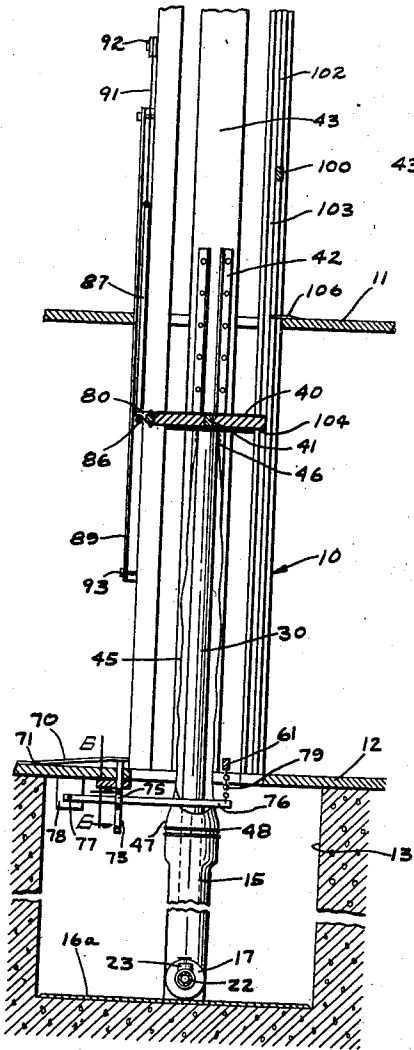


Fig. 2

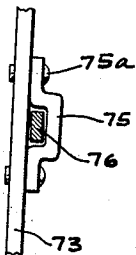


Fig. 6

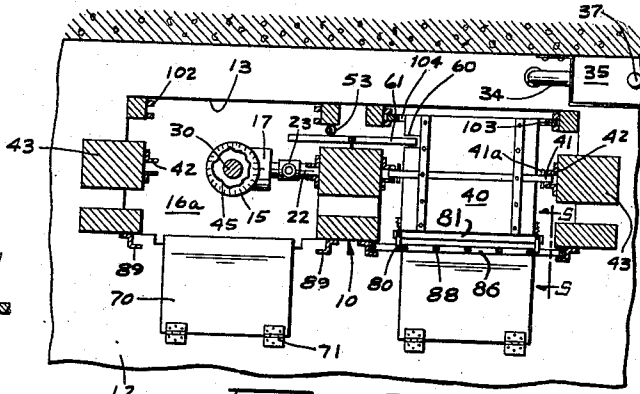


Fig 3

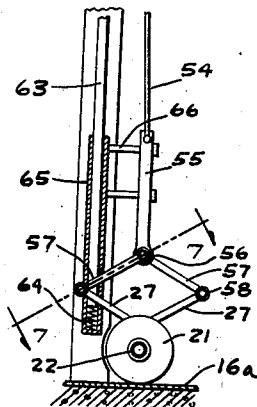


Fig. 4

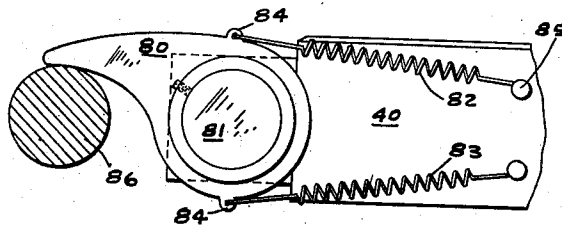


Fig. 5

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2,362,809

ELEVATOR

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Application September 18, 1943, Serial No. 502,920

10 Claims. (Cl. 187—28)

This invention relates to elevators.

The general object of the invention is to provide an elevator construction including a pair of plunger controlled elevators mounted side by side and adapted to move simultaneously so that when one of the elevators moves downwardly the other moves upwardly.

Another object of the invention is to provide a novel valve control means for a pair of duplex elevators.

Another object of the invention is to provide an elevator including means to move an elevator platform and wherein novel means is provided wherein the elevator platform controls its own movement.

Other objects and the advantages of my invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a longitudinal elevation view, partially in section, showing my improved elevator;

Fig. 2 is a fragmentary, longitudinal, sectional view taken at right angles to Fig. 1 and on line 2—2, Fig. 1;

Fig. 3 is a sectional view taken on line 3—3, Fig. 1;

Fig. 4 is a fragmentary section taken on line 4—4, Fig. 1;

Fig. 5 is an enlarged section showing the trigger mechanism, taken on line 5—5, Fig. 3;

Fig. 6 is an enlarged sectional detail showing the safety arm and taken on line 6—6, Fig. 2;

Fig. 7 is an enlarged section taken on line 7—7, Fig. 4;

Fig. 8 is an enlarged section taken on line 8—8, Fig. 1, and

Fig. 9 is an enlarged section taken on line 9—9, Fig. 1.

Referring to the drawings by reference characters, I have shown my invention as embodied in an elevator construction which is indicated generally at 10. My device is particularly adapted for lowering a stack of boxes from one level to another level and the construction includes an upper or loading floor 11 and a lower or delivery floor 12.

From the lower floor 12 a well 13 extends downwardly. In this well I arrange a pair of parallel vertical cylinders 14 and 15. The cylinders have elbow portions 16 and 17 at their lower ends. The cylinders are held in position by means of anchor portions 14a and 15a which extend into the foundation 15b below the well. A base plate 16a arranged in the well supports the cylinders. The elbow portion 16 is connected by a pipe 18

with one end of the housing of a valve 19. The other end of the valve 19 is connected by a pipe 20 with one end of a second valve 21. The other end of the second valve 21 is connected by a pipe 22 with the elbow portion 17. The pipe 22 includes a shut-off valve 23 which may be hand operated to control flow through the pipe 22 and may further serve as a means of governing the speed at which the apparatus operates.

Each of the valves 19 and 21 has a chamber 24 (see Fig. 9) therein and within each chamber I arrange a valve 25 which is pivoted within the chamber as at 26. The valve 25 moves from the solid line position in Fig. 9 to the dotted line position in this figure and each valve is provided with an arm 27 which when moved rocks the valve from open to closed position and vice versa. The valve 25 includes an orifice 28 which in one position aligns with the inlet and outlet openings 29 in the valve housing.

Pivoted valves of this nature are usually constructed so that a tight seal is provided against fluid movement in one direction but fluid moving in a reverse direction tends to leak slowly past the valve and for this reason I prefer to provide two of the valves as shown with the valves facing in opposite directions to thereby insure a complete stoppage of fluid in each direction when the valves are closed.

Each of the cylinders 14 and 15 is provided with a plunger 30 which extends from a position adjacent the bottom of the cylinder to a position above the upper end of the cylinder. A pair of guide rings 31 encircle the lower ends of the plungers 30. The plunger 30 passes through suitable packing means 33 so that fluid cannot lead around the top of the plunger.

The cylinder 14 communicates with a fluid supply pipe 34 which extends to a receptacle 35 and includes a control valve 36 which may be hand operated to control passage through the pipe.

The receptacle 35 has a filling aperture closed by a cap 37 and the construction is such that when the cap 37 is removed and valve 36 is opened fluid will run through the pipe 34 to the cylinder 14 whence, when the valves 19, 21 and 23 are open, it will flow to the cylinder 15. The cylinder 15 includes a bleed pipe 38 which has a closed end and has an outlet valve 39. This valve 39 is opened while the cylinders are being filled with oil to act as an air bleeder and is thereafter closed. The valve 36 is then closed and the valve 23 adjusted to control the rate of flow from one cylinder to the other. This filling operation oc-

curs when the pistons 30 are at the approximate center of their movement.

Each of the pistons 30 at its upper end is provided with a platform 40. These platforms include projecting end members 41 which run between guides 42 arranged on vertical column members 43 so that lateral shifting of the elevator platform is avoided. Further lateral shifting is prevented by means of guide pins 41a arranged within the end members 41 and adapted to travel just outside of the guides 42.

Surrounding each of the pistons 30 I show boots 45 the upper ends of which are suitably secured at 46 to the pistons immediately below the elevator platform while the lower ends of the boots, as at 47, are secured by fastening means 48 to the upper ends of the cylinders 14 and 15. In this way the piston is protected against weather, sand from the boxes, and other conditions.

From the foregoing description it will be apparent that when one of the elevator platforms is up and the other down, with the valve 22 adjusted to a pre-determined position and with the valves 19 and 21 closed, the platform which is up may be loaded, for example, with a stack of boxes which it is desired to lower to the floor 12. As soon as the boxes are arranged in proper order upon the upper elevator an arm 50 (Fig. 8) is rocked about its pivot 51. The arm 50 has its inner end connected to a chain 52 and downward movement of the arm 50 will cause the chain to be pulled upwardly.

The chain 52 extends downwardly to and into a guide pipe 53. The chain extends through the pipe and at its lower end is connected to a rod 54 which in turn is connected to a bar 55. The bar 55 at its lower end is connected by a pivot 56 with a pair of links 57. The links 57 are pivoted at 58 to the arms 27 by means of which the valves 19 and 21 are operated. The construction is such that when the arm 50 is rocked downwardly from the position shown in Fig. 8 it will cause the arms 27 to move inwardly and upwardly thus opening the two valves 19 and 21, the valves being moved from the position shown in Fig. 9 in dotted lines to the position shown in Fig. 9 in full lines so that the orifices 29 in the two valves are open and fluid is permitted to flow between the cylinders 14 and 15.

Since the upper elevator platform is loaded, its weight exceeds the weight of the lower platform and thus the fluid pressure, for example in cylinder 14 shown in Fig. 1, is such that it causes the piston 32 in the cylinder to be displaced upwardly thus causing the platform 40 to be raised while other platform is lowered. The valve 23 is adjusted so that a smooth movement of the two elevator platforms results and this movement continues until the upper elevator, that is the loaded one, moves to its extreme lower position where it will come to rest.

Each platform 40 (see Fig. 3) has a notch 60 which is adapted to freely receive one end of a cross shut off bar 61 which extends laterally across the unit. Extending downwardly from the bar 61, and held in place by a guide member 62 (Fig. 1), I provide a push rod 63, the lower end of which engages a compression spring 64 encased within a hollow guide tube 65 which may be slidably mounted on one of the upright members of the frame 10 and adjacent the bar 55. A pair of connecting members 66 connect the tube 65 and the bar 55. The spring 64 acts as a cushion.

It will thus be seen that upon lowering a stack of boxes on either platform 40, the bottom of the

stack will engage the cross bar 61 depressing the push rod 63 and the spring 64 and through members 66 will move the bar 55 downwardly to thereby close the valves 19 and 21.

A tension spring 67 having its lower end connected to the bar 61 and its upper end connected to one of the frame members, normally urges the shut off mechanism, just described, in an upwardly direction.

Arranged upon the lower floor 12, adjacent the unloading side of the apparatus, I provide a pair of safety plates 70 (Fig. 2), hinged as at 71 to the floor 12. These plates 70 are inclined upwardly and at their free ends adjacent the well 13 have a downwardly extending arm 73 thereon. The lower end of each arm is attached to one end of a tension spring 74 (Fig. 1) which extends upwardly and has its upper end attached to the lower side of the floor 12 and normally urges the associated plate 70 in an upwardly direction.

Mounted on the side of the arm 73, I provide a U-shaped member 75 (Fig. 6) secured thereto by securing means 75a and enclosing a lever 76 which extends rearwardly beneath the associated plate 70 and has one end pivoted as at 77 to a bracket 78 secured to the lower face of the floor 12. The lever 76 extends forwardly and has its free end connected to a chain 79 which in turn is fastened to the lower side of the shut off cross bar 61.

The construction and arrangement of the plate 70, arms 73 and lever 76 is such that when an operator's weight or a hand truck is placed upon the plate 70, through arm 75, lever 76 and chain 79, bar 61, and in turn push rod 63, the valves 19 and 21 will be retained in a closed position. When the boxes have been removed from the platform the bar 61 is free to be raised whereupon the levers 76 and associated parts will prevent another operator on the upper floor 11 from depressing the starting lever 50 and returning one of the platforms which may be on the level of floor 12, until said platform is completely unloaded and the operator is clear.

Disposed on opposite sides of the platform 40 and adjacent the unloading side of the mechanism I arrange a pair of hooks 80 (Fig. 5), located on the opposite ends of a shaft 81 and which are held in neutral position by a pair of tension springs 82 and 83 each of which has one end connected to a lug 84 on the hooks and the other end fastened to the platform 40 by pins 85. The hooks 80 are adapted to engage a lower cross bar 86 of aligning gates 87 and 88, which are slidably arranged within guides 89 and counterbalanced by means of weights 90 attached by means of cords 91 which pass over pulleys 92 to the top cross bar of the gates 87 and 88. Stop pins 93 in the lower ends of the guide members 89 serve to prevent movement of the gates 87 and 88 beyond that point and the construction of the hooks 80 and the springs 82 and 83 is such that they will snap off the lower cross member 86 of the gates and allow the platform to continue its descent. Upon ascent of the platform, the hooks 80 will again engage the bars 86.

These gates, 87 and 88, act as a safety device to prevent a stack of boxes being lowered on one of the platforms from tipping over due to poor stacking or other reasons. It will be seen that the gates will descend with their respective platforms until they strike the stop pins 93, then they will be disengaged and will be caused to rise by the counter-balance weights 90 and the construction is such that by the time the platform

has reached its lower limits, the gate at the same time will clear the top of a stack of boxes that may be resting on this platform, thus preventing the boxes from falling forward during their downward descent.

Arranged above the upper floor 11 I provide another pair of loading gates 100 and 101 which are adapted to travel in guides 102, and have a bar 103 extending downwardly therefrom to engage a tab member 104 arranged on the lower side of the platform 40. A stop member 106 (Fig. 2) located on the floor 11 serves to prevent the gates from descending below the floor 11. It will be seen that these gates will open when their respective platforms are up and close when their platforms descend, thus preventing an operator from mistakably attempting to load on an elevator platform that is in the down position.

In operation and assuming that the left platform is up (as shown in Fig. 1), and that the hand valve 22 has been adjusted to its proper position, a stack of boxes, usually 6 and sometimes 7, may be placed on the platform 40. The lever 50 is then pivoted about its axis 51 to raise the chain 52 to, in turn, raise the levers 57 and arms 27 to open the valves 19 and 21. The valves 19 and 21 being opened as herebefore described, the fluid, which may be oil, will pass from the cylinder 15 to the cylinder 14 as it is displaced by the descending shaft 30. This displaced oil causes the opposite shaft to rise thus elevating the right platform. At the same time as the descent of the left platform, the stack of boxes is prevented from falling forwardly by the gate 87, and the loading opening is being closed by the gate 100. Upon approaching the bottom of its descent, the stack of boxes will engage the cross arm 61, and, as herebefore described, shut off the valves 19 and 21. By means of the safety device involved about the plate 70 the platforms are held in position until they are completely unloaded and the operator is clear of the operating mechanism. The operation of the right platform will be apparent from the previous description.

Having thus described my invention and the present preferred embodiments thereof, I desire to emphasize the fact that many modifications may be resorted to in a manner limited only by a just interpretation of the following claims.

Having thus described my invention, I claim:

1. In an apparatus for lowering boxes from one level to another, a pair of spaced, vertically arranged cylinders, a plunger arranged in each cylinder, a box receiving platform mounted on each plunger, conduit means connecting the cylinders, a valve controlling passage of fluid through the conduit, manual means to open the valve and means operated by a box on the platform for moving the valve to closed position.

2. In an apparatus for lowering boxes from one level to another, a pair of spaced, vertically arranged cylinders, a plunger arranged in each cylinder, a box receiving platform mounted on each plunger, conduit means connecting the cylinders, a valve controlling flow of fluid through the conduit, manual means to open the valve, other means operated by a box on the platform to close the valve, and weight controlled means adjacent to the position occupied by the platform when the latter is in its lowermost position remote from the manual means to oppose actuation of the manual means.

3. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said

cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on each plunger, each elevator platform being movable from an upper position at the loading floor to a lower position at the unloading floor, a conduit connecting the cylinders, said conduit including a shut-off valve, control means to actuate said valve, manual means accessible from the loading floor for actuating the control means to open position and means operated by a box on the platform when either platform approaches its lowermost position for operating the control means to closed position.

4. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on each plunger, each platform being movable from an upper position at the loading floor to a lower position at the unloading floor, a conduit connecting the cylinders, a shut-off valve in said conduit, control means to open or close said shut-off valve, means for actuating the valve control means to open position, means for operating the valve control means to move the shut-off valve to closed position, a weight operated safety plate adjacent the position occupied by each platform when the latter is in its lowest position, means operated when the safety plate is moved by a weight thereon to oppose operation of the control means.

5. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on each plunger, each platform being movable from an upper position at the loading floor to a lower position at the unloading floor, a conduit connecting the cylinders, said conduit including an adjustable valve for controlling the rate of flow therethrough, a shut-off valve in said conduit, control means to open or close said shut-off valve, manual means for actuating the valve control means to open position and means operated by a box on either one of said platforms when the platform approaches its lowermost position for operating the valve control means to closed position.

6. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on each plunger, each platform being movable from an upper position level with the loading floor to a lower position level with the unloading floor, means for guiding each of the elevator platforms against lateral movement, a conduit connecting the cylinders, said conduit including means for controlling the rate of flow therethrough, a shut-off valve in said conduit, control means to open or close said shut-off valve, means for actuating the valve control means to open position and means operated by a box on either one of said platforms when the platform reaches its lowermost position for operating the valve control means to closed position.

7. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on the

upper end of each plunger, each platform being movable from an upper position level with the loading floor to a lower position level with the unloading floor, means for guiding each of the platforms against lateral movement, a conduit connecting the cylinders, said conduit including an adjustable valve for controlling the rate of flow therethrough, a pair of oppositely directed shut-off valves in said conduit, control means to simultaneously open or close both of said shut-off valves, manual means for actuating the valve control means to open position and means operated by a box on either one of said platforms when the platform approaches its lowermost position for operating the valve control means to closed position.

8. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on each plunger, each platform being movable from an upper position at the loading floor to a lower position at the unloading floor, a conduit connecting the cylinders, a pair of oppositely directed valves in said conduit, control means to simultaneously open or close both of said valves, manual means for actuating the valve control means to open position and means operated by a box on either one of said platforms when the platform approaches its lowermost position for operating the valve control means to move the valves to closed position, a weight operated safety plate adjacent the position occupied by each platform when the latter is in its lowest position, and means operated when the safety plate is moved by weight thereon to oppose operation of the manual means.

9. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on the upper end of each plunger, each platform being movable from an upper position level with the

loading floor to a lower position level with the unloading floor, means for guiding each of the platforms against lateral movement, a conduit connecting the cylinders, said conduit including an adjustable valve for controlling the rate of flow therethrough, a shut-off valve in said conduit, control means to open or close said shut-off valve, manual means for actuating the valve control means to open position, means operated by a box on either one of said platforms when the platform approaches its lowermost position for operating the valve control means to move the shut-off valve to closed position, a weight operated safety plate adjacent the position occupied by each platform when the latter is in its lowest position, and means operated when the safety plate is moved by a weight thereon to oppose operation of the manual means.

10. In an apparatus for lowering boxes from one level to another, a pair of spaced cylinders, said cylinders being vertically disposed, an upper loading floor and a lower unloading floor, a plunger in each cylinder, a box receiving platform on the upper end of each plunger, each platform being movable from an upper position at the loading floor to a lower position at the unloading floor, means for guiding each of the platforms against lateral movement, a conduit connecting the cylinders, said conduit including an adjustable valve for controlling the rate of flow therethrough, a pair of oppositely directed shut-off valves in said conduit, control means to simultaneously open or close both of said shut-off valves, manual means for actuating the valve control means to open position and means operated by a box on either one of said platforms when the platform approaches its lowermost position for operating the valve control means to move the shut-off valves to closed position, a weight operated safety plate adjacent the position occupied by each platform when the latter is in its lowest position, and means operated when the safety plate is moved by a weight thereon to oppose operation of the manual means.

ERNEST EUGENE EVANS.