

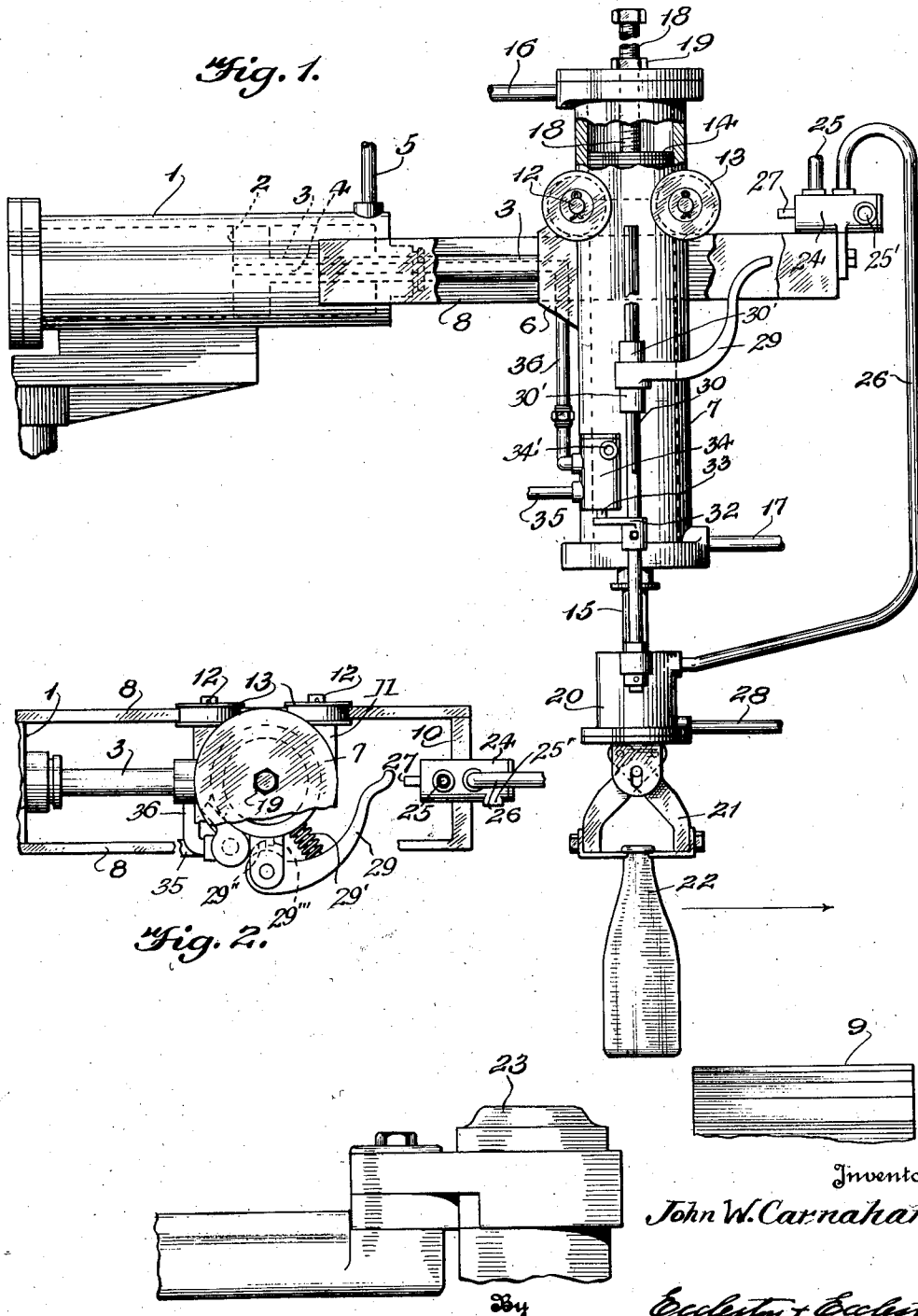
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TRANSFER DEVICE

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## UNITED STATES PATENT OFFICE

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## TRANSFER DEVICE

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The invention relates generally to a device for transferring glassware from a forming machine to a leer cross-conveyor or directly to the pans of the leer conveyor. In particular, the invention relates to thus transferring ware from forming machines of the type in which the tops or necks of ware of different length have a fixed position; the lower end of the ware having a variable position depending on the length of the ware.

Obviously, the leer conveyers or cross-conveyers are not vertically adjustable; and for ware of different lengths, fabricated in machines in which variations in length of ware is taken care of by retaining the same position of the neck ring and increasing the length of the mold downwardly and lowering the position of the mold bottom, it is highly desirable to have a transfer device which will not only carry the ware laterally to the conveyor, but which will also move it vertically, if necessary, to the proper extent so that the lower ends of the ware will be just slightly above the plane of the conveyor, irrespective of the length of the ware and the vertical position of the lower ends of the ware at the delivery station of the forming machine.

The present invention, therefore, relates to a mechanism for transferring ware of different lengths from a forming machine to a leer conveyor or leer cross-conveyor. A device for accomplishing substantially the same purpose is disclosed in the application of Bowman and Stenhouse, Serial No. 280,861, filed May 26, 1928; but the mechanism of the present application differs widely from the invention disclosed in the said Bowman and Stenhouse application.

For a complete understanding of the present invention reference is to be had to the accompanying drawings, in which

Figure 1 is a side elevational view of the device, with parts broken away to more clearly show the construction; and a portion of a forming machine and a portion of a leer cross-conveyor being shown diagrammatically; and

Figure 2 is a fragmentary plan view of the device, mainly illustrating the carriage and

rails by which one of the cylinders is moved back and forth.

Referring to the drawings more in detail, numeral 1 indicates a cylinder which is mounted on the frame of a forming machine or on a structure in close proximity thereto. Numerals 2 and 3 refer to the piston and piston rod respectively, of the cylinder 1; and it will be noted that the piston and piston rod are provided with a passage 4, by which compressed air or other fluid pressure is admitted to the rear end of the cylinder 1, in a manner to be hereinafter described. Fluid pressure is conveyed to the forward end of the cylinder 1 by means of pipe 5; said pipe being controlled by a timing valve, not shown.

The hollow piston rod 3 is attached to a boss 6 on a cylinder 7; the function of this cylinder being to move the ware vertically to the desired degree, depending on the length of the article, as will be described hereinafter. The cylinder 7 is moved back and forth between pick-up and delivery position by means of cylinder 1 and its piston rod 3. For the purpose of supporting the cylinder 7 and its associated parts, and to permit the back and forth travel thereof, I provide two parallel rails 8, which are attached to the cylinder 1, or suitably mounted otherwise; and which project outwardly to a sufficient extent to permit the cylinder 7 to travel to a position over the leer conveyor or cross-conveyor, which is shown only diagrammatically herein, and which is indicated by numeral 9. The outer ends of the rails are united by a cross-member 10, which member also preferably acts as a support for a valve, to be later described. The cylinder 7 is provided with suitable bosses 11, to receive axles 12, on which are mounted the rollers or wheels 13. This construction constitutes a carriage which travels back and forth on the rails 8 and carries the cylinder 7 and associated parts.

The cylinder 7 has a piston 14 and a piston rod 15; and fluid pressure is conveyed to the upper and lower ends of the cylinder by means of flexible pipes or hose 16 and 17 respectively, the alternate admission and exhaust of fluid pressure being controlled by ordinary timing valves, not shown.

A rod 18 is threaded through the upper cylinder head of cylinder 7, and is vertically adjustable, being maintained in adjusted position by means of lock-nut 19. This rod 18 adjustably controls the upper limit of the piston 14.

Attached to the lower end of the piston rod 15 is a cylinder 20, provided with a piston and piston rod (not shown) for operating the grippers 21. The cylinder 20, the grippers 21, and the operating connections between the cylinder and grippers, are well known in the art, and any detailed description or illustration thereof, seems to be unnecessary. A bottle 22 is shown in the act of being transferred from a mold 23 of a forming machine, to the leer conveyer or cross-conveyer 9.

Numeral 24 indicates a valve casing, which is preferably mounted on the cross-member 10, in the path of movement of the cylinder 7. Associated with the valve casing is a pipe 25 leading from a source of compressed air or other fluid pressure; an outlet 25' adapted to communicate with the atmosphere; and a flexible pipe or hose 26 leading to the upper end of the cylinder 20. A valve stem 27 projects through the casing toward the cylinder 7, and is so positioned that it will be struck by the cylinder as it reaches the end of its outward travel. The cylinder 7 will thus force the valve stem 27 inwardly in its casing and thereby move its valve to open communication to the upper end of cylinder 20, so that compressed air will pass from pipe 25 through pipe 26 to the upper end of the cylinder, and thereby move its piston and rod downwardly to open the grippers and release the transferred article. At the proper time, as will be described hereinafter, air is admitted through pipe 28, to the lower end of cylinder 20, to lift its piston and rod to close the grippers for the purpose of gripping the next article to be transferred; the admission of fluid pressure to pipe 28 being controlled by an ordinary timing valve, not shown.

Also at the time the cylinder 7 reaches the outer limit of its travel, and substantially simultaneously with the operation of the valve stem 27, the finger 29, which is keyed on a rod 30, between lugs 30', comes into contact with the cross-member 10, whereby the finger 29 and rod 30 are rotated, against the pressure of spring 29'. A lug 29'' and stop-member 29''' , or other equivalent means, cooperate to limit the movement of finger 29 in the opposite direction. The rod 30 is fixed to and is vertically movable with the cylinder 20; being guided by the lugs 30'. Adjustably mounted on the rod 30 is a valve opening lug 32, which when the bottle or other article has been lifted, comes into contact with the valve stem 33 of valve 34, thereby lifting the valve and permitting fluid pressure to flow from pipe 35 to pipe 36 to the passage 4 of piston rod 3 and thence to the rear end of

cylinder 1, thereby causing the transfer unit to move bodily outward. Of course, the lug 32 is vertically adjusted in accordance with the height of the ware being handled, so that it will always contact with and open the valve, just as the piston 14 reaches the upper limit of travel, which upper limit is controlled by the adjustable rod 18. When the cylinder 7 and its associated parts approach the outward limit of travel, the finger 29 and rod 30 are rotated by reason of the finger engaging the cross-member 10. This rotative movement frees the lug 32 from the valve stem 33, permitting it to move downward, and thereby shutting off communication between pipe 35 and the rear end of cylinder 1, and opening communication between the rear end of the cylinder and the atmosphere, through port 34', thus exhausting the rear end of the cylinder and permitting the piston 2 to move to the left (Fig. 1) when pressure is admitted to the front end of the cylinder through pipe 5. When the cylinder 7 and its associated parts, starts the return movement (to the left) the spring 29' will tend to rotate the finger 29 and rod 30 in the opposite direction, but this movement will be limited by the lug 32 striking against the lowered valve stem 33. But when the cylinder 20 is lowered to position to grip another article, the lug 32 will be accordingly lowered, and the instant it is carried below the stem 33 it will be swung beneath the stem by spring 29', this swinging movement being limited by the lug 29'' and stop 29'''.

As soon as the cylinder 7 starts its inward travel, it releases the valve stem 27, which is automatically moved to its outwardly projecting position, thereby shutting off communication between pipes 25 and 26, and opening communication between pipe 26 and the atmosphere, through port 25', thereby exhausting the upper end of cylinder 20.

A brief description of a complete cycle of operation will now be given; and for the purpose of this description it will be assumed that the cylinder 7 is at the inner or left-hand limit of its travel, that the piston rod 15 and the cylinder 20 carried thereby are at their lowermost position and over the article to be transferred, and that the grippers 21 are open. The parts being in this position, fluid pressure will be admitted to the lower end of cylinder 20, through pipe 28, to lift its piston and thereby close the grippers 21 about the article 22 which is to be transferred from its mold to a leer conveyer or cross-conveyer. Immediately following this gripping action, air is admitted to the lower end of cylinder 7, through pipe 17, which causes the piston 14 to move upwardly, thereby lifting the cylinder 20, grippers 21 and article 22, to a position determined by the threaded rod 18. It will be understood, of course, that the admission and exhaust of fluid pressure, is con-

trolled by the ordinary timing valves operated in conjunction with the glass forming machine.

The rod 30 and valve opening lug 32 is also carried upward by the upward movement of the cylinder 20; the lug being adjusted on the rod so that as it reaches the upper limit of travel it strikes the valve stem 33, and opens the valve, to permit fluid pressure to flow through pipes 35 and 36, and cylinder 1, thereby moving the cylinder 7 and associated parts outwardly toward the discharge position. The article has now been gripped, elevated to the desired vertical position until the piston 14 struck the rod 18, and is being moved laterally to discharge position over the conveyer; so that the parts are in the position shown in Figure 1, and moving in the direction of the arrow, toward the conveyer 9.

Just as the cylinder 7 is about to reach the outward limit of travel, it strikes the valve stem 27, thereby admitting fluid pressure to the upper end of cylinder 20, to force its piston downwardly to open the grippers and deposit the article on the conveyer 9.

Substantially simultaneously with the opening of valve 27, the finger 29 strikes the cross-member 10 whereby the rod 30 is rotated to swing lug 32 from beneath valve stem 33, whereupon the valve is automatically moved downward to shut off fluid pressure from pipe 35, and to open pipe 36 to the atmosphere through port 34', thereby exhausting the rear end of cylinder 1. Fluid pressure is now admitted to the forward end of cylinder 1, by the operation of an ordinary timing valve, not shown. This admission of fluid pressure to the forward end of cylinder 1, causes the cylinder 7, and the mechanism carried thereby, to travel backward to the pick-up position.

As soon as this backward travel is started, the valve stem 27 is released and is automatically moved to closed position, thereby shutting off communication with pipe 25, and opening pipe 26 to the atmosphere through port 25', to exhaust the upper end of cylinder 20. Also, as soon as the backward travel is started, the spring 29' swings the finger 29 outwardly, until the lug 32 strikes the lowered valve stem 33. During the backward travel of the cylinder 7, preferably just after the mechanism has cleared the conveyer 9, fluid pressure is supplied through pipe 16, to the upper end of cylinder 7, thereby moving the cylinder 20 and the grippers 21 downwardly to position to grip the next article to be transferred, and completing a cycle of operation. The downward movement of the cylinder 20 carries the rod 30 and lug 32 downwardly, thereby moving the lug below the valve stem 33, whereupon the spring 29' swings the lug beneath the valve stem, in position to again operate the stem upon the next upward movement; the swinging movement

of lug 32 being limited by the cooperating members 29'' and 29''', or by equivalent means. The next cycle starts immediately by the admission of fluid pressure through pipe 28 to the lower end of cylinder 20, to cause the grippers to close and grip the bottle or other article to be transferred. Substantially simultaneously with the gripping operation, fluid pressure is admitted to the lower end of cylinder 7 to lift the cylinder 20 and the article 22 to the desired height, and this upward movement of the cylinder 20 causes lug 32 to operate the valve 34 to admit fluid pressure to the rear end of cylinder 1; and the operation continues throughout the same cycle as before.

It is believed the construction and operation of the device will be clearly understood from the foregoing description. While I have particularly described the device in connection with a forming machine, in which the upper end of the ware is fixed, and the lower limit being variable in accordance with the variable length of ware manufactured; yet it is adapted to use with forming machines in which the upper end of the ware is variable and the lower end is fixed, or where both the upper and lower ends of the ware are variable. To make the device adaptable to use in such instances it is only necessary to add to the lower end of cylinder 7, an adjustable rod similar to the rod 18 in the upper end of such cylinder.

Obviously the invention is subject to various changes and modifications, all of which I aim to include within the scope of the appended claims.

Having fully described the invention, what I claim as new is:

1. Transfer apparatus for glassware including a substantially vertical cylinder, a second cylinder for moving the first-mentioned cylinder back and forth between pick-up and delivery position, a valve operated by the first-mentioned cylinder for controlling the second cylinder, a gripper operating cylinder carried by the piston rod of the first-mentioned cylinder, and means for adjusting the upper limit of movement of said piston rod.

2. Transfer apparatus for glassware including grippers and a cylinder for operating the grippers, a second cylinder for lifting the first-mentioned cylinder a variable distance, a third cylinder for moving the second-mentioned cylinder laterally, and a valve controlling the third-mentioned cylinder operated by the upward movement of the first-mentioned cylinder.

3. Transfer apparatus for glassware including grippers and a cylinder for operating the grippers, means for lifting the cylinder a variable distance, means for moving the cylinder laterally, and a valve operated by the upward movement of the cylinder for

controlling the means for moving the cylinder laterally.

4. Transfer apparatus for glassware including grippers and a cylinder for operating the grippers, a cylinder for lifting the gripper operating cylinder a variable distance, a cylinder for moving the second-mentioned cylinder laterally, a valve for controlling the third-mentioned cylinder, and adjustable means operated by the gripper-operating cylinder to operate said valve when the gripper-operating cylinder reaches its variable upper limit of movement.

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