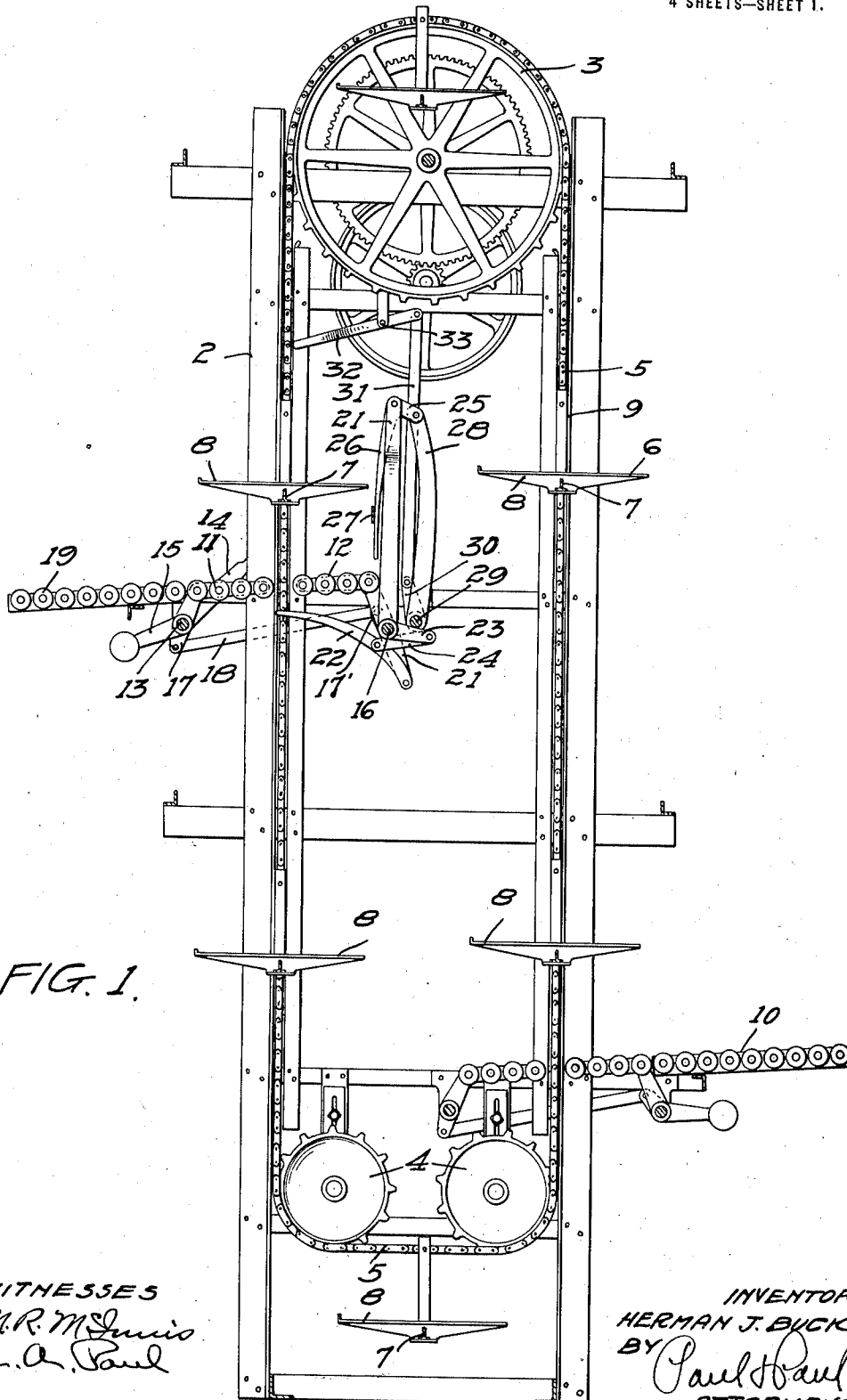


H. J. BUCK.
 AUTOMATIC EJECTOR FOR STRAIGHT LIFT ELEVATORS.
 APPLICATION FILED FEB. 16, 1914.

1,302,631.

Patented May 6, 1919.

4 SHEETS—SHEET 1.



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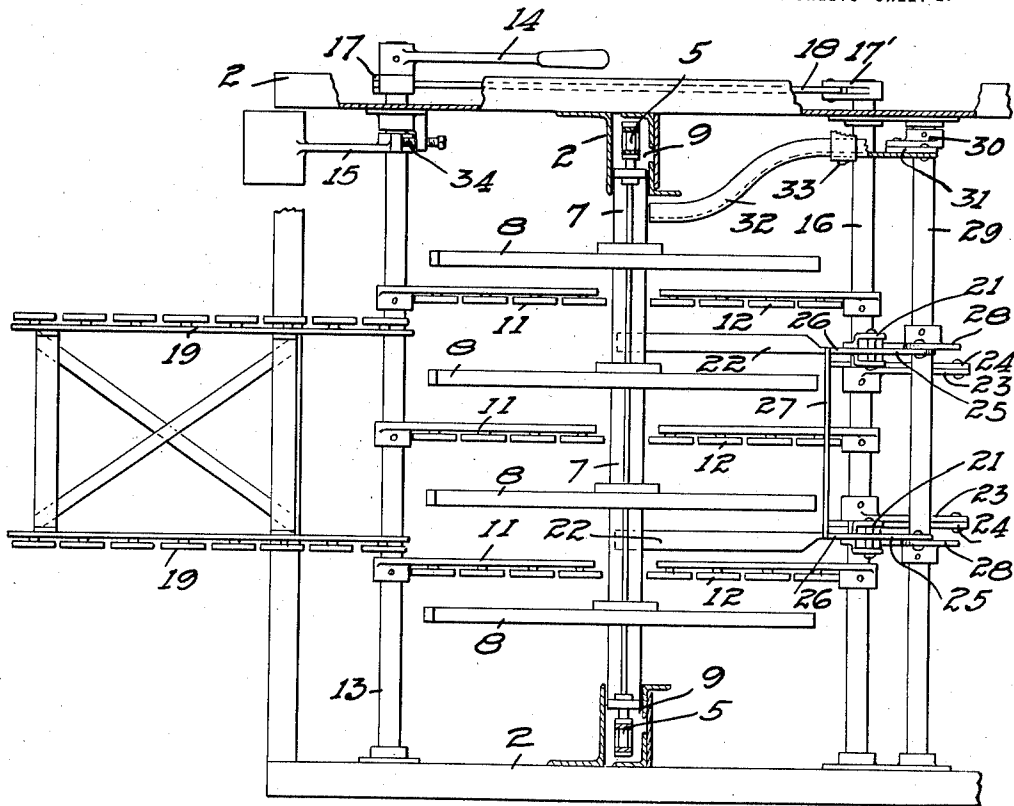


FIG. 2.

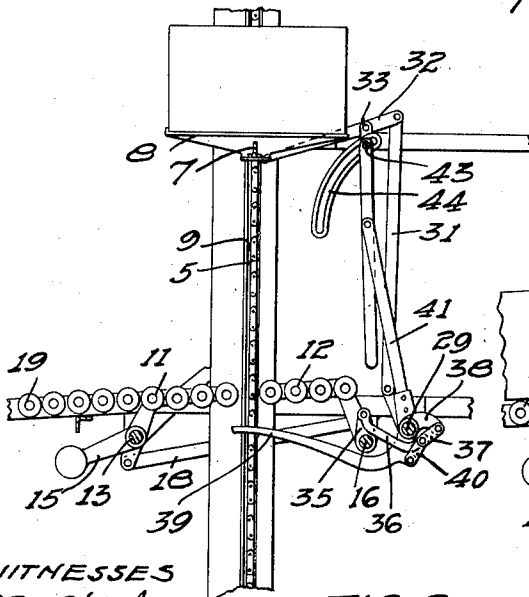


FIG. 6.

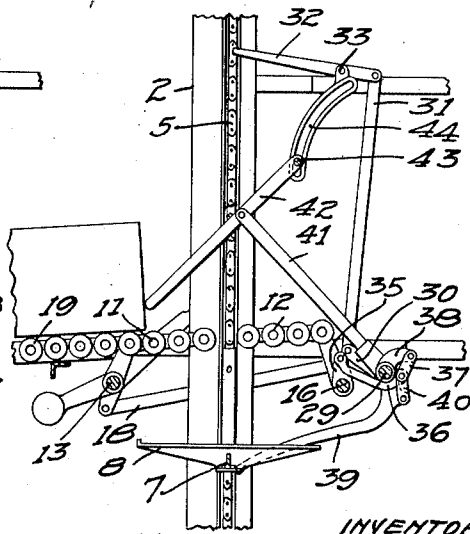


FIG. 7.

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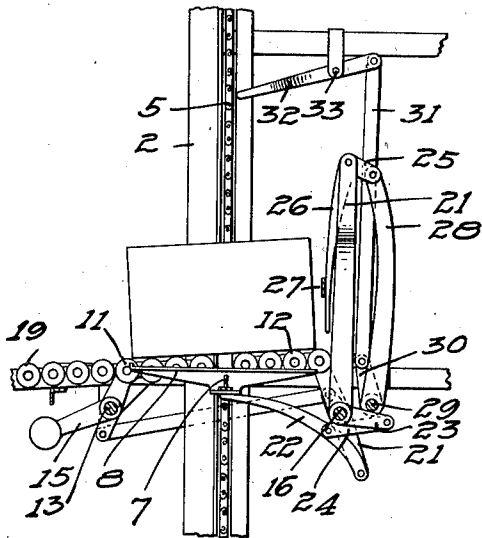


FIG. 3.

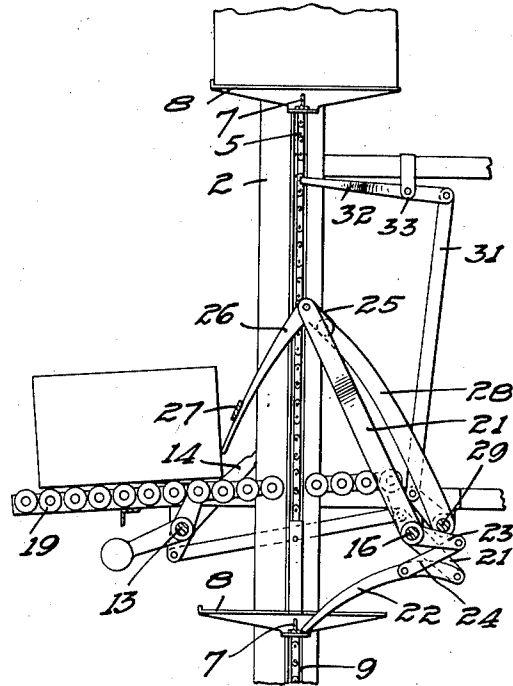


FIG. 4.

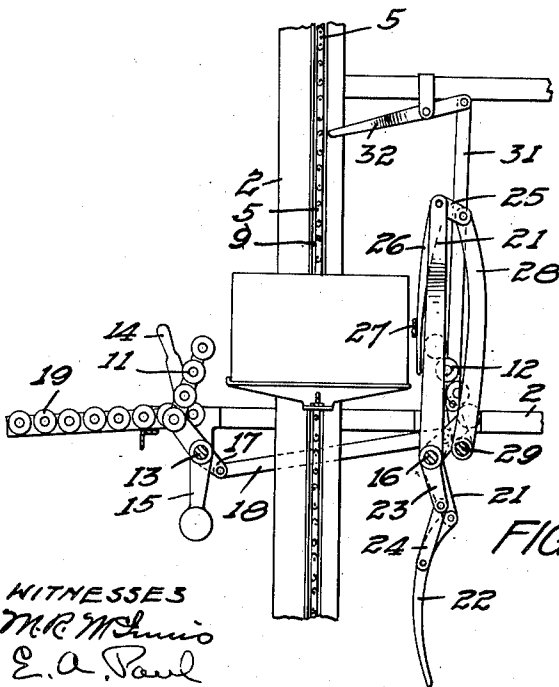


FIG. 5.

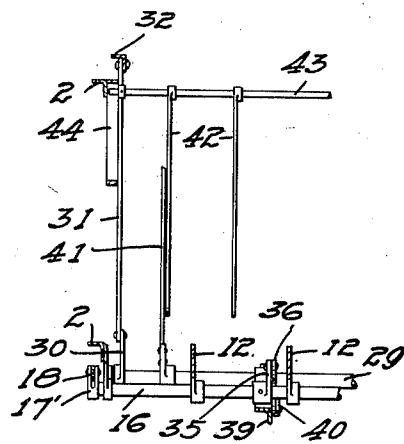


FIG. 6.

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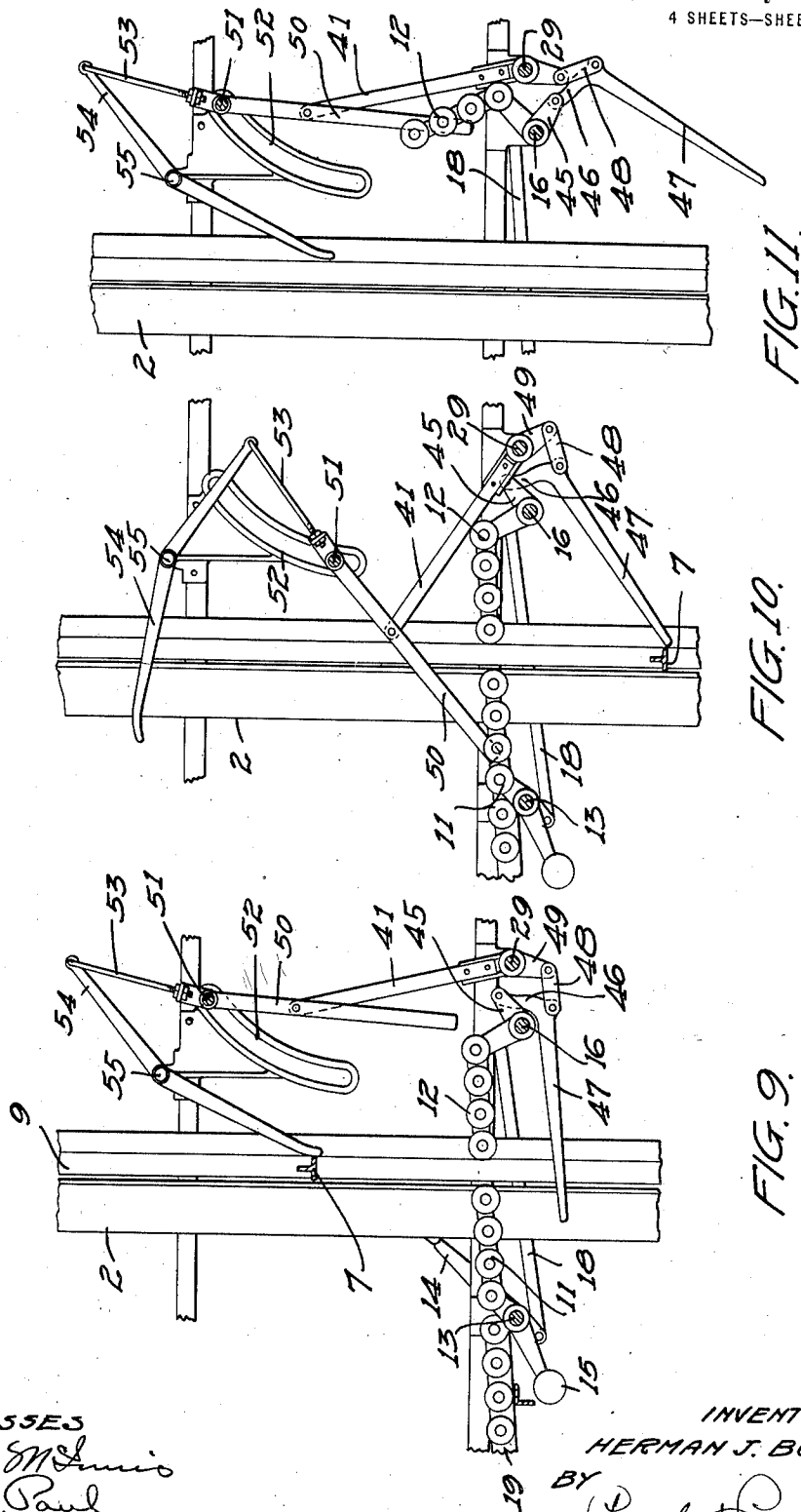
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC EJECTOR FOR STRAIGHT-LIFT ELEVATORS.

1,302,631.

Specification of Letters Patent.

Patented May 6, 1919.

Application filed February 16, 1914. Serial No. 818,967.

To all whom it may concern:

Be it known that I, HERMAN J. BUCK, citizen of the United States, resident of Ellwood City, county of Lawrence, State of Pennsylvania, have invented certain new and useful Improvements in Automatic Ejectors for Straight-Lift Elevators, of which the following is a specification.

In the operation of a straight lift elevator, arranged to receive packages or articles from a gravity carrier on one side of the elevator and deliver them to a similar carrier on the other side of the elevator, it has been found that the force of gravity is not always sufficient to insure the movement of the package delivered by a carriage upon the carrier on the down side of the elevator out of the path of the next carriage, and it sometimes happens that this failure of the package to move out of the path of an incoming carriage results in damage to the carriage, the elevator, or the package.

The object, therefore, of my invention is to provide a device which will positively and automatically push or eject the package or other article delivered at a station of the elevator out upon the carrier section, or other support, and away from the path of the next elevator carriage, regardless of the form or size of the package.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification,

Figure 1 is a vertical sectional view of a straight lift elevator embodying my invention, the ejector device being shown in position to be actuated by the carriage approaching the station,

Fig. 2 is a horizontal sectional view, showing one of the delivery stations of the elevator,

Fig. 3 is a detail view, showing the carriage in engagement with the ejector actuating arm,

Fig. 4 is a similar view, showing the ejector mechanism actuated by the downward movement of the carriage past the station,

Fig. 5 is a detail view, illustrating the position of the parts when the ejector arm is moved out of the path of the carriage for the purpose of allowing the carriage to move

past the station without discharging its load.

Fig. 6 is a detail view of a modified construction showing a carriage approaching a station and in the act of returning the ejector device to its normal position,

Fig. 7 is a similar view showing the position assumed by the ejector device when discharging a package from the station,

Fig. 8 is a vertical sectional view, showing the preferred manner of mounting the ejector bars,

Fig. 9 is a detail sectional view, illustrating another and probably the preferred construction, showing the cross bar of the carriage in the act of returning the ejector arm to its normal position,

Fig. 10 is a similar view, showing the mechanism actuated by the cross bar of a carriage when leaving the station for swinging the ejector bar across the station in a direction parallel with the surface thereof to propel the carriage load from the station,

Fig. 11 is a similar view, showing the ejecting mechanism set in a neutral or inoperative position.

In the drawing, Fig. 1, 2 represents an upright frame of suitable construction wherein the elevating mechanism proper is supported. 3 represents a sprocket wheel mounted in the upper portion of the elevator and 4 the lower wheels. These upper and lower sprocket wheels are connected by a chain belt 5, it being understood that similar wheels and a similar belt are provided on the opposite side of the frame. I have not thought it necessary to illustrate both sides of the elevator, as the general principle of a straight lift elevator of this type is old. At suitable intervals carriages 6 are pivotally supported by the sprocket chains, said carriages having preferably a centrally arranged bar 7 on which cross bars 8 are mounted in parallel relation with one another and at suitable intervals. Upright guides 9 are mounted in the frame 2 between which the carriages are adapted to move. The guides operate to hold the carriages in a horizontal position in their vertical movement, directing them upwardly on one side of the elevator and downwardly on the opposite side. As the carriages ascend, they pass one or more receiving stations, each equipped with an inwardly inclined gravity

carrier section 10 on which boxes, packages, or other articles may be transported from a distant point and delivered automatically to the elevator carriages. The upside of the elevator is equipped with receiving stations, and the down side of the elevator with delivering stations, and these stations are so arranged that they may be rendered operative or inoperative, the packages being received from any desired receiving station and delivered or discharged at any desired discharging station. The mechanism which I prefer to employ for rendering the stations operative or inoperative is substantially the same as that shown in Patent No. 1,020,746, issued March 19, 1912, to Albert S. Dehler.

As shown herein, each delivering station is preferably provided with comparatively short gravity sections 11 and 12. Each section 11 is supported upon a rock shaft 13 having an operating lever 14 and a counterweight 15 which normally tends to hold the carrier sections in a raised, inoperative position, as will hereinafter appear. Each section 12 is supported upon a rock shaft 16. An arm 17 depends from the shaft 13 and a bar 18 is pivotally connected to the arm 17 and to an arm 17' on the rock shaft 16. When the mechanism is in the position shown in Fig. 1, the delivery station is closed and the packages will be received thereby from the descending carriages and delivered by gravity from the sections 11 and 12 upon a carrier section 19 which is inclined downwardly and forms a continuation of the delivering carrier section 10 but upon a different level. The carriages in their up and down movement pass between the rails of the sections 11 and 12, as indicated in Fig. 2, receiving the packages therefrom or depositing them thereon, as usual in elevators of this type.

It sometimes happens that a package deposited by a carriage at one of the discharging stations will fail to move entirely out of the station, resulting in damage to the next carriage or the elevator, or the package. To obviate this objection and insure the prompt and positive movement of the package out of the station as soon as delivered, I have provided an automatic ejecting or discharging mechanism which I will now describe in detail.

In the one form of the mechanism, loosely mounted arms 21 depend from the shaft 16 and one or more levers 22, preferably curved, are pivotally connected to the lower ends of the arms 21. The levers 22 project outwardly a sufficient distance to stand normally in the path of a descending carriage, as shown in Figs. 1, 2 and 3. Arms 23 are fixed on the shaft 16 and project inwardly therefrom, and links 24 pivotally connect the arms 23 with the levers 22 at a point beneath and near the shaft 16. The arms 21

extend above the shaft 16 for a considerable distance and also above the elevator station and are free to swing on the shaft 16 and are pivotally connected at their upper ends to ejector bars in the form of bell cranks having short arms 25 and comparatively long arms 26, the pivotal connections of the arms therewith being preferably at the junction of the arms 25 and 26. The lower ends of the arms 26 are preferably connected with one another by a bracing bar 27. Bars 28 are pivotally connected at their upper ends with the short arms 25 and are fastened at their lower ends to a rock shaft 29. An arm 30 projects from this rock shaft and a bar 31 is pivotally connected at its lower end with the arm 30 and at its upper end to the short arm of a lever 32 that is pivoted at 33 on the elevator frame, the long arm of said lever extending outwardly into the path of a descending carriage to be actuated thereby.

Referring now to Fig. 1, a carriage is shown approaching the station after having passed the lever 32 and actuated it to return the kicking device to its normal position. The carriage as it descends will pass between the carrier sections at the station and engage the outer ends of the levers 22, as indicated in Fig. 3, where the carriage is shown on the point of passing through the station. The downward movement of the carriage as it leaves the station will force the levers 22 downwardly from a position indicated in Fig. 3 to that shown in Fig. 4, whereupon the bars 21 will be rocked on the shaft 16 and thrown to the position indicated in Fig. 4, and a corresponding movement will be imparted to the bars 28. These bars 28 form toggle joints, in effect, with the short arms 25 of the ejector, the toggle being broken in Figs. 1 and 2 and nearly closed in Fig. 4. The straightening of the toggle, or when the bars are moved to the position shown in Fig. 4, will result in a short stroke of the arms 25 of the ejector and a comparatively long stroke of the arms 26, and a movement of the said arms sufficient to engage and positively eject the package or other article from the station, assuming that it has not already moved off through the influence of gravity. As the shaft 29 is rocked by the outward movement of the bars 21 and 28, the bar 31 will be drawn down, raising the long arm of the lever 32 to its normal position to be engaged and actuated by the next carriage. This is illustrated in Fig. 4, where one carriage is shown as passing out of engagement with the levers 22, the ejector being at the end of its stroke while another carriage is approaching the lever 32 to move it to the position indicated in Fig. 1 and raise the ejector to an upright position to allow the next descending carriage to enter the delivering station.

From the foregoing description it will be

noted that the ejector not only has a swinging movement on its pivots but also moves bodily with the supporting bars 21 toward the carrier station and consequently the ejector will follow the package or load in the station, substantially parallel with the inclined carrier surface, entirely across the station, as indicated in Fig. 4, and insure its positive discharge out of the path of the next incoming carriage. This travel or stroke of the ejector across the station from one side to the other and substantially parallel to the inclined carrier surface I regard as an important feature of my invention and a marked improvement over an ejecting device which merely shoves the package and then relies on its momentum to carry it out of the station.

It is sometimes desirable to allow the carriage to pass through the station without actuating the ejector mechanism. In that case the lever 14 is moved from the position indicated in Fig. 1 to that shown in Fig. 5, whereupon the shaft 13 will be rocked, the carrier section 11 raised to a substantially upright position, and the carrier section 12, through its connection 18 with the arms 17 and 17', will also be raised to a point indicated by dotted lines in Fig. 5, out of the path of the approaching carriage. The arms 23, mounted on the shaft 16, will be swung down to a substantially vertical position, as indicated in Fig. 5, and the levers 22 will drop by gravity with the downward movement of the arms 23 until they assume the inoperative position illustrated in Fig. 5 out of the path of the descending carriage. As indicated in Fig. 2, a stop device 34 is provided in the path of the weighted arm 15 for the purpose of preventing the carrier section 11 from swinging downwardly below the level of the station.

In Figs. 6, 7 and 8 I have illustrated a modified construction of the ejector mechanism, which consists in providing an arm 35 on a shaft corresponding to the shaft 16 and which I will designate by the same reference numeral, said arm being pivotally connected by links 36 and 37 with an arm 38 on a shaft corresponding to the shaft 29 and designated by the same numeral. Levers 39 are loosely mounted on the shaft 29 and have links 40 connecting them with the links 36 and 37 so that when the levers 39 are forced downward by the pressure of the carriage the arm 38 will be lifted, rocking the shaft 29. A bar 41 is mounted on the shaft 29 and pivotally connected at its upper end to an ejector bar that is mounted on a shaft 43 slidable in a guide 44 on the elevator frame. This shaft is provided with a series of ejector arms 42 and is slidable at both ends in guides 44, one of said guides being shown in Figs. 6, 7 and 8. The pivotal connection of the bar 41 with the bar 42 is

made preferably at a point above the center of the ejector bar and when the shaft 29 is rocked by the descent of the carriage the bar 41 will be turned outwardly, swinging the ejector bar 42 in the same direction and drawing it down in the curved guide 44. The lower end of the ejector bar will engage with the package in the station if not already discharged, and will promptly and positively eject the package from the station and out of the path of the next approaching carriage. The guide 44 is mounted in any suitable manner upon the frame of the elevator, and while I have shown but one set of these ejector bars, and the operating links and bars therefor, it will be understood that another set is provided on the other side of the elevator.

When the station is opened and the shaft 16 is rocked, the link 36 will break the toggle joint, composed of links 37 and 40, and swing the lever 39 to a position similar to that assumed by the lever 22, as indicated in Fig. 5. To return the ejector mechanism to its normal position I provide a lever device corresponding to the one shown and described with reference to Fig. 1 and which I will indicate by the same reference numerals. The carrier sections of the station will also be raised and lowered by a mechanism corresponding to that of the previous figures and indicated by the same reference characters.

In Fig. 9 I have shown another modified construction, which consists in providing a shaft 16 corresponding substantially to the similarly located shaft in the previous figures with an arm 45 to which the short arm 46 of a bell crank lever 47 is pivotally connected. A link 48 pivotally connects the bell crank lever at a point near the junction of its long and short arms with the arm 49 on the rock shaft 29. The long arm of the bell crank lever projects under the station into the path of the carriage as it leaves the station. The upper end of the bar 41 is pivotally connected with the upper portion of an ejector arm 50, whose lower end depends to a point near the surface of the station and whose upper end has a pivotal support on a shaft 51 and said shaft slides in a curved guide 52 somewhat similar to the guide shown in Figs. 6 and 7. Rods 53 are attached to the shaft 51 and are pivotally connected to one end of a lever 54 that is pivoted at 55 on the frame of the elevator, and projects outwardly into the path of the carriage as it approaches a station to be actuated thereby and return the ejector arm to its normal upright position. The function of this lever is substantially the same as described in the other figures, the only difference being its manner of connection to the ejector arm. When the carriage has deposited its load in the station

and is leaving the station, it will engage the lever 47 and the ejector arm will be moved to the position indicated in Fig. 10, and it will be noted that the ejector arm will travel
 5 across or through the station in a direction parallel substantially with the floor of the station, hence there is no tendency to tilt the package, which frequently happens where the ejecting device swings on the arc
 10 of a circle. The package is pushed outwardly from the station, resting evenly on the carrying surface, and there is less danger of its lodging *en route* and delaying or stopping altogether the operation of the elevator than there would be if the ejector had a lifting or tilting effect when it engaged the
 15 package to be ejected. Furthermore, as in the previously described constructions, the ejector arm remains in contact with the package throughout its travel from the station and therefore positively insures the discharge of the package out of the path of the incoming carriage.

In Fig. 11 the ejecting mechanism is shown moved to a neutral position, where the actuating levers will not be out of the path of the elevator carriages.

I claim as my invention:

1. The combination, with a gravity carrier station, of carriages mounted to move past said station and deposit their load thereon, mechanism actuated by a carriage when leaving the station for positively ejecting the load from said station, said
 30 mechanism including a rocking member projecting above the station and an ejector carried thereby, and means actuated by a carriage approaching said station for returning said ejecting mechanism to its normal
 35 position.

2. The combination, with a gravity carrier station, of carriages mounted to move past said station and deposit their load upon said station, a toggle mechanism having
 45 ejector arms actuated by a carriage when leaving said station to eject the load therefrom out of the path of the next carriage approaching said station and a swinging support for said ejector arm.

3. The combination, with a gravity carrier station, of carriages mounted to move past said station and deposit their load thereon, a lever mounted to project into the path of a carriage leaving said station to be actuated thereby, ejector arms mounted
 55 to engage and eject the load from said station, a swinging support for said arms and a toggle mechanism connecting said lever with said ejector arm.

4. The combination, with a gravity carrier station and carriages mounted to move past the same successively and deposit their loads thereon, of a rocking bar projecting above said station, an ejector device carried
 60 thereby, a lever mounted to project into the

path of a carriage leaving said station, means positively connecting said lever with said bar for swinging said bar and said ejector device toward the load on the station, and means for tilting said ejector device during such swinging movement to eject the load from said station. 70

5. The combination, with a gravity carrier station and carriages mounted to move past the same and deposit their loads thereon, of a swinging bar mounted to project above said station, an ejector device pivoted thereon, means mounted to project into the path of a carriage as it leaves said station and connected with said bar to tilt the same outwardly over said station, and a second swinging bar also pivotally connected with said ejector device for tilting it to eject the load from the station during the swinging movement of said first named bar. 85

6. The combination, with a gravity carrier station and carriages mounted to move past the same and deposit their load thereon, of an ejector device pivotally supported and mounted to swing bodily toward said station, and mechanism actuated by a carriage leaving said station for swinging said ejector device toward said station and simultaneously tilting it on its pivot to engage and eject the load from said station. 95

7. The combination, with a gravity carrier station and carriages mounted to move past the same, of an upright swinging bar, an ejector device pivoted thereon and comprising a long and short arm, means actuated by the movement of a carriage leaving the station for swinging said bar toward said station, a second upright swinging bar pivotally connected with the short arm of said ejector device and operating to tilt said ejecting device on its pivot to eject the load from the carrier station. 105

8. The combination, with a gravity carrier station and carriages mounted to move past the same and deposit their load thereon, of a swinging ejector having means for contacting with the load on said station and adapted to exert continuous uniform pressure thereon and remain in positive engagement with the load until it is discharged from the station, and mechanism actuated by a carriage leaving the station for operating said ejector device. 115

9. The combination, with a gravity carrier station and carriages mounted to move past the same and deposit their load thereon, of a pair of upright swinging bars, an angular ejector device pivotally supported on one of said bars and having a pivotal connection with the other bar, a lever device projecting into the path of a carriage leaving said station and mechanism connecting said lever device with said first named bar for swinging both of said bars toward said station and simultaneously tilting said ejector device 130

vice on its pivot to engage and eject the load from said station.

10. The combination, with a straight lift elevator having a carrier station and carriages and supporting belts therefor, said carriages being mounted to move past said station and deposit their loads thereon, of an ejector device mounted to swing bodily toward said station and having an independent tilting movement, means actuated by a carriage when leaving said station for moving said ejector toward the load on said station, means for simultaneously tilting said ejector device to engage and follow the load out of said station, and mechanism actuated by an incoming carriage for returning said ejector device and actuating mechanism to their normal position.

11. The combination, with a straight lift elevator having a gravity carrier station, elevating belts and carriages mounted thereon, said carrier station being composed of tilting carrier sections adapted to be swung out of the path of an approaching carriage, of an ejector device having a member normally projecting into the path of a carriage leaving said station to be actuated thereby and operate said ejector device, and mechanism for simultaneously tilting said carrier sections to open said station and release said member from its position in the path of a carriage.

12. The combination, with a straight lift elevator having a gravity carrier station, elevating belts and carriages mounted thereon, of an ejector device including an arm mount-

ed to contact with the article delivered to the station by a carriage with continuous pressure and remain in such contact until the article passes out of the station, whereby the positive ejection of the article is insured.

13. The combination, with a straight lift elevator comprising a gravity carrier station, elevating belts and carriages mounted thereon, of an ejector device mounted to engage and eject from the station the load deposited by a carriage therein, a swinging support for said ejector device, said ejector device remaining in contact with the load until discharged from said station, mechanism actuated by a carriage leaving said station for operating said ejector device, and mechanism actuated by a carriage approaching said station for returning said ejector device to its normal position.

14. The combination, with a straight lift elevator having a gravity carrier station, elevating belts and carriages therefor, of an ejector arm mounted to contact with an article and eject it from the station, and remain in such contact during the movement of the article out of the station, the path of said ejector arm being paralld substantially with the surface of said station, whereby tilting of the article and clogging of the station is prevented.

In witness whereof, I have hereunto set my hand this 20 day of January, 1914.

HERMAN J. BUCK.

Witnesses:

FRANK E. MOORE,
JOS. W. HUMPHREY.