

March 6, 1934.

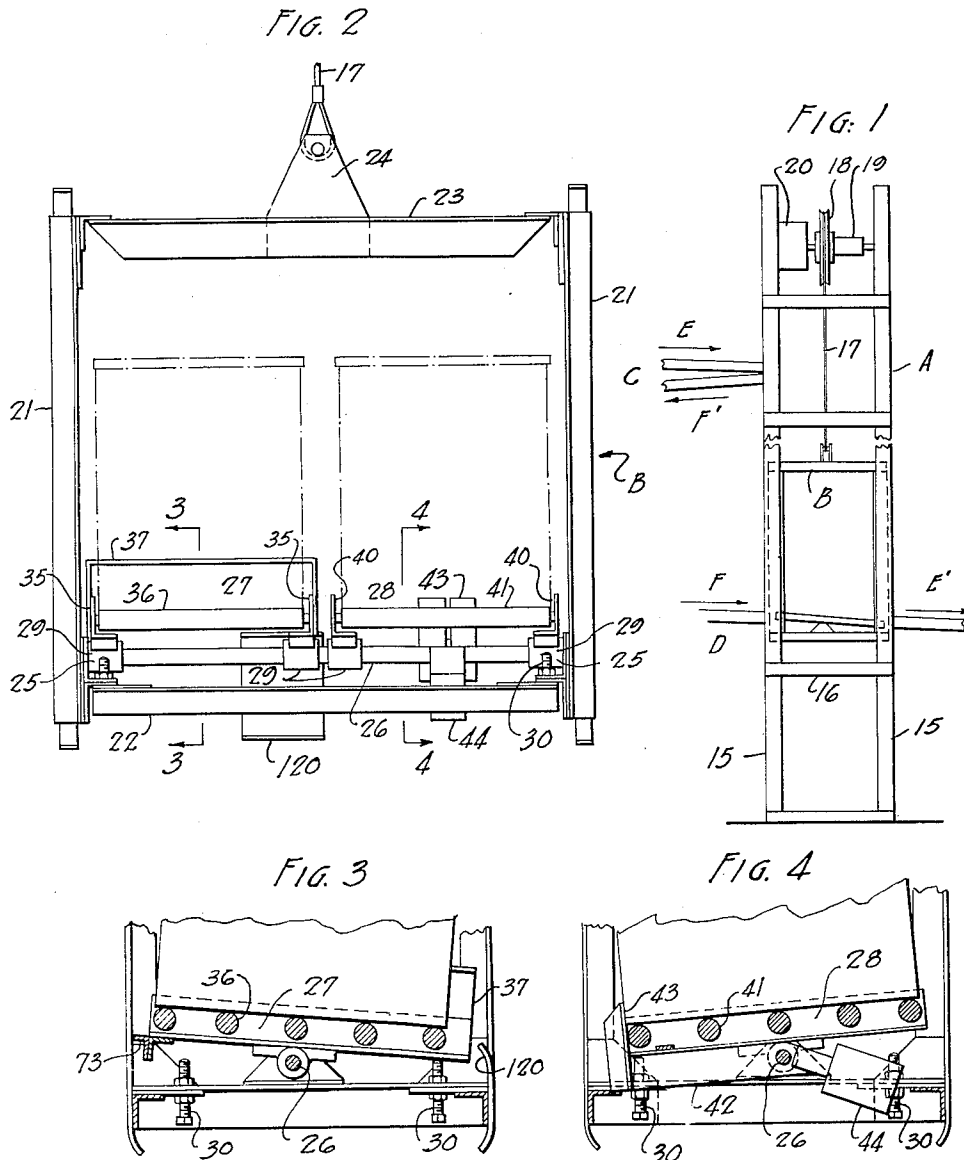
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1,949,964

CONVEYER MECHANISM

Filed July 15, 1930

9 Sheets-Sheet 1



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1,949,964

CONVEYER MECHANISM

Filed July 15, 1930

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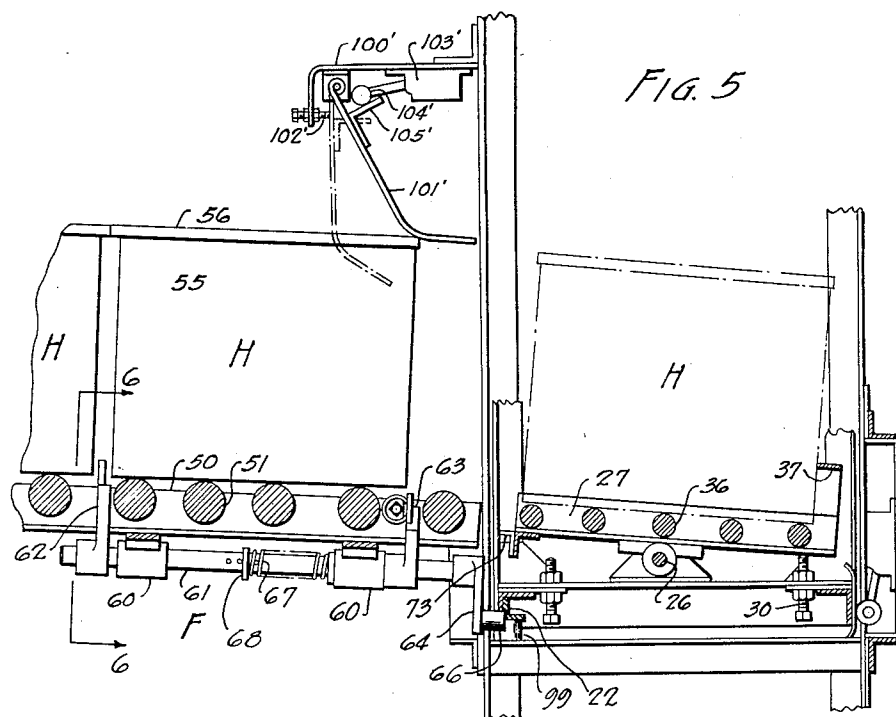


FIG. 5

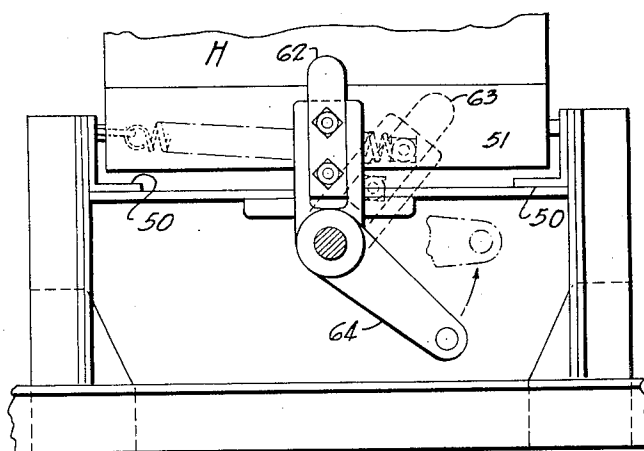


FIG. 6

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Filed July 15. 1930

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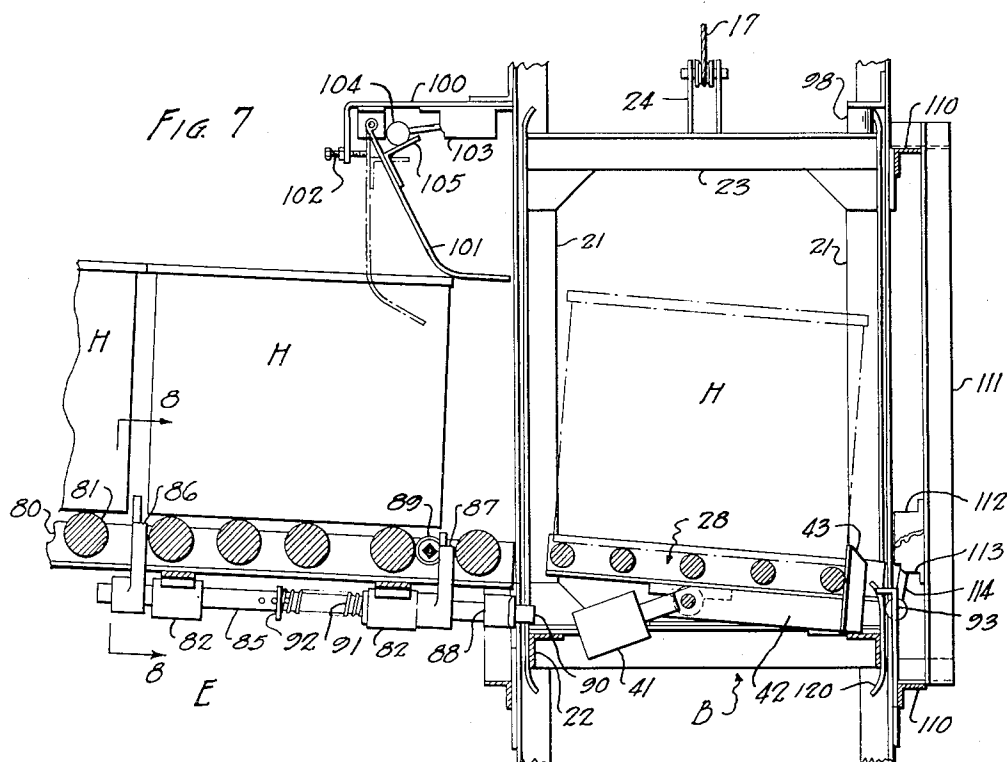
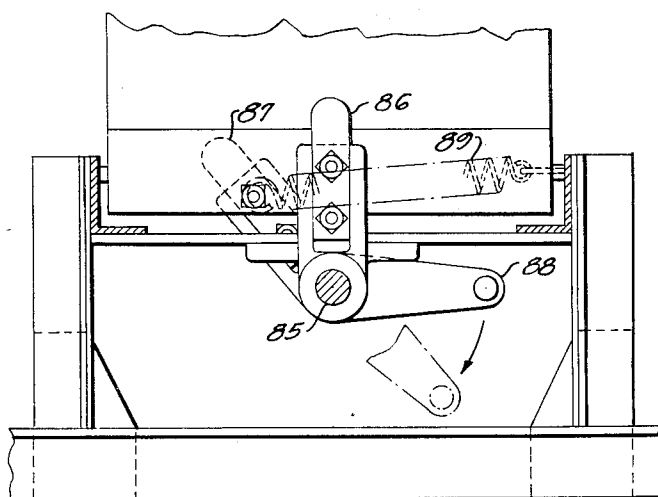


Fig. 8



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1,949,964

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FIG. 10

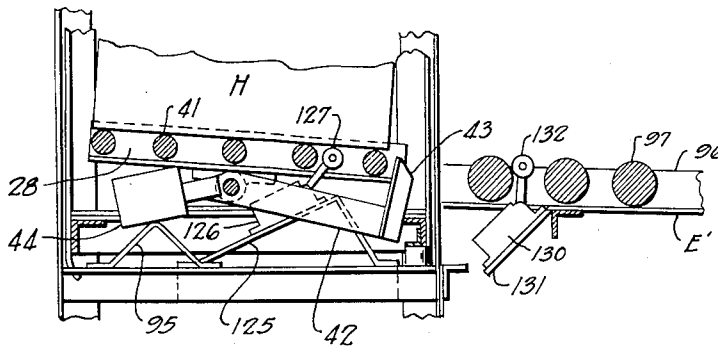
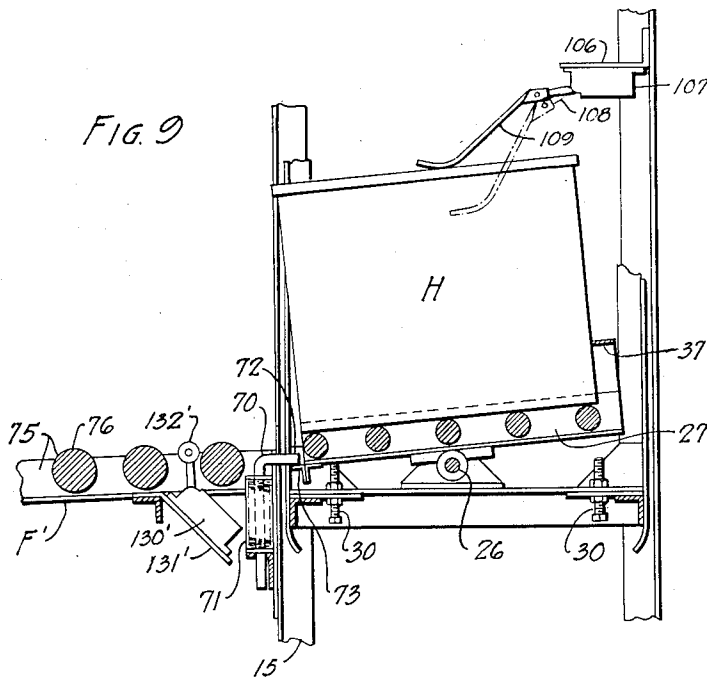


FIG. 9



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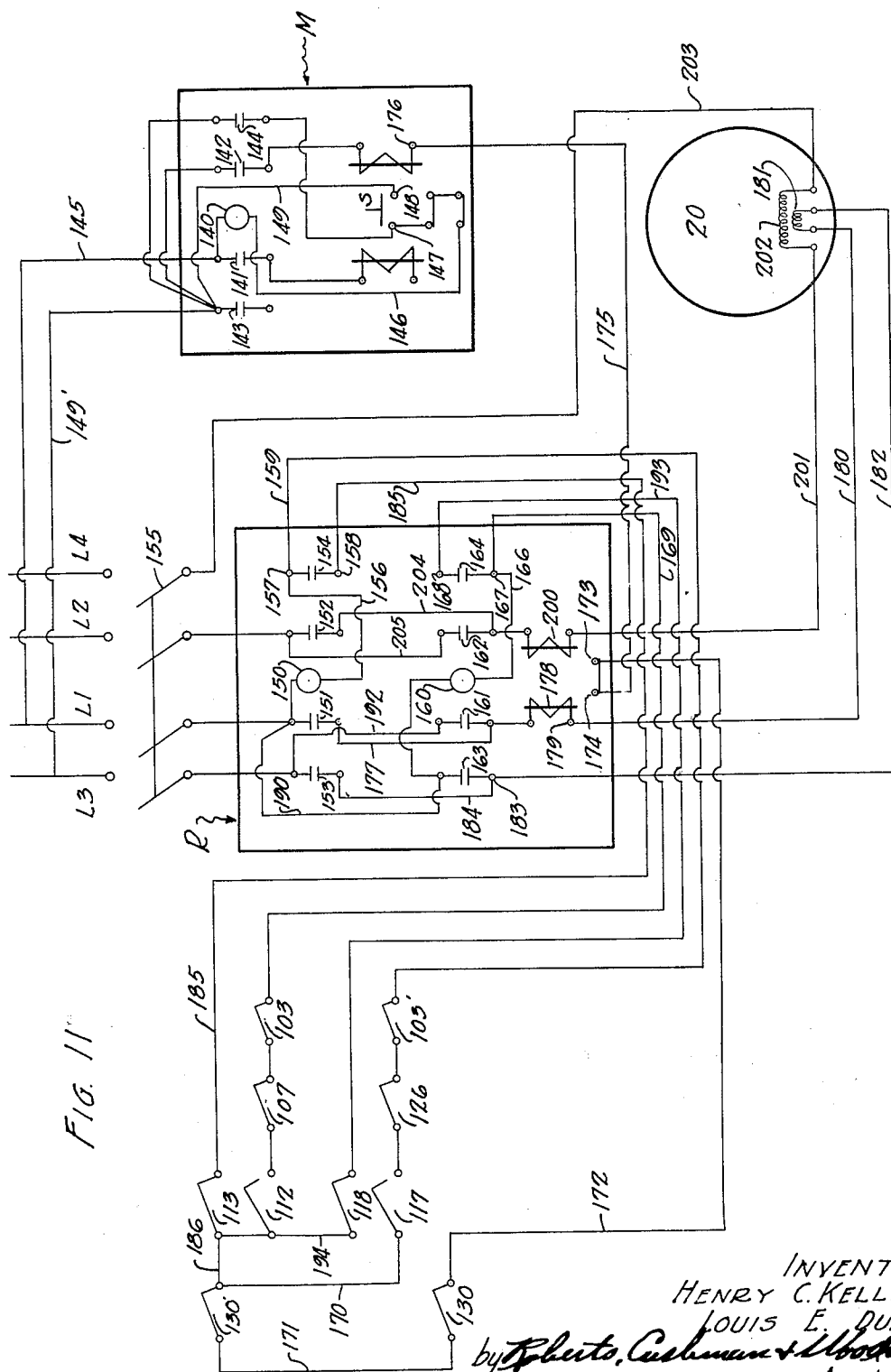
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Fig. 13

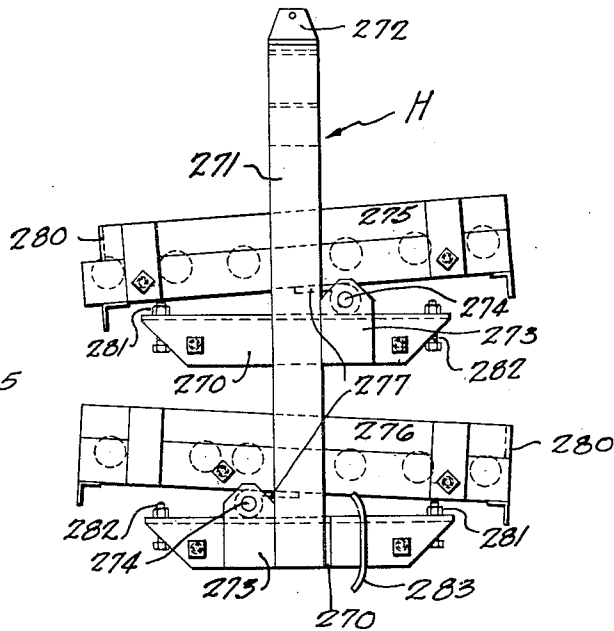
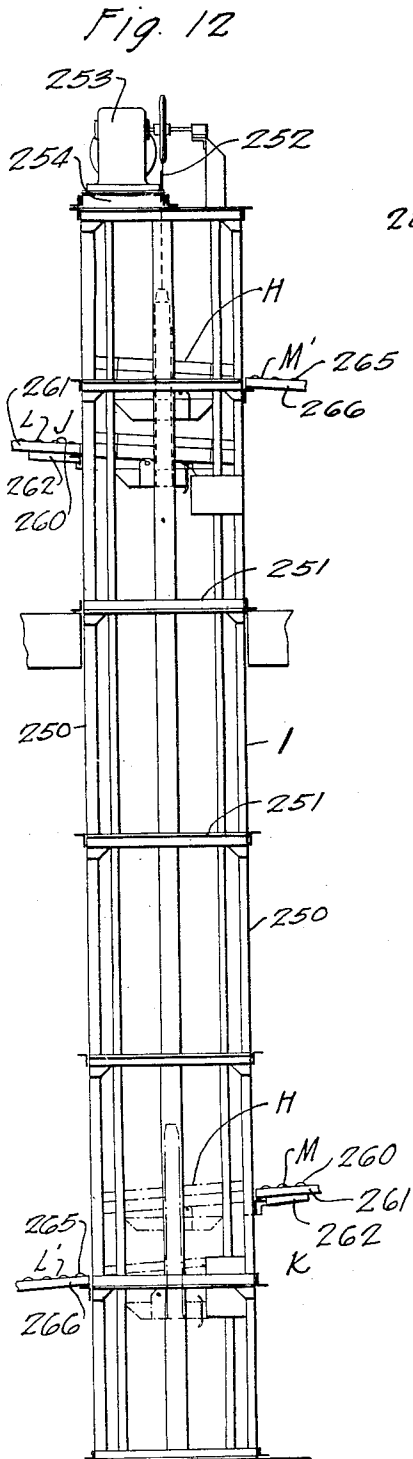
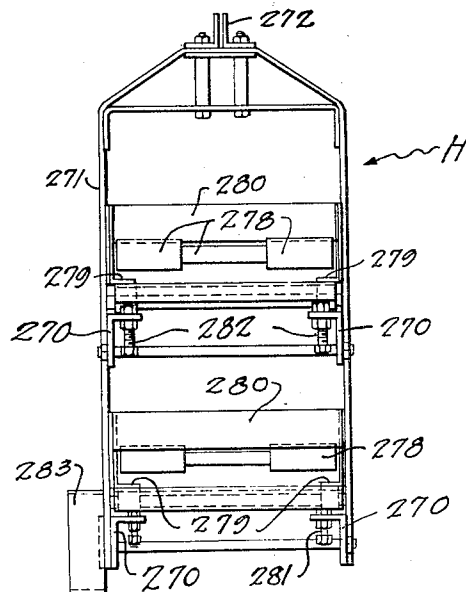


Fig. 14



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CONVEYER MECHANISM

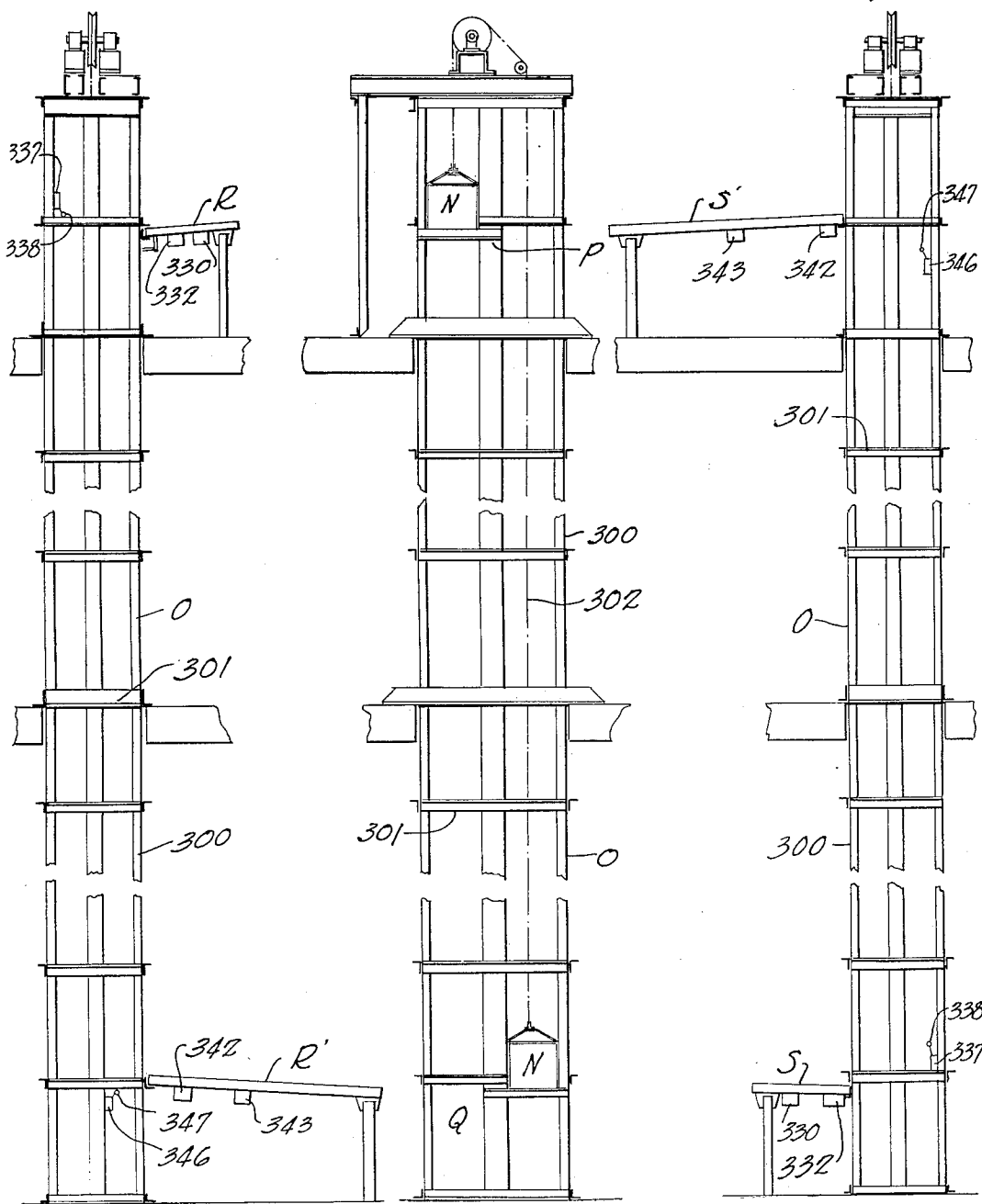
Filed July 15, 1930

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Fig. 16.

Fig. 15

Fig. 17



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CONVEYER MECHANISM

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Fig. 19

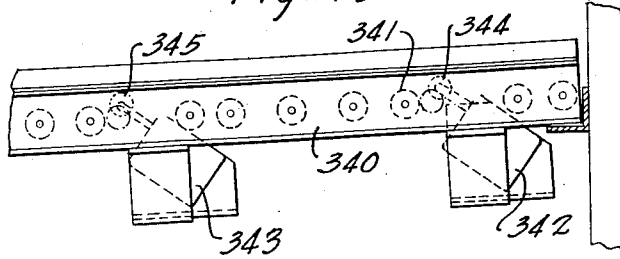


Fig. 20

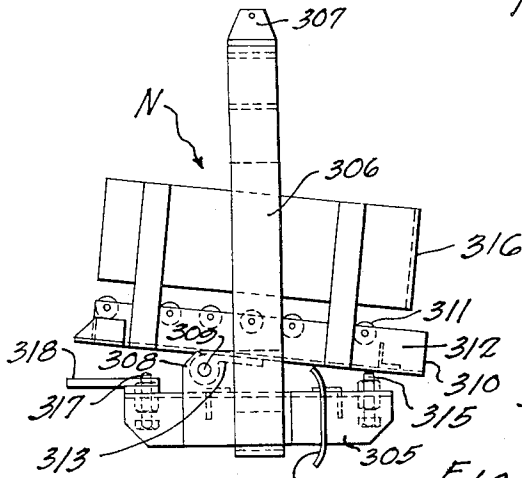


Fig. 21

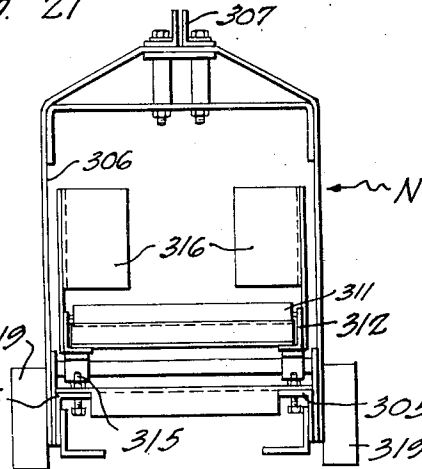
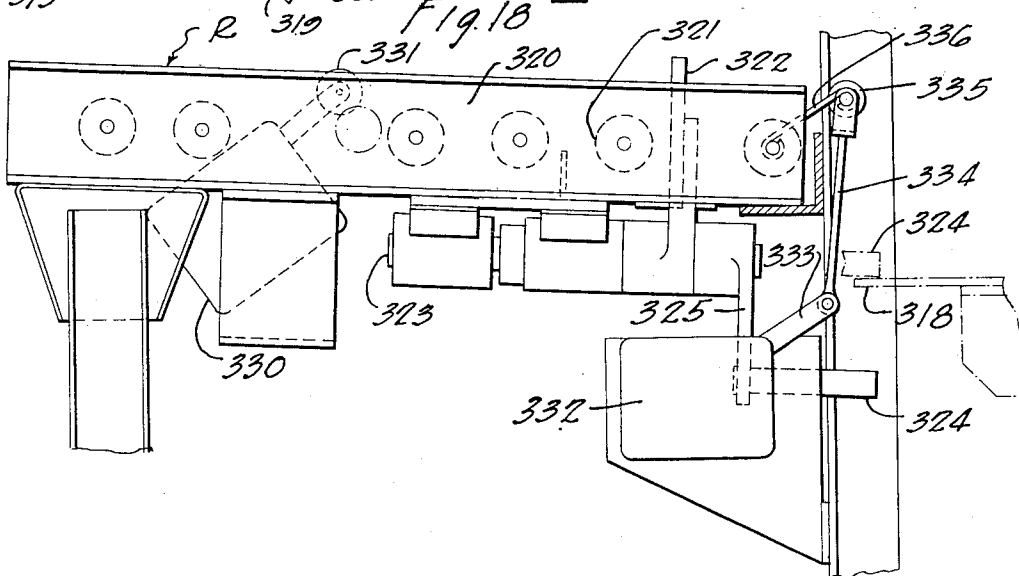


Fig. 18



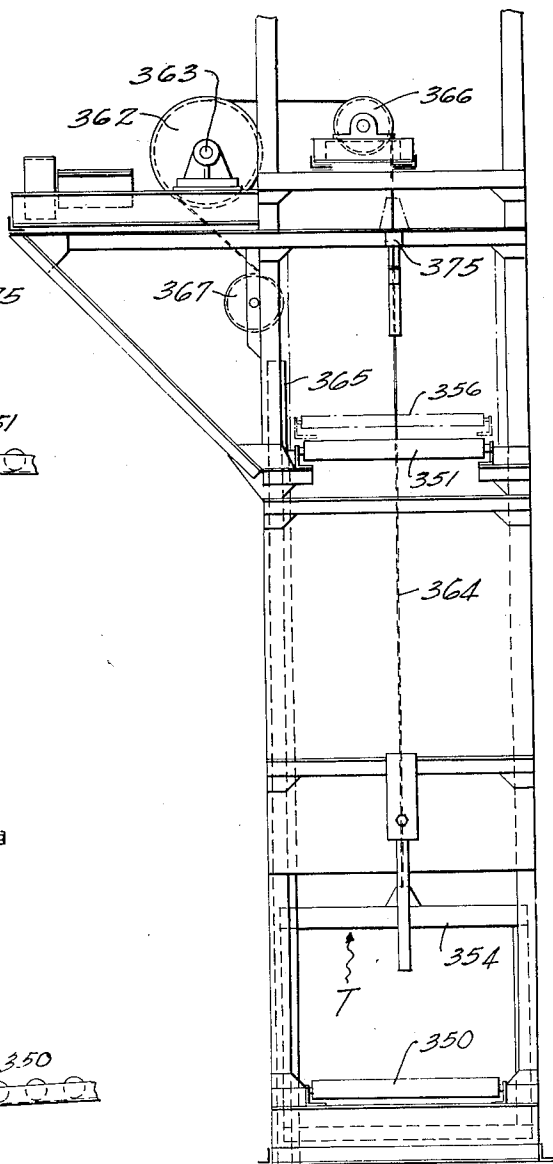
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Filed July 15, 1930

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Fig. 23



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UNITED STATES PATENT OFFICE

1,949,964

CONVEYER MECHANISM

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Application July 15, 1930, Serial No. 468,004

21 Claims. (Cl. 198—26)

This invention relates to an improvement in a conveyer mechanism and more particularly in a mechanism wherein the articles are transported from one point to another by a reciprocating car and in the means for controlling the feeding of the articles to the car and their delivery therefrom.

The primary object of this invention is to provide in combination with a car having two compartments adapted to carry two load units, means for feeding the load units to the car, means for preventing the feeding of the units except when the car is in the position to receive them and means at each station for loading units unto and removing units from the car. Other objects of this invention reside in the detailed construction of the car, of the loading and unloading means and of the mechanism for controlling the loading movement of the units.

One embodiment of this invention is set forth for illustration in the drawings in which:

Fig. 1 is a diagrammatic view illustrating the location of the loading and unloading stations;

Fig. 2 is a view in elevation of a car adapted to be used in this embodiment;

Figs. 3 and 4 are transverse sectional views taken along the lines 3—3 and 4—4 of Fig. 2;

Fig. 5 is a side elevation of the lower loading station;

Fig. 6 is an enlarged view of the stop and release mechanism associated with such station;

Figs. 7 and 8 are views similar to Figs. 5 and 6 of the upper loading station;

Fig. 9 is a side elevation of the upper unloading station;

Fig. 10 is a similar view of the lower unloading station;

Fig. 11 is a diagrammatic view of the wiring which may be employed in the operation of this embodiment;

Fig. 12 is a side elevation, a second embodiment of this invention wherein the car platforms are arranged vertically instead of horizontally;

Fig. 13 is a side elevation of a car adapted for use in this embodiment;

Fig. 14 is a side elevation of such car;

Fig. 15 is a front elevation of a third embodiment of the invention wherein two cars reciprocate in separate wells;

Figs. 16 and 17 are left and right hand side elevations thereof;

Fig. 18 is an enlarged side elevation of a station loading platform;

Fig. 19 is an enlarged side elevation of an unloading platform;

Fig. 20 is a side elevation of one of the cars employed in this embodiment;

Fig. 21 is an end elevation of such car;

Fig. 22 is a front elevation of a fourth embodiment of this invention wherein a car reciprocates in an elevator well carrying a load in one direction only; and

Fig. 23 is a side elevation of such embodiment.

The conveyer or lift comprises a frame forming a well A in which a car B travels between the upper station C and the lower station D. Each of these stations includes a loading platform and an unloading platform. The loading platforms at stations C and D are designated by the reference characters E and F respectively and the unloading platforms at such stations by the reference characters F' and E' respectively. It will be understood that the units loaded from the platform E at the station C are unloaded at the platform E' at the station D and that the units loaded on the car at the platform F' of station D are unloaded at platform F' and station C.

The frame of the well A is formed in the usual manner by a plurality of uprights 15 joined at suitable intervals by cross braces 16. The car B is guided for reciprocation in the well A in any suitable manner not shown and is raised and lowered by a cable 17 which passes around a pulley 18 on a shaft 19 driven by a motor 20.

The car B comprises a plurality of uprights 21 connected at the bottom by cross-bars 22 and at the top by crossbars 23 on which is mounted a bracket 24 to which the lower end of the cable 17 is secured. Mounted upon bearings 25 carried by the cross-bars 22 is a shaft 26 which pivotally supports platforms 27 and 28. Each of the platforms is provided with a pair of bearings 29 through which the shaft 26 passes and by reason of which the platforms 27 and 28 may be rocked. The limit of this rocking movement is determined by adjustable set bolts 30 carried by the crossbars 22.

The platform 27 is adapted to receive loads at the loading platform F' of station D (Fig. 5) and deliver such loads to the unloading platform F' of station C (Fig. 9), while the platform 28 is adapted to receive loads at the loading platform E at station C (Fig. 7) and deliver them to the unloading platform E' of station D (Fig. 10). In other words as shown in Fig. 1 the loads are delivered to and removed from the platform 27 at the same side of the well while the loads are delivered to the platform 28 from the platform E at one side of the well and delivered

onto the platform E' at the other side of the well. Due to this difference in function the platforms differ considerably in construction and operation as will now be pointed out.

5 The platform 27 comprises a pair of side rails 35 formed by angle bars to which the bearings 29 are secured. Supported by the side rails 35 are a plurality of freely rotating rollers 36 on which the loads are carried. Mounted on the
10 side rails 35 at one end is a stationary yoke or stop member 37 against which the loads normally rest.

The platform 28 comprises a pair of side rails 40 which correspond in construction and function to the side rails 35 of the platform 27 from which depend the bearings 29 and on which are supported freely rotating rolls 41. Pivotal-ly mounted upon the shaft 26 intermediate the bearings 29 is a lever 42 to one end of which
15 is secured a pair of upright plates 43 which normally extend above the level of the rollers 41 and thus act as a stop to prevent further travel of the load units. Rounded upon the other end of the lever 42 is a weight 44 which acts to hold
20 the stop plates 43 normally in the functioning position as shown in Fig. 4. Due to the provision of means which will be pointed out below, when the platform 28 arrives at the unloading platform E' of station D the stop plates will be retracted thus permitting the load unit to continue its movement across the platform 28.

The platform 27 of the car is loaded at station D from the platform F' (see Figs. 5 and 6) which comprises suitably supported side rails 50 by which are carried freely rotating rollers 51,
25 the rails 50 being inclined so that the units placed thereon tend to advance. The present embodiment is intended to receive load containers H which, as shown in the drawings, comprise a rectangular body portion 55 and a cover or lid 56, the edge of which projects beyond the body portion so that the body portions of two adjacent containers are never in contact. This permits the separation of the containers at the loading platform as will now be pointed out.

Suitably journaled in bearings 60 carried by the side rails 50 is a rock shaft 61 from which project a pair of fingers 62, 63 and an arm 64. The fingers 62 and 63 are fixed to the shaft at such an angle to each other that when either is in the upright position with its tip projecting above the plane of the rollers 51 the tip of the other is in a position below such plane. The stop fingers are shown in Figs. 5 and 6 in the position they occupy when a car is at the platform F' ready to receive a load, the stop finger 62 being raised and the stop finger 63 lowered. Under such conditions referring to Fig. 5 the container H as shown in full lines on the rollers 60
50 51 between the stops 62 and 63 is free to advance by the force of gravity on the platform 27 as shown in dotted lines.

The finger 62, however, prevents the following container from advancing until the spring 65 is free to act and restore the stop mechanism to its normal position in which the stop finger 63 is raised and the stop finger 62 lowered. The position of this mechanism shown in Figs. 5 and 6 is due to the contact of a cross frame 22 of the car, as it approaches station D, with a button 66 outwardly projecting from the end of the arm 64 whereby the arm is caused to move from its normal position indicated in dot and dash lines on Fig. 6 to the full line position indicated on that
75 figure. A spring 67 surrounding the shaft 61 be-

tween the right bearing 60 and a washer 68 acts as a cushion allowing the shaft to advance slightly when the leading container hits the upstanding stop finger 63.

The container H delivered onto the platform 27 at the platform F' as just described is unloaded onto the platform F' of station C as indicated in Fig. 9. Carried by the uprights 15 of the well A is a trip 70 mounted in a casing 71. The trip 70 includes an outwardly projecting tongue 72 which engages an angle plate 73 carried by the platform 27 of the ascending car and thus positively tilts the platform on the shaft 26 from the position shown in Fig. 5 to that shown in Fig. 9. The unloading platform F' comprises side rails 75 and a plurality of freely rotatable rollers 76 carried thereby. The side rails 75 are preferably inclined away from the conveyer well and hence when the car B has reached the station C and the tongue 72 has tilted the platform 27 the container H carried by the platform passes off under the action of the force of gravity onto the platform F' where it is suitably handled in any desired manner.

The platform 28 is supplied with a container H at the upper station C (see Figs. 7 and 8). The loading platform E at that station comprises briefly a pair of inwardly inclined side rails 80 on which are supported a plurality of freely rotating rollers 81. Suitably supported in journal bearings 82 carried by the side rails 80 is a shaft 85 to which are secured a pair of spaced stop fingers 86, 87 and an arm 88. The shaft 85, fingers 86, 87 and arm 88 comprise a stop mechanism by which the movement of the containers is controlled. As will be apparent from a consideration of Fig. 8 the stops 86 and 87 are so arranged on the shaft 85 with respect to each other that when the tip of one of the stop fingers is above the plane of travel of the containers over the rollers the tip of the other stop finger is out of such plane. A spring 89 normally holds the stop mechanism with the finger 86 lowered and the finger 87 raised to prevent the advance of the container into the well.

The arm 88 is provided with a button 90 which is contacted by a cross rail 22 of the car when the car approaches its upper position and under such contact the shaft 85 is rocked and the stop finger 86 swung into functional position while the stop 87 is removed therefrom. This movement of the stop mechanism is, as will be apparent, in opposition to the urge of the spring 89. When the car reaches this position and the stop mechanism has been swung out of its normal position to that shown in Figs. 7 and 8 the container H on the rollers 81 in advance of the stop 86 slides forward under the force of gravity onto the platform 28 into contact with the stop plates 43 thereof. As soon as the car B starts to descend the spring 89 acts to raise the stop finger 87 and lower the stop finger 86 so that the next container in line passes onto the loading section of the platform E into contact with the stop 87 which is at that time raised. A spring 91 surrounding the shaft 85 between the forward bearing 82 and a washer 92 permits a slight advance of the shaft under the impact of the container H against the stop finger 88. As the car B arrives at station C a tongue 93 carried by the well frame contacts with the projecting edge of one side rail 40 and thus holds the car platform 28 in position to receive the container H.

When the car B descends to station D where the container on the platform 28 is delivered to

the platform E' the weight 44 by which the stop plates 43 on the lever 42 are normally held in the functioning position contacts with an abutment 95 suitably supported on one of the cross frames of the well (see Fig. 10). The weight 44 is raised by reason of its contact with the abutment 95 and the stop plates 43 lowered so that the container H on the platform 28 is free to travel under the force of gravity onto the unloading platform E'. The platform E' like the platforms previously described comprises inclined side rails 96 and a plurality of freely rotating rollers 97 on which the container H is received and conducted to its desired destination. Mounted upon the well frame at stations C and D are bumpers 98 and 99 which limit the travel of the car. The shaft is controlled by a solenoid brake (not shown) by which the car is stopped one half inch before reaching the bumpers in order to reduce the shock and jar.

From the above description of the various features it will be apparent that the conveyer functions in the following manner. The car B is continually reciprocated in the well A by the motor 20 between stations C and D. Upon arriving at station C a container is loaded onto the car platform 28 from the station platform E and at the same time a container H is unloaded from the car platform onto the station platform F'. The car then travels to station D where it receives a container H on the car platform 27 from the station platform F' and at the same time the stop plates 43 are lowered and the container on the car platform 28 passes out of the car onto the station platform E'. The stop fingers at the loading platforms E and F operate automatically in the manner previously described to release a container only when a car is in position to receive it.

The travel of the car is preferably controlled automatically by the provision in the motor circuit of suitable automatic control devices which are operated by the containers on the various station platforms and by the car itself. One system of such control features is shown in the drawings and will now be described.

Pivotaly supported on a bracket 100 carried by the well frame at station C is a finger 101 which extends into the path of travel of the containers as they enter the loading platform E (see Fig. 7). A set screw 102 is provided in the bracket to limit the movement of the finger 101 in one direction. Secured to the bracket 100 is a circuit breaker 103 which may be of any desired type and includes a pivotally mounted trip arm 104. Fixed upon each finger 101 is a plate 105 on which the end of the trip arm 104 rests. A similar arrangement is provided at station D and for convenience the various elements are there designated (see Fig. 5) by the reference characters above used but distinguished by the addition of prime marks. Projecting into the well A is a bracket 106 which supports a circuit breaker 107 having a trip arm 108 to which is secured an extension finger 109. The finger 109 projects into the path of a container on platform 27 as it approaches the unloading station F' and is tripped thereby.

Mounted upon the well frame at station C opposite the platform E are beams 110 which carry a plate 111 upon which are supported a circuit maker 112 and a circuit breaker 113 each of which has a trip arm 114 (only one shown in Fig. 7). Similarly mounted upon the well frame at station D opposite station F' are beams 115

which carry a plate 116 upon which are supported a circuit maker 117 and a circuit breaker 118 each of which has an arm 119 (only one shown in Fig. 5). A curved plate 120 carried by a crossbar 22 of the car is so positioned that, when the car is at stations C or D it will trip the arms 114 or 119, the various control devices closing circuits through the makers 112 or 117 and opening circuits through the breakers 113 or 118.

Carried by a bracket 125 mounted at the bottom of the well A is a circuit breaker 126 having an upwardly extending trip arm 127 (Fig. 10). The circuit breaker is located below the car platform 28 in such position that, when the car is at station D, the arm 127 projects between two of the rollers 41 and is tripped by the container H supported thereby.

Each platform E' and F' is provided respectively with a circuit breaker 130, 130' supported upon a bracket 131, 131' attached to the under side of this platform. The tip of each trip arm 132, 132' of each circuit breaker 130, 130' projects between the rollers of its platform and is tripped by the container H.

Associated with the various circuit makers and circuit breakers previously described is a master starter M and a reversing starter R (see Fig. 11). In the present embodiment alternating current is supplied through the lines L¹, L², L³ and L⁴. The master starter M is connected to the lines L¹ and L³ and includes a relay mechanism consisting of a magnet 140 and a plurality of switches 141, 142, 143, and 144 controlled by the magnet 140. The magnet 140 is directly connected with line L¹ at all times by a lead 145 and is connected through a lead 146 with a post 147 of a starter switch S. The other post 148 of this switch is connected through leads 149 and 149' to the line L³. It is to be understood of course that when the conveyer is to be operated the starter switch S is closed and the current will flow between lines L¹ and L³ through the circuit formed by the lead 145, magnet 140, lead 146, post 147, switch S, post 148 and leads 149 and 149'. The magnet 140 will thereupon be energized and will close the various switches 141 to 144 inclusive.

The reversing starter R comprises two relay mechanisms one of which consists of a magnet 150 and a plurality of switches 151, 152, 153 and 154, the positions of which are controlled by the magnet 150. The second relay mechanism comprises a magnet 160 and a plurality of switches 161, 162, 163 and 164 respectively, which switches are controlled by the magnet 160. The starter R is normally connected with the lines L¹, L², L³ and L⁴ by a main switch 155 and the magnets 150 or the magnet 160 is energized to close the switches controlled thereby through the operation of the proper circuit makers 112 or 117 at stations C or D in the manner about to be described.

Let it be assumed that the master starter switch S is closed so that the magnet controlled switches 141, 142, 143 and 144 are closed and that the main switch 155 is also closed. While the magnet 140 of the relay in the master starter M is energized it will be understood that the magnets 150 and 160 in the relays of the reversing starter R are not energized and that the switches 151 to 154 inclusive and 161 to 164 inclusive are all open so that no current flows to the motor 20. Let it also be assumed that the car B is at the lower station D, the platform 28 being empty

the container H having been delivered to the unloading platform E' and having passed the circuit breaker 130 and that a container H is ready to be fed from the station platform F' onto the platform 27 of the car. It will of course be understood that the car B upon its arrival at station D has tripped the circuit maker 117 and the circuit breaker 118. The container as shown in full lines in Fig. 5 has tripped the arm 101' of the circuit breaker 103' which is in series with the circuit maker 117. When however the container H has moved onto the platform 27 as shown in dotted lines in Fig. 5 the circuit breaker 103' is released. Thereupon the current is free to flow from the line L¹ through the magnet 150, lead 156 to the post 157 and thence through lead 159, circuit breaker 103', circuit breaker 126, circuit maker 117 now tripped by the car into the circuit closing position, lead 170, circuit breaker 130', lead 171, circuit breaker 130, lead 172 to the post 173, thence to the post 174 and through the lead 175 to post 176 in the master starter M and through switch 142 to line L³. This flow of current energizes the magnet 150 whereupon the switches 151 to 154 inclusive are closed. The closing of the switches 151 and 153 permits the current to flow from the line L¹ through lead 177 and thermo cut-out 178 to a post 179 and thence through lead 180 to a coil 181 in the motor 20, thence through lead 182 to a post 183 connected by lead 184 to the switch 153 and the line L³ starting the motor and causing the car B to rise. As soon as the car rises the circuit maker 117 is released and the starting circuit just described will be broken. However, a maintaining circuit has been provided from the post 157 through switch 154 to a post 158 and thence through lead 185, circuit breaker 113, lead 186, circuit breaker 130', lead 171, circuit breaker 130 and lead 172 to the post 173. When the car reaches station C it trips circuit breaker 113, and opens the circuit so that the magnet 150 is deenergized, the switches 151 to 154 opened and the motor is stopped.

It will be noted that while the car trips the circuit maker 112 as well as the circuit breaker 113 the container H on the car trips the circuit breaker 107 in series with the circuit maker 112 so that the car can not move until the container has been discharged onto the platform F'. Moreover the circuit breaker 103 which is in series with the circuit maker 112 and circuit breaker 107 is tripped by a container on the platform E if one be there as shown in Fig. 7. When the container H on the car (see Fig. 9) is discharged on the platform F' it releases the circuit breaker 107 but trips the circuit breaker 130' so that no movement of the car can take place until after this circuit breaker also has been released by the movement of container away from the car. When the container H on the platform E has been fed onto the platform 28 of the car as shown in dotted lines in Fig. 7 the circuit breaker 103 is released and the circuit closed.

Thereupon the motor is started to operate in the opposite direction by current through electric connections similar to those previously described which will now be set forth briefly as follows: starting at line L¹, through lead 190 to the magnet 160, through lead 166 to post 167, lead 169, circuit breaker 118, lead 191, circuit maker 112, circuit breaker 103, circuit breaker 107, circuit maker 112, leads 194 and 186, circuit breaker 130', lead 171, circuit breaker 130, lead 172, to the post 173

and thence through post 174, lead 175, post 176, to current line L³. The magnet 160 is energized by this flow of current closing the switches 161 to 164 inclusive in the usual manner. The closing of the switch 163 completes the motor circuit starting at line L¹, lead 190, switch 163, lead 182, the coil 181 in the motor and thence through the lead 180, post 179, thermo cut-out 178, switch 161, lead 192 to the line L³. It will be noted that the current in the motor circuit now flows in the opposite direction from that previously described and that the direction of the movement of the motor is thereupon reversed. The closure of the switch 164 by the magnet 165 permits the provision of a maintaining circuit by reason of which the motor will continue to operate after the circuit maker 112 has been released by the descent of the car. This circuit may be traced as follows from the post 168 through the lead 193, circuit breaker 118, lead 194, lead 186, circuit breaker 130', lead 171, circuit breaker 130, lead 172 to the post 173. When the car reaches the station D it trips the circuit breaker 118 and circuit maker 117 so that the motor will be stopped.

From the above description it follows that should no container H be ready at the loading platform F' the car will rise as soon as its container has been delivered and similarly should no container H be ready at the loading platform E the car will descend as soon as its container has been delivered. Moreover if the car arriving at station E' carries no container it will rise at once if no container is ready at the loading platform and similarly if it arrives at station F' without a container it will descend at once if no container is ready at the loading platform E. Hence the car will reciprocate between the stations as long as the starter switch S and main switch 155 and its station stops are thus controlled by the containers carried or ready to be carried thereby. Furthermore a container placed on one of the loading platforms will stop the car, move thereon and allow the car to start when properly loaded without further attention by the operators.

The motor 20 here shown is of the two phase type, the second phase being supplied through the lines L² and L⁴. The connecting circuit includes a thermo cut-out 200, a lead 201, a coil 202 and a lead 203. The line L² is connected to the thermo cut-out 200 by the lead 204 when the switch 152 is closed by magnet 150 and by the lead 205 when the switch 162 is closed by the magnet 160.

The operation of this conveyer mechanism selected to illustrate one form of this invention will now be described briefly. When the master starter switch S and the main switch 155 are closed the car B will be caused to travel in the well A by the motor 20. Upon its approach to a station for example C at which a container H is ready to be delivered the car will be stopped because the container will trip the circuit breaker 103 (Fig. 7). As the car approaches the loading platform E however its cross rail 22 will strike the button 90 releasing the container thereon and allowing it to advance onto the car platform 28 while preventing the advance of the succeeding container.

The car then descends to station D where a container on platform F' ready to be fed onto platform 27 (Fig. 5) has tripped circuit breaker 103' insuring the halting of the car at the station. As the car arrives at the station the gate 43 is

tilted allowing the container on platform 28 to pass onto platform E'. The container as the car comes to a stop trips the circuit breaker 126 and, as it passes onto platform E', trips the circuit breaker 130 and prevents any movement of the car until the circuit breaker is released. As the car approaches the station D the cross rail 22 acts on the button 67 to rock the shaft 61 releasing the container and preventing the advance of the succeeding container until the car starts on its upward trip, after the container has been fed from platform F' and the circuit breaker 103' released.

Thus the car is automatically reciprocated in the well and is held at a station until a container waiting at the station is fed onto the car and/or until a container on the car has been delivered. Moreover the container is held against advance to the well until automatically released when the car is in the position to receive it and the succeeding container is only permitted to advance after the car has started from the receiving position. Figs. 12, 13, and 14 illustrate an embodiment of this invention wherein the car platforms are spaced in a vertical plane instead of in a horizontal plane, and in which the platforms at the stations are similarly spaced. Thus as shown in Fig. 12 the car H travels in the well I between stations J and K each of which stations includes a loading platform and an unloading platform. The loading platforms are designated by the reference characters L and M' and the unloading platforms as L' and M', the units loaded at platform L of station J being unloaded at platform L' of station K and those loaded at platform M of station K being unloaded at platform M' of station J.

The well I comprises a plurality of uprights 250 and cross braces 251. The car is reciprocated in the well by a cable 252 driven by a motor 253 here shown as mounted upon a platform 254.

The loading platforms L and M may be of any desired type but are here illustrated as similar in construction to the loading platforms E and F' previously described in detail having a plurality of load supporting freely rotatable rollers 260 carried by side rails 261. These platforms are preferably inclined downwardly toward the elevator well and include stop and release mechanism 262 which corresponds to that also previously described, and hence not herein set forth in detail.

The unloading platforms L' and M' may also be of any desired type, and are here illustrated as similar in construction to the unloading platforms E' and F' having a plurality of load supporting freely rotatable rollers 265 carried by side rails 266. These side rails are preferably inclined downwardly away from the elevator well.

The car H (see Figs. 13 and 14) comprises vertically spaced angle bars 270 fixed upon a frame 271 having at its upper end a member 272 to which one end of the cable 252 is secured. Carried by the bars 270 are brackets 273 which support cross shafts 274. Pivotaly mounted on the shafts 274 are the upper and lower car platforms 275, 276 each of which carries loops 277 through which the shafts 274 extend. The platforms 275 and 276 each comprise freely rotatable rollers 278 carried by side rails 279 and a guard bar or stop 280, connecting the side rails 279 at one end. It will be noted that, as shown in Fig. 13, the shaft 274 on which the platform 275 is supported is at the right of the frame while the shaft 274 on which the platform 276 is supported is at the left of the frame. As a result the platforms are nor-

mally tilted and the stop carrying ends rest upon adjustable studs 281 carried by the bars 270. Similar studs 282 are provided on which the ends of the platforms rest under conditions to be pointed out later.

On one bar 270 is mounted a shoe 283 which coacts with suitably located circuit control devices at each station. Control devices are also provided in the well which are actuated by the units on the car as it approaches the unloading station, as well as devices on the loading and unloading platforms which are tripped by the units and thus prevent any movement of the car at a time when the units are not fully transferred onto or off from the car platforms.

In order to insure that the pivotally mounted platforms of the car are in alignment with the station platforms, suitable means are provided for tilting the car platforms onto the studs 282 and thus into the proper position when the car arrives at a station. Such means may be of any suitable construction as for example projecting tongues like the tongues 72 and 93 previously described at the upper station and rigidly mounted stops at the lower station.

The embodiment of this invention shown in Figs. 15 to 21 inclusive comprises two cars N which reciprocate in separate paths in the well O and transport load units between stations P and I, each station comprising a loading platform and an unloading platform. The car N in one path receives a load at platform R of station P and delivers it to platform R' of station I while the car N in the other path receives a load at platform S of station I and delivers it at platform S' of station P.

The well O comprises uprights 300 and cross braces 301. The cars are connected by a cable 302 which is actuated by a motor or other suitable means and when one car is raised the other car is lowered.

Each car N (Figs. 20 and 21) comprises parallel angle bars 305 mounted upon a frame 306 having at its upper end a member 307 to which one end of the cable 302 is attached. Carried by plates 308 fixed upon the bars 305 is a shaft 309 upon which the car platform 310 is supported. The platform 310 comprises freely rotatable rollers 311, supported at their ends upon side rails 312. The platform is pivotally connected to the shaft 309 by loops 313 which as shown in Fig. 20 are offset from the center line so that the platform 310 is normally tilted and one end rests upon adjustable studs 315 fixed in the bars 305. At that end of the platform are secured guard plates or stops 316 against which the loads on the rollers 311 rest during the travel of the car. When the car arrives at a loading platform, the car platform is rocked on the supporting shaft by any suitable means until its other end rests upon adjustable studs 317, also carried by the bars 305 and to which is secured a plate 318. Shoes 319 are also carried by the bars 305.

A typical loading platform as illustrated in Fig. 18 comprises suitably supported parallel side bars 320 which are inclined downwardly toward the elevator well, and upon which are carried freely rotating rollers 321, so that articles placed thereon normally advance toward the well under the force of gravity. This movement of the articles is checked by a stop finger 322 on a shaft 323 which normally projects above the plane of the rollers 321 under the urge of a spring (not shown). The finger 322 is depressed upon the arrival of a car N at the station by the contact of the plate

318 thereon with a pin 324 projecting into the well O from an arm 325 fixed on the shaft 323. Fig. 18 shows the loading platform R of station P and the arm 325 is so fixed upon the shaft that the pin 324 will contact with the plate 318 as the car rises. It will be understood of course that the arm 325 at the platform R' will be so fixed that the pin 324 will contact with the plate 318 as the car descends.

Carried by the loading platform is a circuit breaker 330 having an arm 331 which is tripped by an article on the platform and insures the stopping of the car at the station when an article is awaiting at the loading platform. A second circuit breaker 332 is mounted on the elevator frame below the platform and has an arm 333 connected by a link 334 with a roll 335 supported by a plate 336 pivoted upon the shaft of the forward roller 321. The roll 335 normally projects into the path of travel of an article onto the car platform and is tripped thereby to break the operating circuit and prevent movement of the car before the article has been loaded thereon. Mounted upon the elevator frame opposite the loading platform is a circuit maker 337 having an arm 338 which is tripped by an article after it has passed completely onto the car platform into contact with the guard plates 316 to complete the operating circuit so that the car will be set in motion.

Fig. 19 illustrates a typical unloading platform in the present instance, the platform S' at station P. This platform comprises suitably supported parallel side bars 340 which are inclined downwardly away from the elevator well and upon which are carried freely rotating rollers 341 so that the articles delivered thereto will travel automatically away from the well under the force of gravity. Carried by the platform S' are circuit control devices 342 and 343 each having arms 344, 345 respectively that project into the path of travel of the articles on the rollers 341. The device 342 is a circuit breaker which when the arm 344 is tripped by an article opens the operating circuit and prevents any movement of the car until the article has passed completely onto the platform, while the device 343 is a circuit maker that acts when the article trips the arm 345 to close the operating circuit and cause the car to resume its travel. Fixed on the elevator frame below each loading platform is a circuit breaker 346 having an arm 347 which is tripped by one of the shoes 319 on the car, when the car arrives at the unloading station, to open the operating circuit and stop the travel of the car.

Figs. 22 and 23 illustrate another embodiment of the invention wherein a car T travels in a well U between stations V and W, the former comprising a loading platform 350 and the latter an unloading platform 351. The loading platform 350 and unloading platform 351 are similar in construction to platforms previously described, and hence will not be set forth in detail.

The car T comprises uprights 352 connected by crossbars 353, 354. Pivotally supported on a shaft 355 carried by the crossbars 353 is a platform 356 which comprises side rails 357 and freely rotatable rollers 358 on which the loads rest. The platform 356 normally tilts downward as shown in full lines in Fig. 22 and is provided with guard plates or stops 359 against which the articles loaded onto the car rest. When the car reaches station W, angle plates 360 carried by the elevator frame contact with the ends of the side rails 357 and tilt the platform on the shaft into alignment

with the platform 351 as shown in dotted lines in Fig. 22.

The car is reciprocated by a motor 361 which drives a sheave 362 on the shaft 363. A cable 364, connected at one end to the car T and at the other end to a counterweight 365 is guided over the sheave 362 by sheaves 366 and 367.

Circuit control devices, to determine the movement of the car, consist of circuit makers and circuit breakers, the locations of which will be described. In the elevator well U opposite the platforms 350 and 351 are mounted circuit breakers 370 and 371 which are tripped by the car upon its arrival at the stations and open the operating circuit. On the elevator frame over the platform 350 is mounted a circuit maker 372 which is tripped by an article on the platform closing a circuit, and in case the car is then at station W, causing it to be lowered. A circuit maker 373 is mounted at the bottom of the well, its arm 374 extending upwardly when the car is down, passing between two of the rollers 358 into the path of travel of an article onto the car. The tripping of the arm 374 by the article closes a circuit and causes the motor 361 to raise the car and its load. Mounted above the unloading platform 351 is a circuit breaker 375 which is tripped by the article being unloaded, opening the motor circuit and preventing the descent of the car until the article has passed completely off the car platform onto the unloading platform.

It will be noted that in each of the various embodiments of the invention hereinabove set forth, the presence of an article on a loading platform insures the stopping of the car at the loading platform, that the car is prevented from leaving an unloading platform until the article being unloaded has completely left the car; that the loading and unloading platforms are inclined; that the car includes a pivoted article carrying platform which is automatically swung into alignment with the proper station platform; and that after the main switch has been thrown the cars travel automatically between the loading and unloading platforms under the control of the articles to be loaded and unloaded so that it is merely necessary for the operators to supply the articles to the loading platforms and to remove them from the unloading platforms.

While certain embodiments have been shown and described, they were selected for purposes of illustration only and not of limitation, and it will be understood that we are not limited thereto and that changes and substitutions may be made therein and other embodiments made without departing from the spirit and scope of the invention as set forth in the following claims.

We claim:

1. The combination with an article carrying conveyer adapted to travel in a predetermined path and including an article carrying car, of means for actuating said conveyer, a station associated with said conveyer and including an unloading platform to which articles carried by the car may be delivered and a loading platform from which articles may be delivered onto the conveyer car and mechanism controlled conjointly by the article on the car to be delivered to the unloading platform and by the article on the loading platform to be delivered to the car for stopping the operation of the conveyer actuating means when the car reaches said station.

2. The combination with an article carrying conveyer adapted to travel in a predetermined path and including an article carrying car, of

means for actuating said conveyer, a station associated with said conveyer and including an unloading platform to which articles carried by the car may be delivered and a loading platform from which articles may be delivered onto the conveyer car and mechanism controlled conjointly by the article on the car to be delivered to the unloading platform and by the article on the loading platform to be delivered to the car for stopping the operation of the conveyer actuating means when the car reaches said station and holding the conveyer stationary until the article on the car has passed completely off the car onto the unloading platform and the article on the loading platform has passed completely off the platform onto the car.

3. The combination with an article carrying conveyer adapted to travel in a predetermined path and including an article carrying car, of means for actuating said conveyer, a station associated with said conveyer and including a loading platform from which articles may be delivered onto the conveyer car and mechanism at said station controlled by the article upon the loading platform for stopping the operation of the conveyer actuating means when the car reaches said station.

4. The combination with an article carrying conveyer adapted to travel in a predetermined path and including an article carrying car, of means for actuating said conveyer, a station associated with said conveyer and including a loading platform from which articles may be delivered onto the conveyer car and mechanism at said station controlled by the article upon the loading platform for stopping the operation of the conveyer actuating means when the car reaches said station and holding the conveyer stationary until the article upon the platform has passed completely off the platform onto said car.

5. The combination with an article carrying conveyer adapted to travel in a predetermined path and including an article carrying car, of means for actuating said conveyer, a station associated with said conveyer and including a loading platform from which articles may be delivered onto the conveyer car and mechanism at said station controlled by the article upon the loading platform for stopping the operation of the conveyer actuating means when the car reaches said station and starting the operation of the conveyer actuating means when the article has passed completely onto the car.

6. In a conveyer system the combination with a conveyer car, a loading platform from which an article is delivered to the car, and means for feeding articles seriatim to said platform, of stop and release mechanism associated with said platform and including a rock shaft carried by the platform, two stop fingers mounted on the shaft and angularly disposed relative to each other, the first stop finger being located between the platform and the car and normally raised into the path of travel of the article thereon and the second stop finger being located between the platform and the feeding means and normally depressed out of the path of travel of the succeeding articles, and an arm fixed upon said shaft in a position to be actuated by the car upon its approach to the platform and rock said shaft whereby the first finger is depressed to release the article on the platform for travel onto the car and the second finger is raised to stop the advance onto the platform of the succeeding article.

7. The combination with a platform of stop and

release mechanism associated therewith and comprising a rock shaft and a pair of stop fingers carried radially thereby and angularly disposed to each other whereby when one stop finger projects above the plane of the platform the other stop finger is below such plane.

8. The combination with a platform over which articles are fed of stop and release mechanism associated therewith and comprising a rock shaft and a pair of spaced stop fingers carried radially by the shaft and adapted to project into the path of travel of the articles, one finger in front of and one behind an article, said fingers being angularly disposed to each other whereby when the finger in front of the article is depressed and the article is free to advance the finger behind the article is raised to prevent the advance of the succeeding article.

9. The combination with a platform adapted to receive an article thereon of stop and release mechanism associated therewith and comprising a rock shaft supported by said platform and a pair of spaced stop fingers carried radially by the shaft and adapted to project above the article supporting plane of the platform, one finger in front of and the other behind said fingers being angularly disposed to each other whereby when either finger projects above the plane of the platform the other finger is below such plane.

10. In a conveyer car, a shaft fixed in the car, two platforms supported upon the shaft, and a stop associated with each platform and against which the article thereon normally rests, one of said stops being movable relative thereto.

11. In a conveyer car, a shaft fixed in the car, two platforms supported upon the shaft, and a stop associated with each platform and against which the article thereon normally rests, one of said stops being pivotally supported upon said shaft and movable relative to its platform.

12. In a conveyer car, vertically spaced parallel shafts carried thereby, platforms pivotally mounted off center upon said shafts, stops at one end of each platform against which the loads carried by the platforms normally rest, and adjustable studs on which the ends of the platforms rest and by which the limits of the pivotal movement thereof is defined.

13. In a conveyer system, the combination with a conveyer car adapted to reciprocate in a well, a loading platform and an unloading platform at opposite ends of such well, and means actuated by a load on the loading platform for causing the car to approach and stop at such platform.

14. In a conveyer system, the combination with a conveyer car adapted to reciprocate in a well, a loading platform and an unloading platform at opposite ends of such well, means actuated by a load on the loading platform for causing the car to approach and stop at such station, and means actuated by a load on the car for preventing such movement of the car.

15. In a conveyer system, a conveyer car adapted to reciprocate in a well to and from a station, said car including a shaft, a platform pivotally mounted thereon and a stop at one end of the platform, said platform being normally inclined with the stop associated end depressed, and means engaging said platform upon the arrival of the car at the station for tilting the platform on the shaft and raising the stop associated end thereof.

16. In a conveyer system, a conveyer car adapted to reciprocate in a well to and from a station, said car including a shaft, a platform

pivotally mounted thereon and a stop at one end of the platform and pivotally supported upon said shaft, said platform being normally inclined with the stop associated end depressed, and means engaging said stop upon the arrival of the car at the station for lowering the stop.

17. In a conveyer system, a conveyer car adapted to reciprocate in a well to and from a station, said car including a shaft, a platform pivotally mounted thereon, and a stop at one end of the platform and pivotally supported upon said shaft, a weight for holding the stop associated with the platform, said platform being normally inclined with the stop associated end depressed, and means engaging said weight, upon the arrival of the car at the station for lowering the stop.

18. In a conveyer system, a conveyer car adapted to reciprocate in a well between two stations each of which stations comprises a loading platform inclined toward the well and an unloading platform inclined away from the well, said car comprising two load carrying platforms and shafts upon which said platforms are pivotally mounted, said platforms being normally inclined to form extensions of the platforms of one station, and means for engaging said car platforms upon the arrival of the car at the other station and ensuring that such platforms form extensions of the platforms of that station.

19. In a conveyer system, a conveyer car adapted to reciprocate in a well between two stations, each of which stations comprises a loading platform inclined toward the well and an un-

loading platform inclined away from the well, said car comprising two load carrying platforms and shafts upon which said platforms are pivotally mounted, said platforms being normally inclined to form extensions of the platforms of the lower station and means for engaging said car platforms upon the arrival of the car at the upper station and ensuring that such platforms form extensions of the platforms of that station.

20. In a conveyer system, a conveyer car adapted to reciprocate in a well between two stations, each of which stations comprises a loading platform inclined toward the well and an unloading platform inclined away from the well, said car comprising two load carrying platforms and shafts upon which said platforms are pivotally mounted, said platforms being inclinable to form extensions of the station platforms and means at each station for positively engaging the car platforms and bringing them into the proper inclination with respect to the station platforms upon the arrival of the car thereat.

21. In a conveyer system, the combination with a conveyer car adapted to reciprocate in a well, a loading platform and an unloading platform at opposite ends of such well, means actuated by a load on the loading platform for causing the car to approach and stop at such station, and means actuated by a load being delivered from the car at the unloading platform for preventing such movement of the car.

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