Aug. 9, 1932. C. H. HARDMAN 1,870,506

LEER LOADER

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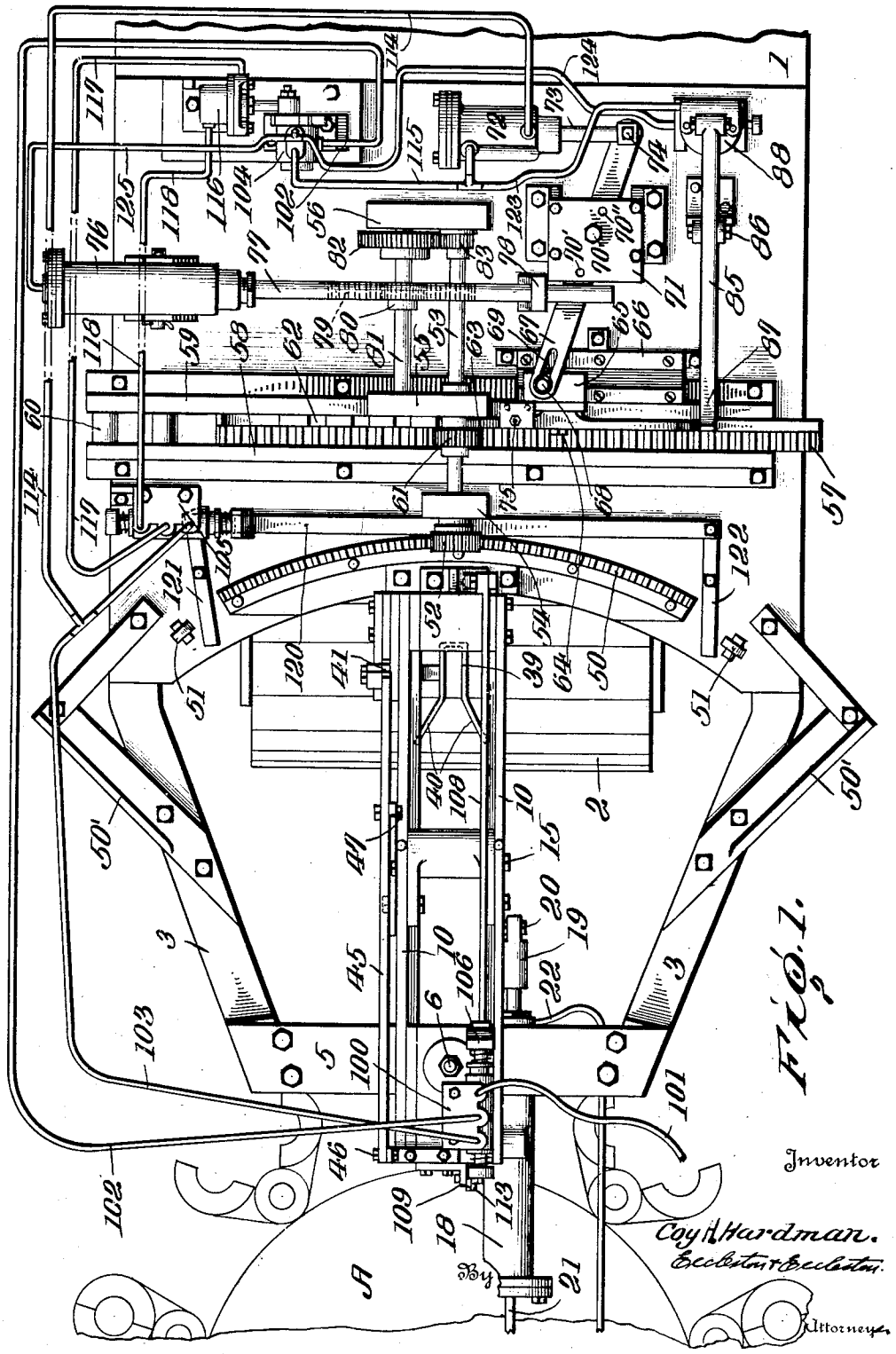


Fig. 1.

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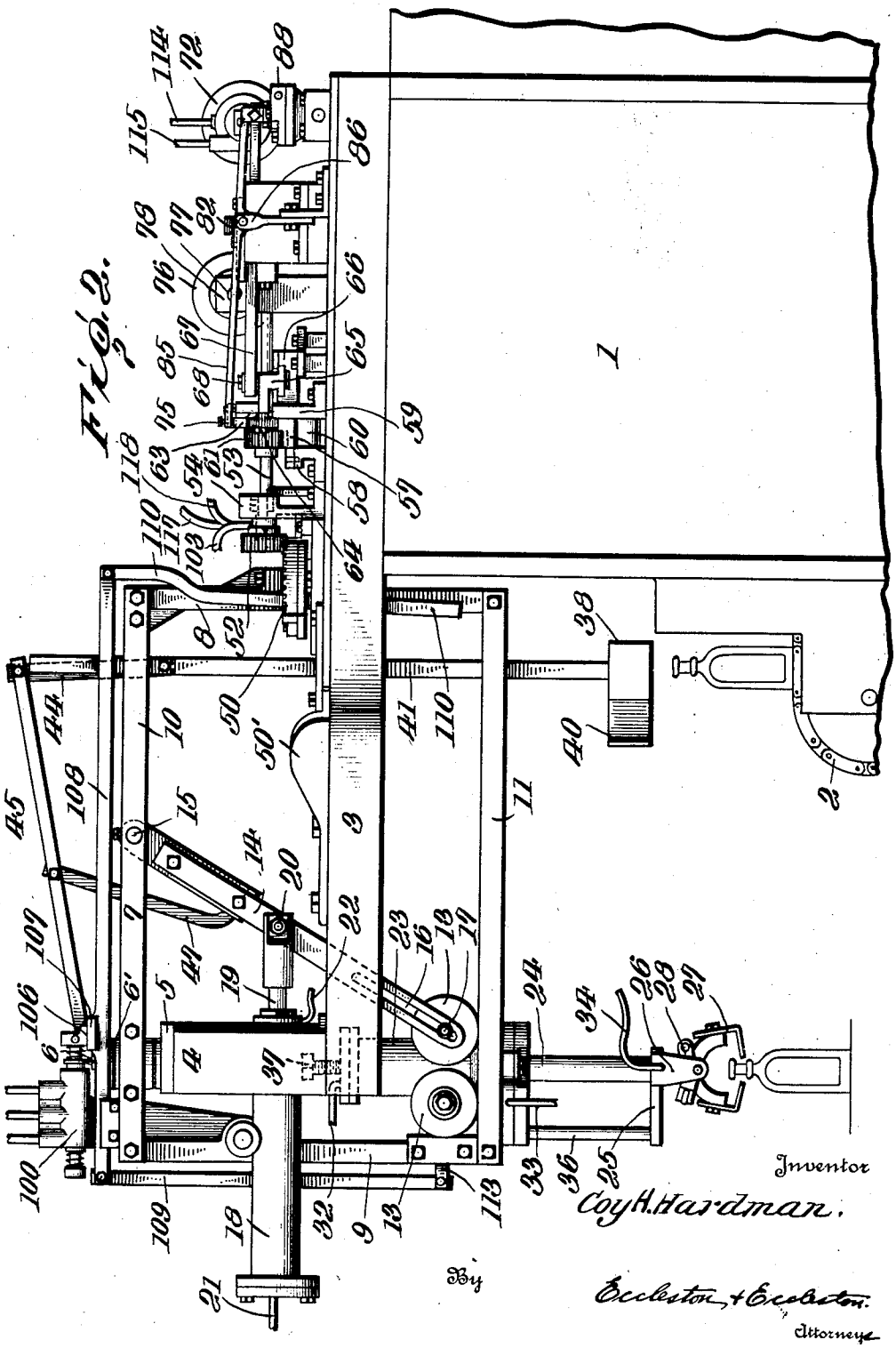
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Fig. 2.



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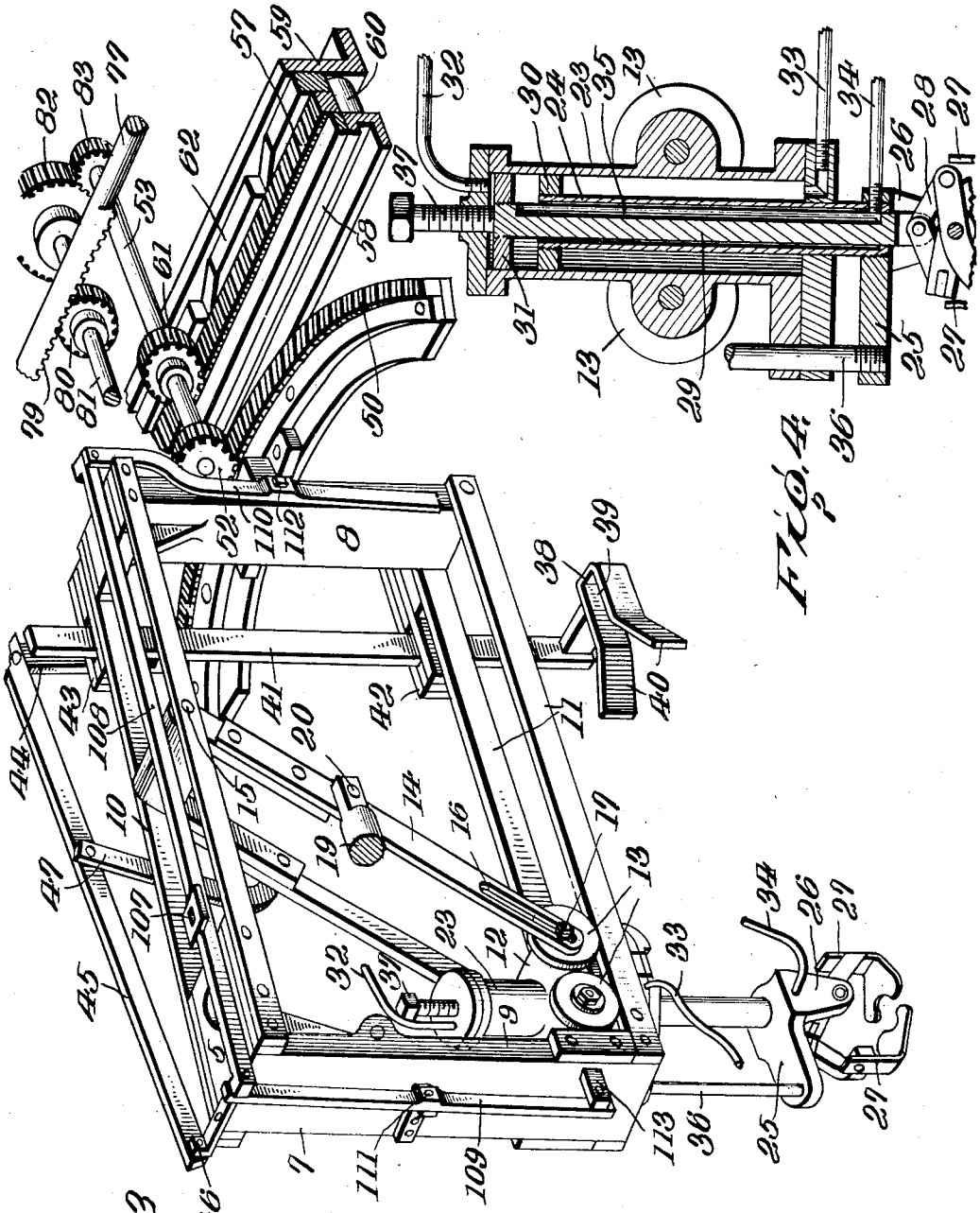


FIG. 4



FIG. 3

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# UNITED STATES PATENT OFFICE

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## LEER LOADER

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This invention relates to the handling of glassware and has for its primary object to provide a unitary mechanism by which the ware is lifted from the forming machine after being shaped, and transported directly into the leer.

A further object of the invention resides in the provision of such a device which is entirely automatic in its operation and which serves to stack the formed articles on the leer conveyor in a plurality of substantially transverse rows, the individual articles in each row as well as the series of rows being spaced apart so as to prevent adhesion of adjacent articles.

Another object of the invention consists in combining with the mechanism referred to, a steadying device for the individual articles as they are set upon the leer conveyor, thereby eliminating any possibility of the articles falling over and damaging other articles as well as disrupting the proper functioning of the machine by interfering with the deposit of additional ware on the conveyor.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings; in which

Figure 1 is a plan view of the apparatus.

Figure 2 is a side elevational view.

Figure 3 is a perspective view of the device detached from the leer and certain of the parts removed for the sake of clearness; and

Figure 4 is a vertical sectional view of the gripper operating cylinder.

The leer which is indicated by the numeral 1 is provided with any preferred type of conveyor 2 adapted to receive the formed pieces of glassware in substantially transverse rows and transport them slowly to the rear end of the leer where they are discharged in an annealed condition ready for packing. Projecting forwardly from the main frame of the leer at the top thereof are two beams 3 which are inclined toward each other and provided with uprights 4 on which a cross beam 5 is secured to serve as a pivot and support for the mechanism of the ware-manipulating apparatus.

Pivotally mounted on the cross beam 5 by means of a pivot pin 6 and ball bearing races 6′ is a substantially rectangular frame 7 comprising the front and rear standards 8 and 9 and the upper and lower bars 10 and 11. The lower bars 11 serve as a track for a carriage 12, provided with wheels 13. This carriage, which operates to transport articles directly from the forming machine A to the leer 1, is reciprocated back and forth along the track 11 by means of a lever 14 pivoted at 15 to the upper bars 10 of the frame 7 of the device. The lever 14 is slotted at its lower end as indicated at 16, this slot engaging over a pin 17 on the carriage thus providing a loose connection between these parts. An oscillatory movement is imparted to the lever 14 by means of a cylinder 18 carried by the pivoted frame. The piston rod 19 of this cylinder is pivotally connected at 20 to the lever 14, and the pipe lines 21 and 22 lead compressed air to the opposite ends of the cylinder to provide the necessary motive power for reciprocating the piston rod.

Mounted on the carriage 12 is a vertically disposed cylinder 23 shown in detail in Figure 4. This cylinder is provided with a hollow piston rod 24 carrying a plate 25 and ears 26 on its lower end. Grippers 27 of any preferred construction are pivotally mounted on the ears 26 and are adapted to be operated to engage about the neck of a bottle or the like when moved to gripping position. Links 28 are provided for opening and closing the grippers 27 and these links are operated by a piston rod 29 which is slidably mounted within the hollow piston rod 24. The piston rods 24 and 29 are operated by pistons 30 and 31 respectively which are in turn operated by compressed air admitted to the interior of the cylinder. Flexible pipes 32 and 33 serve to convey motive fluid to the opposite ends of the cylinder 23, while flexible pipe 34 conveys motive fluid to a longitudinal groove 35 formed on the piston rod 29 and by means of which the motive fluid is conveyed to a point above the piston 30 so as to cause a relative movement between the two pistons.

A rod 36 carried by the plate 25 on the

lower end of hollow piston rod 24 extends upwardly through an aperture in the carriage 12 and serves to prevent any rotative movement of the piston rod and the gripper mechanism carried thereby. Variation in the upper limit of travel of the grippers is provided by means of a screw 37 mounted in the upper cylinder head of cylinder 23 and having its lower end positioned in the path of travel of the pistons. By this means the mechanism is readily adapted to handle ware of different lengths requiring to be lifted different heights in order to bring its bottom into or above the plane of the conveyor 2.

In the operation of the cylinder 23, assuming the parts being in the position shown in Figure 4, motive fluid is admitted through pipe 32 to the upper side of piston 31 and released from the underside thereof through pipe 34, so as to lower piston 31 into contact with piston 30. This relative movement between the pistons causes the rod 29 to descend and open the grippers to release a piece of ware which has been transported to the conveyor 2. As the carriage 12 returns toward the forming machine the valve on the forming machine is operated to release the fluid pressure in the lower end of cylinder 23 thereby permitting both pistons to descend and thus carry the grippers (in open position) downwardly to a point where they may be operated to engage a piece of ware at the take-out position. Fluid pressure is then admitted through pipe 33 and longitudinal groove 35 to the under side of piston 31, thereby raising this piston and its rod 29 so as to cause the links 28 to move the grippers 27 to gripping position about the neck of a piece of ware. Both pistons are then raised to the position shown in Figure 4, elevating the ware to a plane determined by the adjustment of screw 37, i. e., to the level of the leer conveyor 2.

When ware having a narrow base is being handled it is extremely desirable that some means be provided to prevent teetering of the ware as it is set upon the conveyor, and for this purpose I provide a steadying cup or guard 38 which is adapted to be lowered into close proximity to the leer conveyor at the point where the particular piece of ware is about to be released. This cup may take many forms but is here shown as formed of a piece of sheet metal bent to form a three-sided inclosure 39 and provided with guide arms 40 for directing the ware to the interior of the inclosure and for turning the ware, if necessary, so that its major transverse axis will extend longitudinally of the conveyor. This cup is carried at the lower end of a vertically disposed rod 41 which extends through guides 42 and 43 carried by the frame 7. Reciprocating movement is imparted to the rod 41 by means of a link 44 which has its ends pivotally connected to the rod and to a lever 45. The lever 45 is pivoted at 46 to the rear end of frame 7 and is oscillated about this pivot by a link 47 which has its respective ends pivoted to the levers 14 and 45. It will be apparent that as the lever 14 oscillates back and forth in reciprocating the carriage 12 the cup 38 will be raised and lowered, thus placing the cup into close proximity to the conveyor 2 when an article is to be deposited thereon and raising it after the article is released.

From the mechanism thus far described it will be observed that means are provided for gripping an article in a mold at take-out position, lifting the article to a point in the plane of the leer conveyor, transporting the article to the leer, lowering a steadying cup to a point adjacent the conveyor, releasing the article, and returning the grippers for another article and raising the cup. And I shall now describe the mechanism by which a translatory step-by-step movement is imparted to the apparatus so as to deposit a row of articles across the leer, and is then returned in a single movement so as to start a new row of ware across the conveyor. The mechanical structure will first be described and then the compressed air system which affords the motive power and controlling means for the mechanical elements.

Fixed to the forward end of the frame 7 is an arcuate rack 50, which is movably supported on a plurality of rollers 51 mounted in bearings on the top of the front end of the leer 1. This construction in addition to forming an auxiliary support for the frame 7 also provides a means by which the frame may be oscillated about its pivot 6. Stops 50′ are provided on each side of the frame 3 to limit the swinging movement of the rack 50 and the frame on which it is mounted. Cooperating with rack 50 is a pinion 52 fixed to a shaft 53 mounted in bearings 54, 55 and 56 on the top of the leer. This shaft is rotated step-by-step in one direction by means of a rack 57 which is slidably mounted between guide members 58 and 59 and supported on anti-friction rollers 60. A pinion 61 on the shaft 53 meshes with the rack and serves to convert the sliding movement of the rack 57 into a rotative movement of the shaft. Movement of the rack 57 in one direction is imparted by a pawl and ratchet mechanism, the ratchet bar being indicated by the numeral 62 and the pawl by numeral 63. The ratchet bar 62 may be fixed to or form an integral part of the rack 57, and the pawl 63 is pivotally mounted at 64 on a slidable bracket 65. A guideway 66 serves as a track for the movements of the bracket and pawl transversely of the leer, and these movements are imparted by a lever 67. This lever is connected to the bracket 65 by a pin and

slot connection 68 and 69, while the lever itself is pivoted at 70 in a plate 71. The lever 67 is operated by a cylinder 72, the piston rod 73 of which is pivotally connected to the lever as indicated by the numeral 74. The piping for cylinder 72 and its synchronization with other parts of the mechanism will be later described.

For the purpose of varying the extent of the step-by-step movement of the transfer mechanism across the leer so as to adapt the device to ware of various transverse dimensions, it is only necessary to substitute different ratchet bars 62. Furthermore, similar adjustments may be made by changing the pivot point 70 of lever 67. To this end the plate 71 is provided with openings 70′ and 70″ which permit a ready shifting of the fulcrum of the lever and consequently an increase or decrease in the extent of movement of the pawl 63. By this means it will be apparent that the pawl will be drawn backwardly across one, two or three teeth, as the case may be, depending upon the position of the pivot pin 70. To insure engagement of the pawl with the ratchet, and especially to insure its return into engagement after being withdrawn in a manner hereinafter described, an adjustable bolt 75 cooperates with a spring (not shown) which bears against the upper side of the pawl.

After the frame 7 has been moved in the step-by-step movement to the far side of the leer and completed the placing of a row of ware on the conveyor it is necessary that it be quickly returned to the starting position to begin a new row. The immediate means for returning the frame is, of course, a reverse movement of the pinion 52. It is also necessary that the ratchet bar 57 be returned to its original position and this is accomplished by a reverse movement of the pinion 61, both being mounted on the shaft 53. This reversal of movement of the pinions 52 and 61 and their shaft 53 is provided for in the following manner. As the frame 7 reaches the end of its movement across the leer it operates a valve in a manner to be described, and admits compressed air to the rear end of a cylinder 76. The piston rod 77 of this cylinder is supported at its free end in a bearing 78 and is provided on its under side with a rack 79 which cooperates with a pinion 80. This pinion is fixed to a shaft 81 supported in bearing members 55 and 56; and the shaft also carries a gear wheel 82 meshing with a smaller gear wheel 83 on shaft 53. Consequently, as the piston rod 77 is forced outwardly from cylinder 76 it actuates the shaft 81, and by reason of the ratios of the gears 82 and 83 rotates the shaft 53 the requisite number of times to restore the frame 7 and rack bar 57 to their initial position.

It will be recalled that the ratchet bar 62 is fixed to the rack 57 and obviously it is necessary that the pawl 63 be raised out of cooperative relation with the ratchet before the above-described return movement of the frame 7 can be initiated. For this purpose, a lever 85 is pivoted to a bracket 86 on the top of the leer and has its free end 87 disposed above the rear terminal of the path of movement of the pawl 63. This lever is moved about its pivot on bracket 86 at the proper time by means of its connection with the piston rod of a cylinder 88; the latter being connected with the pressure system, to be described, so that it will operate to lower the end 87 of the lever when the frame 7 has completed its step-by-step movement. The lowering of the end 87 of the lever 85 disengages the pawl 63 from the ratchet bar 62 and thus releases the shaft 53 and allows it to be operated in the reverse direction, as described above.

The pressure system by which the several elements of the mechanism are operated in proper timed relation will now be described.

The air pressure entering cylinder 18 through pipes 21 and 22 is controlled by ordinary timing valves on the forming machine, whereby the reciprocation of carriage 12 is synchronized with the movements of the forming machine. Likewise, the opening and closing of the grippers, and the raising and lowering of the same, are controlled by timing valves associated with the forming machine, which valves control the admission and exhaust of compressed air through conduits 32, 33 and 34.

In order to control the oscillations of the frame 7 across the front of the leer, the following valves and pipe lines are employed:

Mounted on the top of frame 7 is a conventional type of slide valve 100 to which the main air line 101 is connected. Extending from this valve are two pipe lines 102 and 103, the former extending to a valve 104 on the top of the leer and the latter extending to a valve 105 also mounted on the top of the leer. Valve 100 is provided with a projection 106 on its stem; the projection being disposed in an opening 107 formed on a reciprocable rod 108. This rod has its ends pivoted to levers 109 and 110 which are in turn pivoted to the frame 7 as indicated by numerals 111 and 112, respectively. The free end of lever 110 projects into the path of carriage 12 while the lower end of lever 109 is provided with a horizontal arm 113 projecting through standard 9 into the path of the carriage. Obviously, therefore, the valve 100 will be shifted each time the carriage reaches either of its extreme positions, and compressed air will be allowed to alternately enter and exhaust through the pipes 102 and 103.

Pipe 103 is provided with a branch 114 which extends to a port in one end of cylinder 72, while the port in the opposite end of this

cylinder connects with pipe 102 by means of pipe 115 and valve 104. This valve 104 is operated by means of a cylinder 116 which is provided with pipes 117 and 118 leading to ports in the valve 105. This latter valve is mechanically operated by a slidable rod 120 which has its ends pivotally connected to the levers 121 and 122. These levers have their free ends disposed in the path of lugs (not shown) carried on the underside of rack 50. Obviously, the operations of the valve 105 will be reversed as the rack 50 reaches its extreme positions so that the levers 121 and 122 are rocked about their pivots to shift the bar 120.

The cylinder 88 for operating the pawl release lever 85 is provided with upper and lower pipes 123 and 124, the former having connection with pipe 115 and the latter being associated with valve 104. Also associated with the valve 104 is a pipe 125 leading to the rear end of cylinder 76 which serves to return the parts to their original positions after a complete row of bottles has been placed on the leer conveyor 2.

The operation of the mechanical elements of the apparatus have been described in connection with the detailed description of these elements, and I will now describe the operation of the compressed air system, it being assumed that the carriage is in the position shown in Figure 2 and the grippers about to grasp a bottle.

The timing valves of the forming machine admit air under pressure through the flexible pipe 34 so as to partly raise piston 31 with respect to piston 30; thus causing the grippers to engage the bottle or other article. Air is then admitted to pipe 33 which raises both pistons to the position shown in Figure 4, thus elevating the piece of ware to the plane of the leer conveyor. Air under pressure is then admitted to pipe 21 and released through pipe 22 thus actuating the carriage 12 so as to carry the piece of ware to the conveyor. As already mentioned, this movement of the carriage moves the steadying cup 38 downward to a point adjacent the conveyor ready to receive the piece of ware carried by the grippers. Pressure is now admitted to pipe 32 and exhausted through pipe 34 thereby causing the piston 31 to descend into contact with piston 30 and release the ware. One of the timing valves on the forming machine is now reversed so as to admit live air to pipe 22 to bring the carriage 12 back to its receiving position and thereafter air is admitted to pipe 32 and pipe 33 opened to exhaust, to lower the grippers into position to engage another piece of ware.

It will be noted that when the carriage 12 reached its position over the conveyor 2 it engaged lever 110 so as to shift valve 100 and admit pressure through pipes 103 and 114 to cylinder 72. The admission of air to this end of cylinder 72 and the exhausting of the opposite end of the cylinder through pipe 115 caused the piston rod 73 to be drawn inwardly, thereby rocking the lever 67 about its pivot and retracting the pawl 63 preparatory to the beginning of another shifting of the frame 7. Also when the carriage 12 reached its position remote from the conveyor 2 it engaged arm 113 on lever 109 and shifted the valve 100 so that compressed air passed from pipe 101 through pipe 102 and valve 104 to the opposite end of cylinder 72. This passage of the compressed air to cylinder 72 extended the piston rod 73 and caused the pawl 63 operating through rack 57 and pinions 61 and 52 to shift the frame 7 another step about its pivot 6, thereby positioning the apparatus for placing the next piece of ware on the conveyor 2.

In these operations of the pressure system air is admitted to the upper end of cylinder 88 through pipe 123, to hold the end 87 of lever 85 away from pawl 63. When, however, the frame 7 reaches the limit of its step-by-step movement it shifts the valve 105 by reason of its engagement with lever 121 and causes the compressed air from pipe 103 to pass through pipe 118 to the end of cylinder 116 so as to shift the valve 104 and cause the compressed air to travel through pipe 124 to the lower end of cylinder 88. This admission of air to cylinder 88 will, of course, depress end 87 of lever 85 and disengage the pawl 63 from the ratchet bar 62. The frame 7 is now free to be returned to its initial position, and this movement is accomplished by cylinder 76 and rod 77. The shifting of valve 104, above mentioned, permits compressed air to enter cylinder 76 and project the piston rod 77 outwardly. This movement of rod 77 and rack bar 79 is transmitted through gears 82 and 83 to pinions 61 and 52 which return both the frame 7 and rack bar 57 to their starting positions. A reverse movement of piston rod 77 is, of course, produced by the step-by-step movement of frame 7 after the valves 105 and 104 are again shifted. This latter shifting of the valves is accomplished by reason of the lug on rack bar 50 engaging lever 122 when the frame 7 is returned to its initial position. As these valves are now in their original positions compressed air is admitted to the upper end of cylinder 88 to move the lever 85 to inoperative position with respect to pawl 63, and the mechanism is set for another series of step-by-step movements to place another row of ware on the leer conveyor.

From the foregoing description considered in connection with the accompanying drawings it will be observed that I have devised an entirely automatic mechanism for gripping bottles or the like at the take-out position of a forming machine, for lifting the

ware to the plane of the leer conveyor, for carrying the ware to the leer conveyor, and for depositing the same on the conveyor in transverse rows. It will also be noted that automatically operated means are provided for preventing teetering of the ware; and for returning the parts to initial position; and that the mechanism is readily adjustable to adapt it to ware of different lengths or different widths.

In accordance with the patent statutes I have described what I now believe to be the preferred embodiment of the invention, but obviously the invention may be changed and modified in many respects, both as to construction and operation, and it is intended that the appended claims shall cover all such changes and modifications.

What I claim is:

1. A leer loader including a pivotally mounted frame, a carriage adapted to travel back and forth on said frame, a cylinder mounted on said carriage, grippers adapted to be opened and closed and raised and lowered by said cylinder, a lever operatively connected with said carriage, a cylinder for operating the lever, a vertically reciprocable rod, a ware steadying device carried by the rod, an operative connection between said lever and said rod, and means for swinging said frame back and forth across the leer.

2. A leer loader including a pivotally mounted frame, a carriage adapted to travel back and forth on said frame, grippers mounted on said carriage, means for opening and closing the grippers, a ware-steadying device constructed to partly embrace each individual article transferred, means for swinging said frame step-by-step across the leer, and means for lowering and raising the steadying device each time the frame is swung one step.

3. A leer loader including a pivotally mounted frame, a carriage adapted to travel back and forth on said frame, grippers mounted on said carriage, means for opening and closing the grippers, a ware-steadying device constructed to partly embrace each individual article transferred, means for moving the frame step-by-step across the leer, and a cylinder for lowering and raising the steadying device each time the frame is moved one step.

4. A leer loader including a pair of grippers for transferring glass articles, a cylinder for opening and closing the grippers, a vertically reciprocable ware-steadying device, and a cylinder for lowering the ware-steadying device into cooperative relation with the article transferred.

5. A leer loader including a pair of grippers for transferring glass articles, a cylinder for opening and closing the grippers, a vertically reciprocable ware-steadying device, and a cylinder operatively connected with the grippers and with the ware-steadying device for moving the grippers back and forth and lowering and raising the ware-steadying device.

6. A leer loader including a pair of grippers for transferring glass articles, a ware-steadying device adapted to be moved into cooperative relation with the ware transferred, a lever for moving the grippers back and forth, a connection between the lever and the ware-steadying device for lowering and raising the latter, and a cylinder for operating the lever.

7. A leer loader including a pivotally mounted frame, grippers adapted to travel back and forth on the frame, means for opening and closing the grippers, an arcuate rack carried by the frame, a slidable rack, a shaft, two pinions fixed to the shaft, one of said pinions meshing with the arcuate rack and the other of said pinions meshing with the slidable rack, and means for moving the slidable rack step-by-step in one direction.

8. A leer loader including a pivotally mounted frame, grippers adapted to travel back and forth on the frame, an arcuate rack carried by the frame, a slidable rack, a shaft, two pinions fixed to the shaft, one of said pinions meshing with the arcuate rack, and the other of said pinions meshing with the slidable rack, means for moving the slidable rack step-by-step in one direction, and means for moving the slidable rack in a single movement in the opposite direction.

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