Dec. 8, 1931. J. T. COWLEY 1,835,850

PNEUMATIC DROP

Filed Feb. 20, 1928 3 Sheets-Sheet 1

FIG. 1.

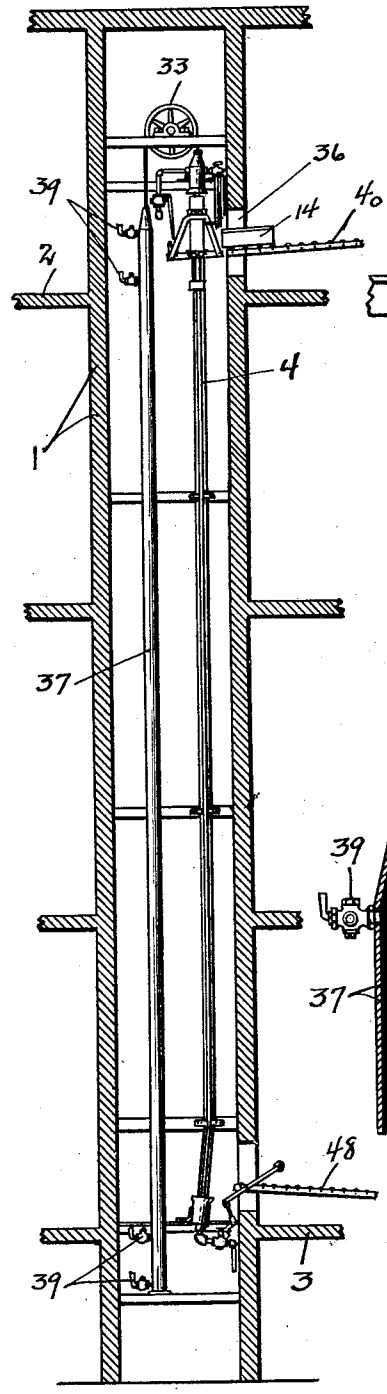
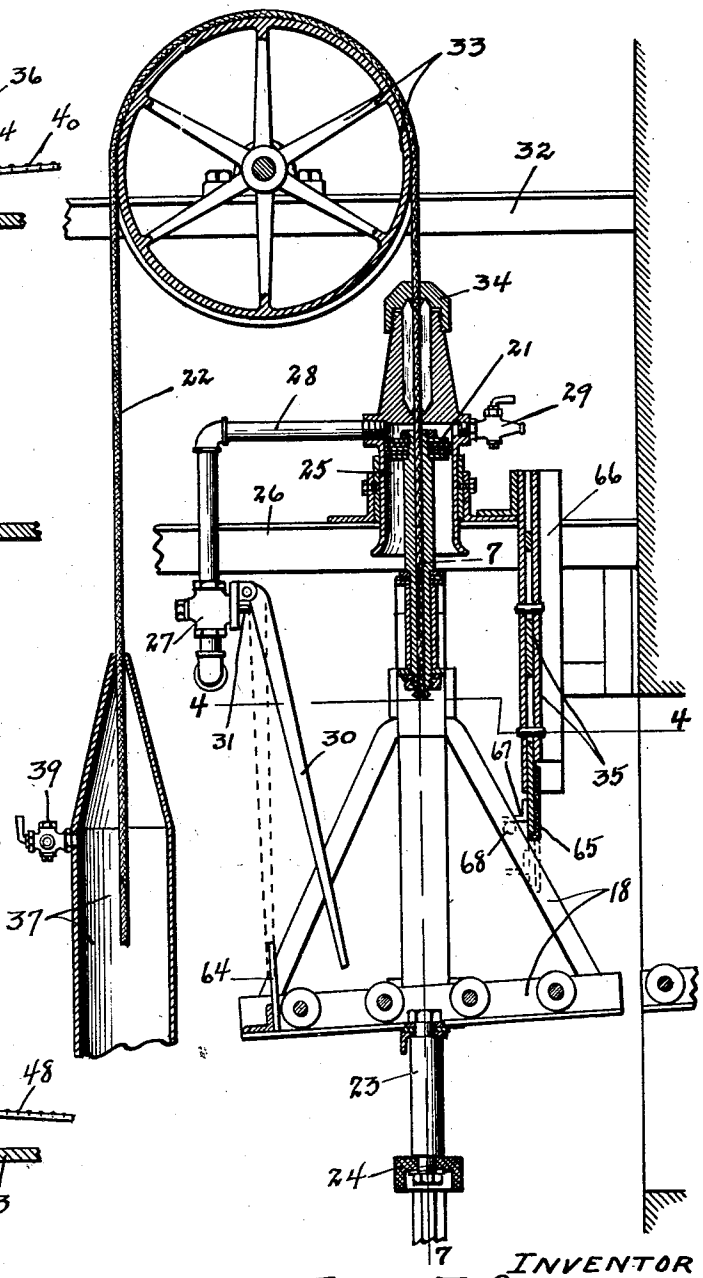


FIG. 2.



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PNEUMATIC DROP

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Fig. 3.

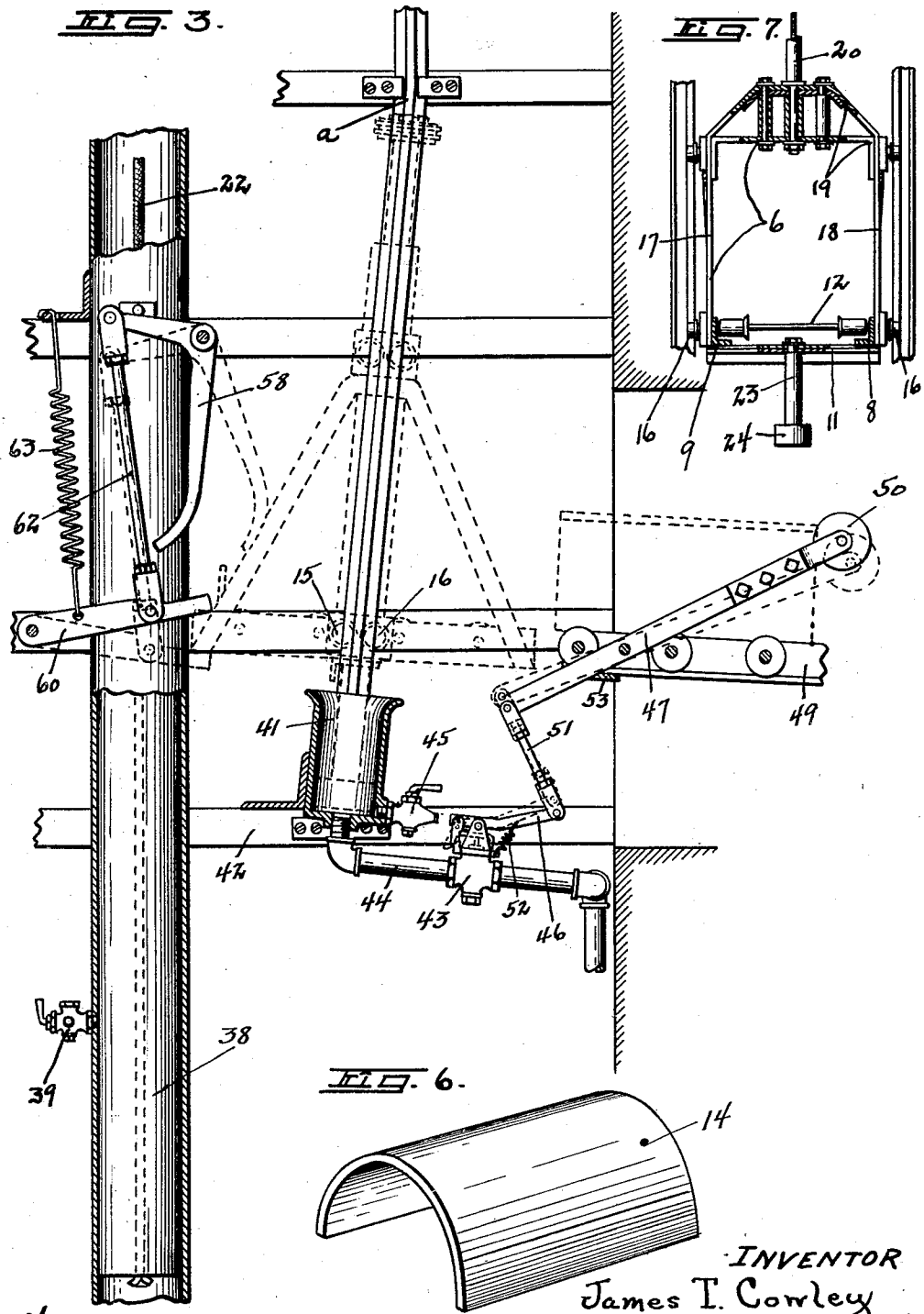


Fig. 7.

Fig. 6.

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PNEUMATIC DROP

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FIG. 5.

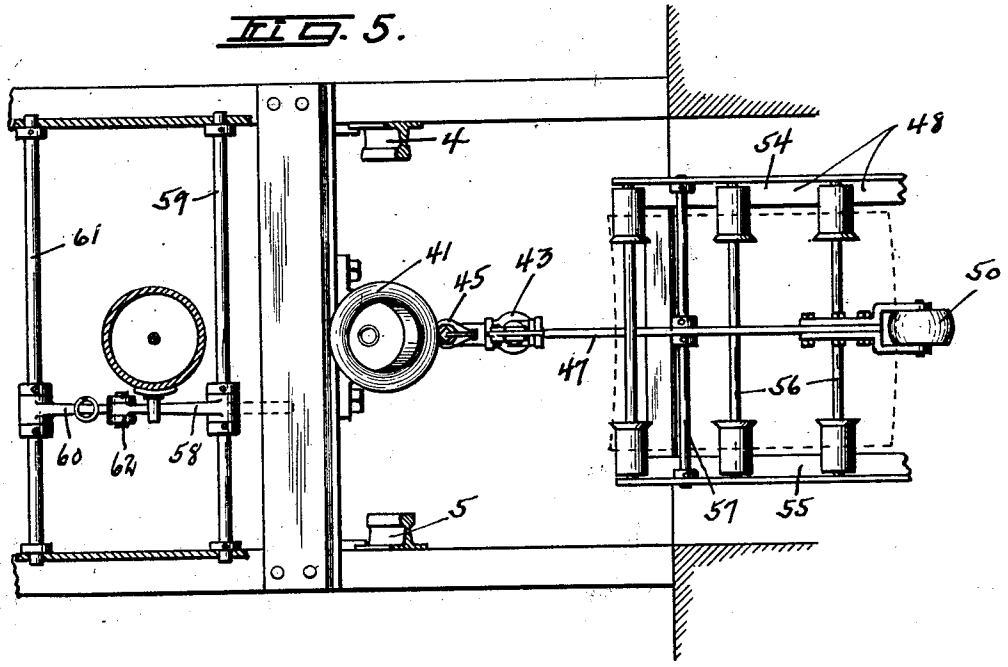
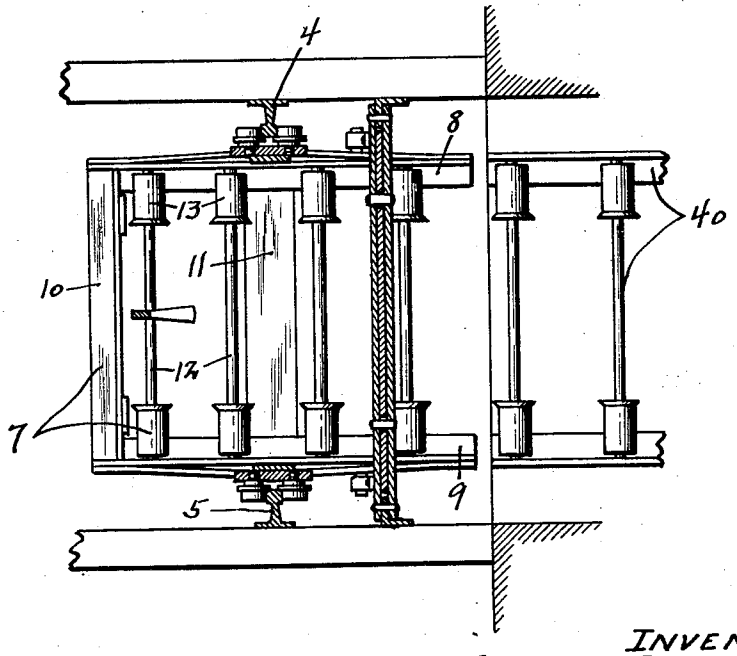


FIG. 4.



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UNITED STATES PATENT OFFICE

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PNEUMATIC DROP

Application filed February 20, 1928. Serial No. 255,770.

This invention relates to a new and improved plate drop for conveying articles by gravity from an upper story of a building to a lower story, the platform of the drop being counterweighted so that it will return to its upper station by gravity after the load has been removed at the bottom station, the movements of the platform of the drop being cushioned in both directions by means of air.

I am aware that pneumatic drops of this general design are well known but all of the drops of this description hitherto known have initially started on their travel either down or up solely through the force of gravity. In many cases, however, and particularly where such drops are used in newspapers or other printing plants it is desirable that they be able to complete their travel either down or up in as short a period of time as possible and in a shorter period of time than such travel will be accomplished if the force of gravity alone is relied upon. In newspaper plants, it is the usual custom to locate a stereotype room on the top floor of the building so that the fumes incidental to the making of the stereotypes will not be distributed throughout the building. It is also customary to place the presses on the first or lower floors so that a firm foundation may be provided for the presses which are of a very considerable weight. In order that the newspapers or other printed matter may be finished in as short a period as possible after the presses have been started running, the stereotype plates must be delivered from the stereotype room to the press room with extreme rapidity.

In order to accelerate the movement of the drop platform both down and up I have constructed a device, the main object of which is to provide a means whereby the initial movement of the carriage is assisted by a supplementary force whereby the time of travel of the carriage both up and down will be materially lessened.

Another object is to provide a cushioning means whereby the stoppage of the carriage at each end of its travel will be cushioned against a sudden shock.

Another object is to provide a means whereby the unloading of the carriage may be accomplished speedily. Other objects and advantages relate to the size, shape and arrangement of parts all as will more fully appear from the following description taken in connection with the accompanying drawings in which:—

Figure 1 is an elevation of my device installed in a building showing the walls and floors of the building in section.

Figure 2 is a vertical section partially in elevation through the top station of the drop showing the carriage in position at such station.

Figure 3 is a vertical section partially in elevation through the bottom station of the drop showing in dotted lines the carriage in position at such station.

Figure 4 is a top plan of the bottom portion of the carriage on lines 4—4 of Figure 2.

Figure 5 is a top plan view partially in section of the bottom station of the drop.

Figure 6 is a perspective view of a stereotype plate which is to be transported on my device, and

Figure 7 is a section partially in elevation on line 7—7 of Figure 2.

My device is designed for transporting articles from an upper story of a building to a lower story but for the purpose of explaining the functioning of my apparatus I have here shown a structure which so far as the carriage itself is concerned is designed for the transportation of stereotype plates from a stereotype room on the upper floor of a printing establishment to the press room on a lower floor.

My device is installed in an open and unobstructed well —1— extending from the upper floor —2— to the press room floor —3—. I provide in well —1— a pair of parallel spaced rails —4— and —5— extending from the top well —1— to the bottom thereof. Rails —4— and —5— are inclined rearwardly from the perpendicular from a point just above the press room floor —3— as indicated at —*a*— on Figure 3 for a purpose hereinafter to be described.

I also provide a carriage —6— which has a bottom frame —7— composed of side rails

—8— and —9— joined together by rear cross member —10— and a central cross member —11—. A plurality of shafts —12— is mounted on the side rails —8— and —9— in spaced relation, and carry on their opposite ends flanged rollers —13— positioned with the flanges on the inner ends so that these flanges may act as guides for the stereotype plate —14— which is semi-circular in cross section when the same is moved along the rollers —12—.

On the outer faces of side members —8— and —9— at approximately their center point I provide a pair of opposed flanged rollers —15— and —16— (as perhaps may best be seen in dotted lines on Figure 3) which rollers are positioned to engage guide rails —4— and —5— to maintain the carriage —6— in position during its travel. I also provide on the opposite sides of carriage —6— side braces 17 and 18, Fig. 7, extending upwardly from side members —9— and —8— respectively and being joined together at their upper ends by means of a cross brace —19—. Cross brace —19— carries a vertically extending rod —20— from the center point thereof. This rod —20— carries on its upper end a piston 21 and this rod —20— has a longitudinal aperture for the reception and retention of cord —22— for a purpose hereinafter to be described. Cross member —11— carries at the center point a depending rod —23— which has affixed at the lower end thereof a second piston —24—.

The upper station for my carriage positioned adjacent to the floor 2 consists (as may perhaps better be seen in Figure 2) of a cylinder —25—, with an open lower end, affixed to a convenient support, as for example, a cross beam —26—, cylinder —25— being positioned to register and co-act with piston —21—. I also provide a source of compressed air, not shown, connected through a valve —27— to a pipe —28— which in turn is connected to the upper end of cylinder —25—. The upper end of cylinder —25— is otherwise closed except for an adjustable air cock —29— positioned in the top end of cylinder —25— for a purpose hereafter described. Valve —27— is normally closed so that the supply of compressed air is cut-off from the inside of cylinder —25—. Operating lever —30— pivotally mounted on the body of valve —27— is positioned against a pin —31— connected with the valve stem, not shown, of valve —27— so that when arm —30— is moved about its pivot it will bear against pin —31— and raise the valve from its seat to permit the passage of the compressed air into cylinder —25—.

I also provide above cylinder —25— and supported by any convenient means, as for example a cross beam —32—, a sheave —33— positioned to receive cord —22— which cord —22— is secured in rod —20— extending upwardly through rod —20— and through cap —34— positioned on the upper part of the body of cylinder —25—. I also provide a stop member —35— depending from cross beam —26— and extending downwardly adjacent the loading opening —36— through which the stereotype plates —14— are delivered on to the carriage —6—.

A cushioning cylinder —37— (as may perhaps best be seen from Figure 1) is positioned in well —1— in parallel relation to tracks —4— and —5— and of approximately the same length. The cord —22— extends over and around sheave —33— and downwardly into the upper end of cushioning cylinder —37— and carries on its lower end a plunger —38—, shown in Figure 3. Cushioning cylinder —37— carries at both its upper and lower ends a pair of air cocks —39— for a purpose hereinafter to be described. The length of the cord —22— is such that when the carriage —6— is at the upper station at floor —2— the bottom of plunger —38— will be approximately at the lower end of the cushioning cylinder —37—.

The upper station at floor —2— also is provided with a feeding conveyor —40— of similar construction to the bottom frame —7— of the carriage —6— as respects the shafts —12— and is so positioned that when the carriage —6— is in the raised position a stereotype plate —14— may pass from feeding conveyor —40— onto carriage —6—.

The lower station for my apparatus at bottom floor —3— (as perhaps may best be seen from Figure 3) consists of a cylinder —41— affixed to any convenient supporting means, as for example cross beam —42—. Cylinder —41— has its upper end open and is of a size and shape to receive and co-act with piston —24— which depends from the under surface of carriage —6—. A source of compressed air, not shown, is connected through valve —43— and pipe —44— to the lower end of cylinder —41—. An air cock —45— is also connected to the lower end of cylinder —41— for a purpose hereinafter to be described.

Valve —43— is normally closed so that the supply of compressed air will be cut off from cylinder —41— but I provide an actuating means for valve —43— consisting of an operating lever —46— pivotally mounted on the top of body —43— and co-acting with the valve stem, not shown, of the valve, not shown, of valve —43—. I also provide a lever —47— pivotally mounted on a receiving conveyor —48— hereinafter to be described. The forward end of lever —47— normally extends upwardly and is provided with a roller —50—. The rear end of lever —47— extends downwardly and is connected to the forward end of lever —46— by link —51—. It will be seen that when the forward end of lever —47— is depressed the rear end of

lever —47— will be raised and through link —51— will raise the forward end of lever —46— upwardly thereby causing the valve stem to be depressed and the valve opened to permit the passage of the compressed air. The forward end of lever —46— is normally held in the lower or closed position by spring —52—, the limit of such movement being determined by a stop —53— co-acting with the rear end of lever —47—.

The receiving conveyor —48— (as perhaps may best be seen from Figure 5) consists of side frames —54— and —55— which carry a series of longitudinally spaced shafts —56— which are the same design as shafts 12 hitherto described. The lever —47— is pivotally mounted at the center point of a rod —57— which is positioned transversely of receiving conveyor —48—.

At the lower station, now being described, I also provide a means for assisting the initial unloading movement of the merchandise being conveyed which in this instance consists of a bell crank —58— pivotally mounted on a rod —59— (as perhaps may best be seen in Figure 5) extending transversely of well —1—. I also provide below bell crank —58— a crank —60— pivotally mounted on a second rod —61— extending transversely of well —1— in parallel relation with rod —59—. I connect the upper end of bell crank —58— to the forward end of crank —60— by means of a link —62— so that the downward movement of crank —60— through link —62— will depress the rearwardly extending upper arm of bell crank —58— and thereby cause the depending arm of bell crank —58— to be moved forward towards and over the carriage —6—. I also provide a spring —63— connected to crank —60— to yieldingly hold the same normally in a raised position.

The operation of my device is as follows: With the carriage —6— at the upper station at floor —2—, a stereotype plate —14—, having been placed on feeding conveyor —40—, will move toward well —1— and through opening —36— on to carriage —6—. As a stereotype plate —14— passes on to carriage —6— it will contact with arm —30— moving the same forward. This movement as above described will open valve —27—, the further forward movement of stereotype plate —14— being stopped by perpendicular check plate —64— extending transversely of carriage —6—. Valve —27— being open a supply of compressed air will be introduced into cylinder —25— on the upper surface of piston —21— which will force piston —21— out from cylinder —25— and greatly accelerate the initial movement of carriage —6— downward. When carriage —6— reaches the bottom of well —1— the piston —24— will enter cylinder —41— compressing the air in the cylinder —41— which will act as a cushion for the stopping of the downward movement of carriage —6—. Air cock —45— is provided in cylinder —41— so that the compressed air may be allowed to escape at the best rate to accomplish this cushioning action. At the same time the downward movement of carriage —6— through cord —22— will have raised plunger —38— in cushioning cylinder —37— which will compress the air in cushioning cylinder —37— to assist in cushioning the stoppage of the downward movement of carriage —6—. Air cocks —39— in the upper end of cushioning cylinder —37— are provided so that the rate at which the compressed air may escape from the upper end of cushioning cylinder —37— may be regulated to obtain the best results in cushioning the stoppage of the downward movement of carriage —6—.

As carriage —6— approaches the lower station (as perhaps may best be seen from dotted lines in Figure 3) the cross member —10— of carriage —6— will strike crank —60— and depress the same with the result that the depending arm of bell crank —58— will be moved forward in a manner heretofore described, and will contact with stereotype —14— to move the same forward from carriage —6— on to receiving conveyor —48—. This forward movement of stereotype —14— is also accelerated due to the fact that the lower ends of rails —4— and —5— are inclined rearwardly which will result in canting carriage —6— so that the rear end of the same will be higher than the forward end and the force of gravity will be exerted on stereotype —14— to cause movement of stereotype —14 off carriage —6—.

As stereotype —14— moves on to receiving conveyor —48— its forward end will contact with roller —50— and will depress the forward end of lever —47— which, as heretofore described, will result in the opening of valve —43— and the introduction of compressed air into cylinder —41—. The compressed air in cylinder —41— will exert force against the bottom face of piston —24— and in consequence will greatly accelerate the initial starting movement of carriage —6— upwardly.

It will be understood that the weight of the carriage —6— and the weight of the plunger —38— are so proportioned with reference to each other that when no load is on the carriage —6— the weight of plunger —38— will be greater than the weight of carriage —6— so that the latter will be moved upwardly by the force of gravity. These two weights, however, are so proportioned that when a stereotype —14— is placed on carriage —6— the combined weight of carriage —6— and stereotype —14— will be greater than the weight of plunger —38— so that the loaded carriage will move downwardly through the force of gravity.

When the carriage —6— reaches the upper station at floor 2 the piston —21— will enter cylinder —25— compressing the air therein and thus cushion the stoppage of the upper movement of the carriage. Air cock —29— is provided in the upper end of cylinder —25— so that the rate of escape of the air so compressed may be regulated to obtain the best results in the cushioning action. At the same time the movement of the plunger —38— downwardly will compress the air in the lower end of cushioning cylinder —37— to assist in the cushioning of the stoppage of the upper movement of carriage —6—. Air cocks —39— are provided in the lower end of cushioning cylinder —37— so that the rate of escape of the air so compressed may be regulated to obtain the best cushioning result.

The height of roller —50— above receiving conveyor —48— is such that when stereotype —14— has engaged roller —50— and depressed the forward end of lever —47— in the manner just described stereotype —14— will continue to move forwardly over roller —50— and pass beyond the same permitting lever —47— to return to the normal or closed position.

It will be apparent that stereotype —14— might move forward on feeding conveyor —40— at a time when the carriage —6— was not in position to receive it. In order that this may not happen I provide the member —35— hitherto mentioned which consists of a stop member —65— slidably mounted in a carrying member —66— which is supported from cross beam —26—. Stop member —65— is normally in the down position indicated in dotted lines on Figure 2 at which time it will be in the path of movement of stereotype —14— so that the same cannot move forwardly off from feeding conveyor —40—. Movable member —65— carries an outwardly extending flange —67— disposed in the path of movement of a pin —68— carried by side member —18— of carriage —6— so that when carriage —6— reaches the upper station pin —68— will contact with flange —67— and will move member —65— upwardly and out of the path of movement of a stereotype —14— to permit the forward movement of stereotype —14— on to carriage —6—.

It will be understood that although I have shown and described an apparatus which in the form of its details is particularly designed for the transportation of stereotype plates such as are shown in Figure 6 yet the details of my structure can be modified to co-act with merchandise of other sizes and shapes and for transportation either up or down without departing from the spirit of my invention. It would also be understood that various means may be used for exerting the pressure of the compressed air against the carriage at either the top or bottom position of the same. For example, it will be entirely feasible to have the pistons described fixed at the top and bottom of the well with cylinders carried on the top and bottom of the carriage. Other modifications might also be made by which this pressure of air against the carriage for accelerating its initial movement would be accomplished, for although I have shown and described a specific structure and form of part as an exemplification of an embodiment of my invention I do not desire to restrict myself to the exact size, shape and relation of parts as various changes may be made within the scope of the appended claims.

What I claim is:

1. In a device of the class described, a vertically movable carriage, a counterweight co-acting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a source of supply of air under pressure, an automatic means for introducing air under pressure into the inner end of the cylinder whereby the piston is forced outwardly from the cylinder.

2. In a device of the class described, a vertically movable carriage, a counterweight co-acting with the carriage, a piston carried on the under part of the carriage a cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the piston, a source of supply of air under pressure, an automatic means for introducing air under pressure into the inner end of the cylinder whereby the piston is forced outwardly from the cylinder.

3. In a device of the class described, a vertically movable carriage, a counterweight co-acting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a second piston carried on the bottom part of the carriage, a second cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the second named piston, a source of supply of air under pressure, automatic means for introducing air under pressure into the inner end of the first named cylinder when the first named piston is positioned in such cylinder, and additional automatic means for introducing air under pressure into the inner end of the second named cylinder when the second named piston is positioned therein.

4. In a device of the class described, a vertically movable carriage, a counterweight co-acting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a source of supply of air under pressure,

automatic means for introducing air under pressure into the inner end of the cylinder whereby the piston is forced outwardly from the cylinder, and means for automatically stopping such introduction of air under pressure.

5. In a device of the class described, a vertically movable carriage, a counterweight coacting with the carriage, a piston carried on the under part of the carriage, a cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the piston, a source of supply of air under pressure, automatic means for introducing air under pressure into the inner end of the cylinder whereby the piston is forced outwardly from the cylinder, and means for automatically stopping such introduction of air under pressure.

6. In a device of the class described, a vertically movable carriage, a counterweight coacting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a second piston carried on the bottom part of the carriage, a second cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the second named piston, a source of supply of air under pressure, automatic means for introducing air under pressure into the inner end of the first named cylinder when the first named piston is positioned in such cylinder, additional automatic means for introducing air under pressure into the inner end of the second named cylinder when the second named piston is positioned therein, and independent means for automatically stopping such introduction of air under pressure.

7. In a device of the class described, a vertically movable carriage, automatic means for placing on the carriage an article to be transported thereon, a counterweight coacting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a second piston carried on the bottom part of the carriage, a second cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the second named piston, a source of supply of air under pressure, automatic means for introducing air under pressure into the inner end of the first named cylinder when the first named piston is positioned in such cylinder, and additional automatic means for introducing air under pressure into the inner end of the second named cylinder when the second named piston is positioned therein.

8. In a device of the class described, a vertically movable carriage, automatic means for placing on the carriage an article to be transported thereon, a counterweight coacting with the carriage, a piston carried on the upper part of the carriage, a cylinder positioned at the top point of travel of the carriage and adapted to coact with the piston, a second piston carried on the bottom part of the carriage, a second cylinder positioned at the bottom point of travel of the carriage and adapted to coact with the second named piston, a source of supply of air under pressure, automatic means for introducing air under pressure into the inner end of the first named cylinder when the first named piston is positioned in such cylinder, additional automatic means for introducing air under pressure into the inner end of the second-named cylinder when the second named piston is positioned therein, independent means for removing such article from the carriage after the transportation of the same has been completed.

9. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means for directing such fluid against the carriage when the latter is in the top position only during the initial downward movement of the carriage.

10. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure automatic means for directing such fluid against the carriage when the latter is in the bottom position only during the initial upward movement of the carriage.

11. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means whereby only the initial downward movement of the carriage is accelerated by such fluid under pressure, and additional automatic means whereby only the initial upward movement of the carriage is accelerated by such fluid under pressure.

12. In a device of the class described, a well extending between floors of a building, a vertical track in said well, a carriage vertically movable along said track, a counterweight coacting with the carriage, a piston extending upwardly from the upper part of the carriage, a second piston extending downwardly from the bottom part of the carriage, a cylinder having one open end adapted to coact with the first named piston and positioned at the top point of travel of the carriage, a second cylinder having one open end adapted to coact with the second named piston and positioned at the bottom point of travel of the carriage, air cocks in the closed ends of said cylinders for permitting the gradual escape of air when a piston enters a cylinder, a source of supply of air under pressure, automatic means for delivering such air to the closed end of the first named cylinder when the piston on the upper part of the carriage is positioned in said cylinder and additional

automatic means for delivering such air to the closed end of the second named cylinder when the piston on the bottom part of the carriage is positioned therein.

13. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means for directing such fluid against the carriage when the latter is in the top position only during the initial downward movement of the carriage, such automatic means being actuated by the load to be carried by the carriage when said load is moved onto the carriage.

14. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means for directing such fluid against the carriage when the latter is in the bottom position only during the initial upward movement of the carriage, such automatic means being actuated by the load being carried by the carriage when such load moves off from the carriage.

15. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means actuated by the load to be carried when the same moves onto the carriage for directing such fluid against the carriage when the latter is in the top position only during the initial downward movement of the carriage, and additional automatic means actuated by such load when the same moves off from the carriage for directing such fluid against the carriage when the latter is in the bottom position only during the initial upward movement of the carriage.

16. In a device of the class described, a vertically movable carriage, a source of supply of fluid under pressure, automatic means at one end of the travel of the carriage actuated by the load to be carried when the same moves onto the carriage for causing the pressure of the fluid to be exerted on the carriage only during the initial movement of the carriage, and additional means at the other end of travel of the carriage actuated by the carried load when the same moves off from the carriage for causing the pressure of the fluid to be exerted against the carriage only during the initial movement of the carriage.

17. Apparatus of the class described comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, shock absorbing means including a means for compressing a fluid at one end of the car path, and means whereby a compressible fluid may be expanded to give the car an initial acceleration away from that end of the path.

18. Apparatus of the class described comprising a car moving upwardly and downwardly along a predetermined path, a counter weight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, shock absorbing means including a means for compressing a fluid at one end of the car path, and means whereby a compressible fluid may be expanded to give the car an initial acceleration away from that end of the path which means are automatically actuated by the loading of the car.

19. Apparatus of the class described comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, shock absorbing means including a means for compressing a fluid at one end of the car path, and means whereby a compressible fluid may be expanded to give the car an initial acceleration away from that end of the path, which means are automatically actuated by the load as it is removed from the car.

20. Apparatus of the class described, comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, means carried by the car, and means at one end of the car path adapted to co-act with said car carried means to decelerate the movement of the car upon approaching the path end and to accelerate its movement upon its leaving that end.

21. Apparatus of the class described, comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means adapted to decelerate the movement of the car upon approaching one end of the path and to accelerate its movement upon its leaving that end, said means including a piston carried by the car and a cylinder adapted to receive the piston at that end of the path, and means for admitting compressed air to the cylinder to accelerate the movement of the car away from that end.

22. Apparatus of the class described, comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means adapted to decelerate the movement of the car upon approaching one end of the path and to accelerate its movement upon its leaving that end, said means including a piston carried by the car and a cylinder adapted to receive the piston at that end of the path, and means automati-

cally actuated by the load as it is placed upon the car for admitting compressed air to the cylinder to accelerate the movement of the car away from that end.

23. Apparatus of the class described, comprising a car moving upwardly and downwardly along a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means adapted to decelerate the movement of the car upon approaching one end of the path and to accelerate its movement upon its leaving that end, said means including a piston carried by the car and a cylinder adapted to receive the piston at that end of the path, and means automatically actuated by the load as it is removed from the car for admitting compressed air to the cylinder to accelerate the movement of the car away from that end.

24. Apparatus of the class described, comprising a car moving upwardly and downwardly in a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means to decelerate the movement of the car upon approaching the upper end of its path and to accelerate its movement upon leaving the same, said means including a piston carried by the car and a cylinder adapted to receive the piston at the upper end of its path, and control means for admitting compressed air to the cylinder to give initial downward acceleration to the car, said last-named means being automatically actuable in response to the loading of the car at the top of its path.

25. Apparatus of the class described, comprising a car moving upwardly and downwardly in a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means adapted to decelerate the movement of the car upon approaching the lower end of its path to accelerate its movement upon leaving that end, said means including a piston carried by the car, and a cylinder at the lower end of the plunger path and control means associated therewith for admitting compressed air to the cylinder to give initial upward acceleration to the car, said control means being automatically actuable in response to the removal of a load from the car when the latter is at the lower end of its path.

26. Apparatus of the class described, comprising a car moving upwardly and downwardly in a predetermined path, a counterweight connected to the car, whereby the latter when loaded tends to move downwardly and when unloaded tends to move upwardly, and means at each end of the car path adapted to decelerate the movement of the car approaching the path end and to accelerate its movement upon leaving the path end, said means including pistons carried by the car and cylinders located at the ends of the paths of the pistons, and control means associated with the cylinders for admitting compressed air to the same to give initial acceleration to the car, said control means being automatically actuable in response to the loading of the car at the upper end of its path and in response to the unloading of the same at the lower end of its path.

27. An apparatus of the class described comprising a vertically movable carriage having an upper station stop and a lower station stop, means for moving said carriage in one vertical direction, and additional means at each of said stops for automatically decelerating the carriage upon its arrival and giving to the carriage an initial movemen upon its departure away from the respective stop stations.

28. An apparatus of the class described comprising a vertically movable carriage having an upper station stop and a lower station stop, means for moving said carriage in one vertical direction, and additional means at each of said stops for automatically decelerating the carriage upon its arrival and giving to the carriage an initial accelerated movement upon its departure away from the respective stop stations.

In witness whereof I have hereunto set my hand this 6th day of February 1928.

JAMES T. COWLEY.