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G. E. ROWE

2,660,831

GLASSWARE TAKEOUT APPARATUS

Filed Feb. 1, 1950

3 Sheets-Sheet 1

FIG. 1a

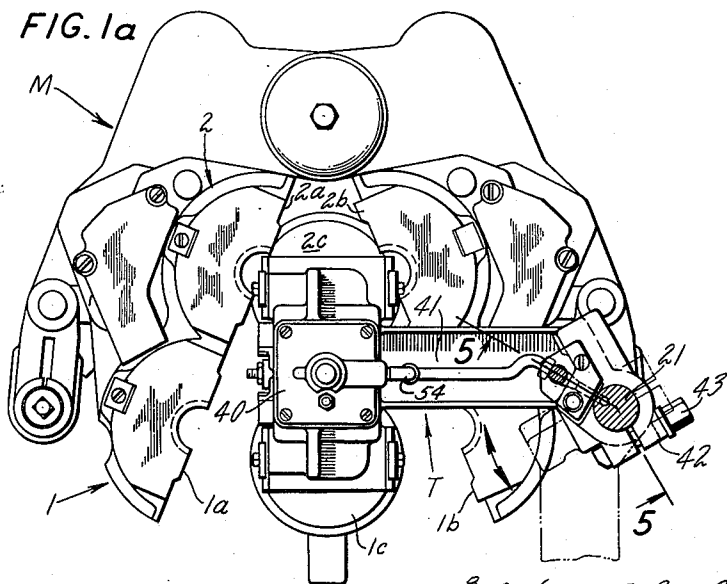


FIG. 1b

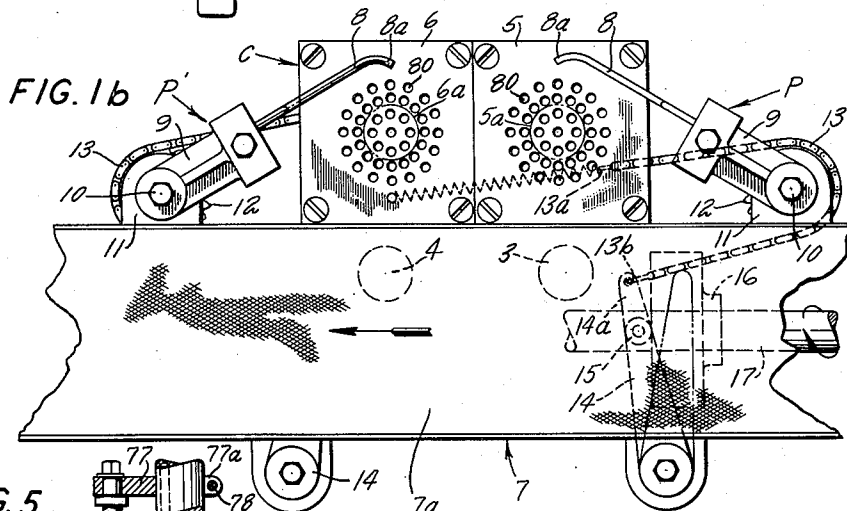
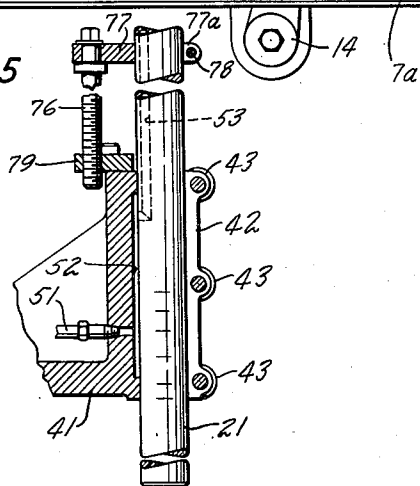


FIG. 5



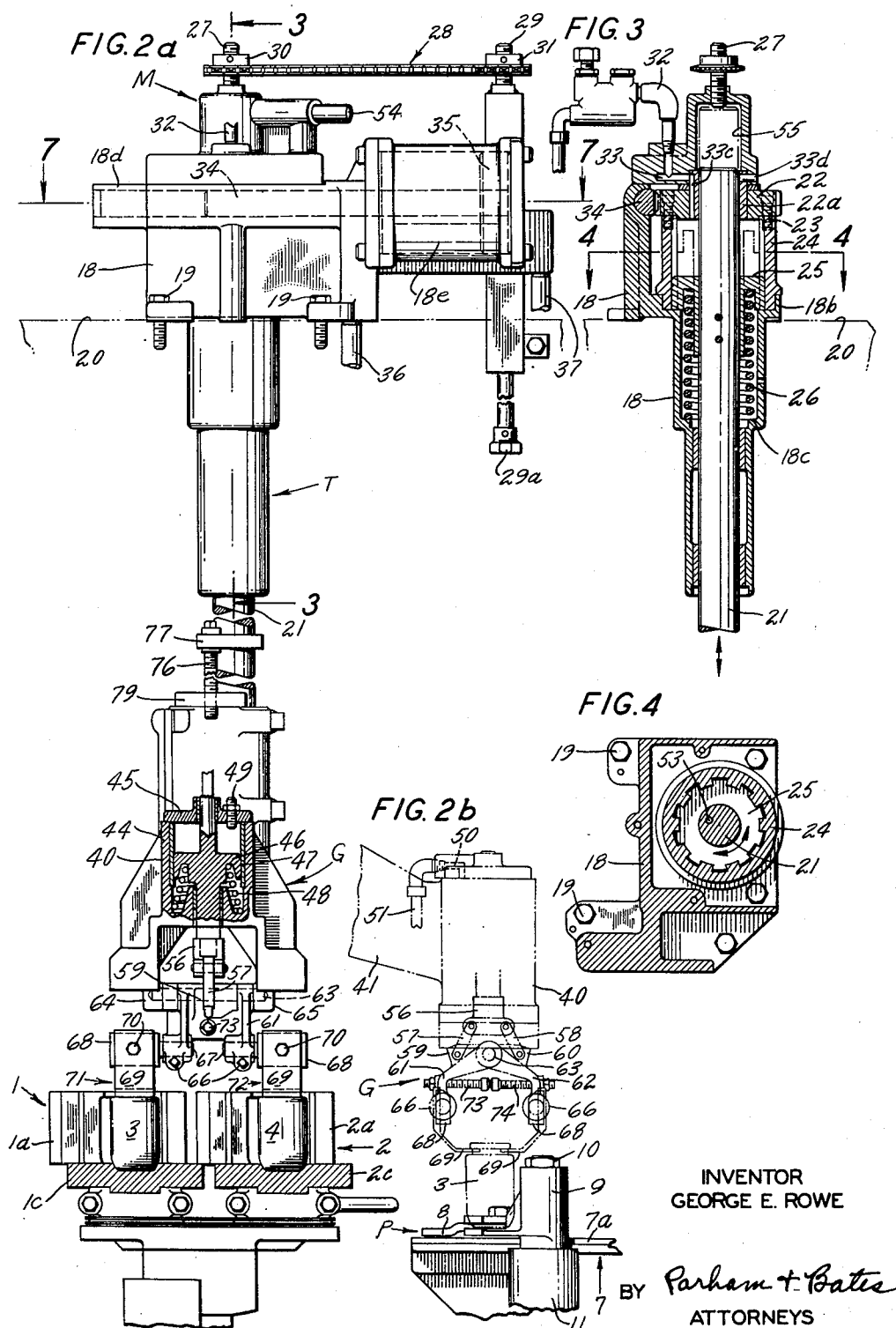
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FIG. 6

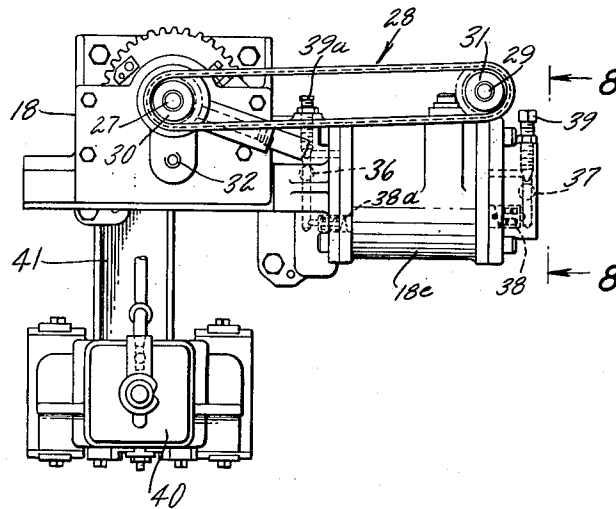


FIG. 7

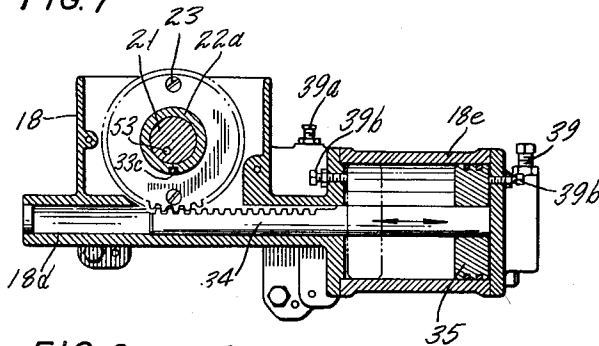
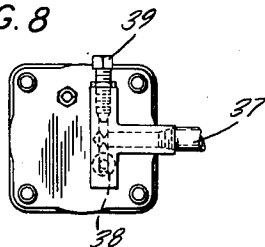


FIG. 8



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GLASSWARE TAKEOUT APPARATUS

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Application February 1, 1950, Serial No. 141,662

10 Claims. (Cl. 49-14)

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The present invention relates to glassware forming machinery and more particularly to improvements in apparatus for handling finished ware immediately following a final forming operation in a finishing mold.

Hollow glassware, such as bottles, tumblers and other types of containers generally are formed either in a single-stage automatic molding machine in which glass charges are directly pressed into finished articles, or in two-stage machines in which the charges are initially formed into parisons or blanks by either a pressing or blowing operation and the parisons subsequently reformed into finished articles within finishing blow molds. The articles may be formed successively one at a time (single gobbing); or in multiples, usually pairs (double gobbing).

Generally, the finished articles must be transferred by means of take-out equipment from the finishing molds and deposited for cooling on a deadplate and thereafter transferred to a conveyor or other means for delivering the ware to alehr or other equipment for annealing.

A principal object of the present invention is to provide improved takeout equipment, the operation of which provides for a longer cooling time on the deadplate without increasing the length of the overall forming cycle.

Other objects and advantages of the present invention will be apparent from a reading of the following description made with reference to the accompanying drawings of a preferred embodiment of the invention, in which:

Figs. 1a and 1b together constitute a plan view of a pair of finishing molds in combination with the lower or gripper portion of a takeout mechanism, together with deadplate, transfer means and conveyor;

Figs. 2a and 2b together comprise a front elevational view partly in section of the apparatus shown in Figs. 1a and 2a, including the upper or operating portion as well as the lower or gripper portion of the takeout mechanism shown in Fig. 1a, Fig. 2b further showing in phantom the lower or gripper portion of the takeout mechanism preparatory to depositing glassware on the deadplate;

Fig. 3 is a cross-sectional view taken substantially on line 3-3 of Fig. 2a showing details of the upper or operating portion of the takeout mechanism;

Fig. 4 is a cross-sectional view taken on line 4-4 of Fig. 3;

Fig. 5 is a cross-sectional view taken on line 5-5 of Fig. 1a showing an arrangement for ad-

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justing the gripper portion of the takeout mechanism relative to the lower end of its supporting and operating shaft;

Fig. 6 is a plan view of the top portion of the takeout mechanism shown in Fig. 2a;

Fig. 7 is a cross-sectional view taken on line 7-7 of Fig. 2a; and

Fig. 8 is an end view of the takeout cylinder head taken from line 8-8 of Fig. 6.

Referring to the drawings and more particularly to Figs. 1a and 2a, there is shown a pair of blow or finish molds generally designated 1 and 2, which include split mold sections 1a, 1b, 2a and 2b and bottom plates 1c, 2c within which glass containers 3 and 4 may be molded.

The mold operating and associated glassware forming mechanism, parts of which are shown in the drawings and designated generally by the letter M, preferably may be of the type illustrated and described in my copending applications, Serial Nos. 103,903 and 143,386 respectively filed July 9, 1949, and Feb. 10, 1950. However, it will be appreciated by those skilled in the art of glassware manufacture, that the present invention may be advantageously employed with other types of forming machines and equipment.

As shown in Fig. 2a, there is provided a takeout mechanism generally designated T for transferring the glass jars 3 and 4 from the respective bottom plates 1c and 2c to their respective stations 5a and 6a (Fig. 1b) on the deadplates 5 and 6 of a cooling mechanism generally designated C. Preferably as indicated in Figs. 1b and 2b, the top surfaces of the deadplates 5 and 6 lie in a common horizontal plane spaced downwardly from the horizontal surface defined by the molding surfaces of the bottom plates 1c, 2c with the line of centers of stations 5a and 6a disposed at right angles to the line of centers of the molds 1 and 2.

Disposed adjacent the deadplates 5 and 6 is a belt conveyor generally designated 7 which, as shown in Figs. 1b and 2b, has an upper surface 7a which lies in the same horizontal plane as the top surfaces of the deadplates 5 and 6 and, as indicated by the arrow in Fig. 1b, travels from right to left so as to carry away the jars 3 and 4 for further processing as, for example, to alehr (not shown) for annealing.

The jars 3 and 4 may be pushed onto the belt conveyor 7 from their respective deadplate stations 5a and 6a by means of push-bar mechanism generally designated P and P'. The transfer mechanisms being identical, the following description of mechanism P also serves as a de-

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scription of the mechanism P', like components of which are designated by like reference numbers in the drawings. More particularly, each mechanism comprises a horizontally extending pusher rod 8 having an outer end 8a which is bent so as to generally conform to the curvature of the jar 3 and which is secured at its inner end within a pivot arm 9 fastened to a vertical shaft 10 that is rotatably journaled in stationary bearing blocks 11 (Fig. 2b). Secured to the lower end of shaft 10 is a sprocket 12 which is engaged by a chain 13, one end of which is spring tensioned as at 13a to continually urge the sprocket in a counterclockwise direction (Fig. 1b). The other end 13b of the chain 13 is secured to the outer end 14a of a pivoted lever 14 having a cam follower 15 which is continually pressed into engagement with a face cam 16 that is secured to a shaft 17 rotated in timed relation to the operation of the forming machine and the takeout mechanism T. It will be understood that the face cam 16 will be shaped so that rotation of shaft 17 will periodically oscillate the arms 14 and the pusher rods 8 will wipe successive jars 3 and 4 that have been deposited by the takeout mechanism M on the deadplates 5 and 6, from their deadplate stations 5a, 6a, onto the conveyor 7.

Referring more particularly to Figs. 2a and 3 for details of the takeout mechanism M, there is shown a housing 18 fastened as by means of bolts 19 to a rigid horizontal frame member 20. A vertically disposed shaft 21 is supported within the upper end of the housing for limited vertical and rotary movement. More particularly, a pinion gear 22 is concentrically disposed about the shaft 21 and is secured, as by means of screws 23, to a concentric sleeve 24, which is rotatably supported at its lower end on an annular supporting portion 18b of the housing 18. As shown in Figs. 3 and 4, the sleeve 24 is splined to a piston 25 which may be pinned or otherwise secured to the shaft 21 so that the shaft is permitted vertical sliding motion and, at the same time, may be rotated by means of the pinion gear 22. A compression spring 26 is located within the housing 18 and about the shaft 21 and is compressed between housing shoulder 18c and the piston 25 so as to urge the latter together with the shaft 21 upward. Adjustable stop screw 27 is threaded into the upper end of the housing 18 in alignment with the shaft 21 and restrains the spring pressed shaft 21 in its upper position at which the lower or tong gripping device G carried by the lower end of the shaft is in gripping registry with the jars 3 and 4 on their respective mold bottom plates 1c and 2c.

Adjustment of the screw 27 may be effected by means of a chain and sprocket drive generally designated 28 and an adjusting thumb screw 29. As best seen in Fig. 2a, adjustment 28 includes like sprockets 30 and 31 pinned or otherwise respectively secured on the adjustment screw 27 and the upper end of the thumb screw 29, the latter being threaded within a portion of the housing 18 and extending vertically downward therethrough so that the manually grippable thumb portion 29a is readily accessible for effecting adjustment of the stop screw 27.

The downward movement of the shaft necessary to lower the gripper G to its lower or ware-depositing position (Fig. 2b) is effected by air pressure from the forming machine timer (not shown) which is supplied to the confined space in the housing 18 above the piston 25 through

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pipe line 32 and connecting passage 33 in the housing 18.

As shown in Fig. 3, the pinion gear 22 is rotatably supported on a bushing 22a through which the shaft 21 slidably extends and in which there is provided a vertical grooved passage 33c which connects the confined space above the piston 25 with the air passageway 33. A pin 33d, or other suitable fastener, anchors the bushing against movement.

Rotation of the shaft 21 from the position shown in Figs. 1a and 2a at which the grippers G are in registry with the jars 3 and 4 and the position at which the grippers G are positioned at the dead plate (Fig. 2b) is effected by a rack 34 slidably supported in a guide portion 18d of the housing.

As best seen in Fig. 7, the rack 34 is secured to a piston 35 reciprocally mounted within a pressure cylinder portion 18e of the housing 18. Operating air is supplied from the timer (not shown) to the opposite ends of the cylinder 18e through lines 36 and 37 for reciprocating the piston 35 and rack 34 and thereby rotating shaft 21 so as to swing the grippers G between their positions above their respective molds 3 and 4 and their dead plate stations 5 and 6. The same lines 36 and 37 serve as exhaust lines from their respective ends of the cylinder 18e.

Preferably, as shown in Figs. 6 and 8, line 37 is provided with a quick opening one-way valve 38 permitting rapid flow of in-put air into the cylinder and an adjustable valve screw 39 for throttling the exhaust of air from the cylinder through the line 37 so as to cushion the travel of the piston 35 at a regulable rate. The line 36 may also be provided with a similar one-way valve 38a controlled by an adjustable throttle screw 39a. Adjustable stop screws 39b may be provided in the cylinder heads for adjustably limiting both ends of travel of the piston 35 and thereby controlling the angular movement of the shaft 21 and the positioning of the gripper G at the blow mold and dead plate stations.

Referring more particularly to Figs. 1a, 2a, 2b and 5, the gripper device G comprises a housing 40 carried at the outer end of an integral supporting arm 41 which is secured by a split ring portion 42 and tightening bolts 43 (Figs. 1a and 5) to the lower end of the shaft 21. As shown in Fig. 2a, the housing 40 includes a cylinder portion 44 and cylinder head 45 within which a piston 46 is mounted for reciprocal movement. Preferably the cylinder 44 is provided with a liner 47 which may be easily replaced when the liner wears out without the necessity of replacing the housing 40.

The piston 46 is pressed upwardly by a spring 48 within the housing 40 into engagement with an adjustable stop screw 49 which determines the upper position of the piston 46. Operating air from the timer (not shown) is supplied to the confined space in the cylinder 44 above the piston 46 through a passageway 50 in the head 45 by means of a line 51 which, as shown in Fig. 5, communicates through a longitudinal groove 52 in the split ring 42 and a connecting passage 53 which extends upwardly through the shaft 21 and is connected with line 54 (Figs. 1a and 2a) from the timer through the confined space 55 (Fig. 3) defined by the housing 18 above the shaft 21.

As best shown in Figs. 2a and 2b, there is secured to the lower end of the piston 46 a cross-head 56 which is connected by links 57 and 58 to ears 59 and 60 which project upwardly from

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a pair of tong supporting arms 61 and 62. The latter are pivotally supported at their upper ends on a pin 63 which is journaled at its ends within bearing blocks 64 and 65 secured to the lower end of the housing 40. The lower ends of the tong arms 61 and 62 are each provided with a pair of like spaced split rings 66 in each of which is secured a horizontally projecting stud 67 having a block 68 to which a tong gripper plate 69 is secured as by means of a bolt 70.

As will be readily seen by reference to Figs. 2a and 2b, the tong gripper plates are arranged as two spaced pairs, designated by the general reference numbers 71 and 72, for gripping the jars 3 and 4 respectively beneath the finish in the manner illustrated in Fig. 2b. It will be seen that the gripper plates 69 may be individually adjusted by axial and rotary movement of the studs 67 to spot the gripper plates in their proper positions relative to the ware 3 and 4 in the blow molds 1 and 2. Further adjustment of the tongs is provided by coextending adjustment screws 73 and 74 which are mounted in the tong arms 61 and 62 and cooperatively engage so as to limit the closing of the gripper plates 69 at preselected gripping positions. It will be seen that the adjustment screw 49 which limits the upward movement of the piston 46 also serves to determine the extreme open position of the gripper arms 61 and 62.

Prior to tightening the fasteners 43, the position of the housing 40 relative to the shaft may be accurately adjusted by means of an adjustment screw 76 (Fig. 5) which is rotatably supported at its upper end in a projecting arm 77 having a split ring portion 77a which is secured as by means of a screw fastener 78 on the shaft 21. The lower end of adjustment screw 76 is threaded through a bracket 79 fastened to the housing 40 and provided means for adjustably raising and lowering the gripper supporting arm 41 prior to tightening the split ring bolts 43.

The operation of the illustrated apparatus embodying the present invention will be generally understood from the above description of its several components. Preferably the sequence of operation is as follows:

As the blow mold sections 1a, 1b, 2a and 2b open and leave the jars 3 and 4 supported on their respective bottom plates 1c and 2c, operating air is supplied from the timer (not shown) through line 37 to move the piston 35 to the left (Fig. 7) thereby rotating the shaft 21 and pivoting the gripper G carried by the pivot arm 41 so that the two pairs of gripper plates 71 and 72 are disposed on opposite sides of their respective jars 3 and 4. Thereupon operating air is supplied from the timer through the line 54 to depress the piston 46 and cause each pair of tongs 71 and 72 to grip the finish of their respective jars substantially as shown in 2a and 2b. Immediately thereafter, bottom plates 1c and 2c drop and air is supplied by the timer through line 36 to force the piston 35 to the right (Fig. 7) and swing the gripped jars to positions spaced directly above their respective dead plate stations 5a and 6a and the jars still located thereon from the immediately preceding forming and transferring operation. It will be seen that the immediate removal of the jars from their bottom plates 1c and 2c makes the blow molds 1 and 2 immediately available for forming the next pair of jars. While the jars 3 and 4 are being moved to and held in elevated position by the gripper device G above their dead plate stations 5a and 6a,

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the wiper or transfer arms T are actuated by the heretofore described rotating cam 16 and the jars of the preceding cycle are wiped from the dead plate stations 5a and 6a onto the conveyor 7. Thereafter while the jars are held suspended over the dead plate stations each cam 16 forces each wiper arm 8 back to the inoperative position shown in Fig. 1b, whereupon operating air is supplied by the timer through line 32 to depress the piston 25 and the shaft 21 thereby lowering the gripper G secured to the shaft to the position illustrated in phantom in Fig. 2b. Thereafter, the timer relieves air in line 54 thereby relieving the air pressure in the cylinder 44 whereupon the spring 48 forces tong operating piston 46 to its upper or tong-opening position which releases the jars 3 and 4 and deposits them on the dead plates 5 and 6 and finally the timer relieves the pressure in line 32 thereby removing pressure from the piston 25 and permitting spring 26 to raise the piston 25 and shaft 21 to its upper position preparatory to repeating the takeout cycle heretofore described.

The present invention has the advantage of providing substantially greater effective cooling for the ware during a maximum portion of the complete cycle. More particularly, the operation of an apparatus embodying the invention serves to position the ware on or above their respective dead plates in the path of cooling air discharged from holes 80 in the latter, even prior to the return of the pusher arms 8 to their inoperative positions (Fig. 1b).

Other advantages of apparatus embodying the present invention and of its operation according to the present invention will be apparent to those skilled in the art.

While but one embodiment of the invention has been illustrated and described, it will be clear that modifications may be made without departure from the scope of the invention as defined in the appended claims.

I claim:

1. In a glassware forming machine including a pair of multi-part final blow molds and a bottom plate for each of said molds, means for gripping the formed glassware articles on the bottom plate, means for laterally transferring the gripping means and gripped glassware articles from the bottom plates to positions elevated above respective dead plate cooling stations, means operable beneath said elevated articles for removing glassware from said dead plate stations while said gripped articles are transferred from said bottom plates, and means for lowering said elevated articles and opening said gripping means to deposit said articles at said dead plate stations after said removing means have operated beneath said elevated articles to clear said stations and said removing means have returned to inoperative position, said means for effecting said lateral transference of said gripping means and gripped articles being operable independently of and prior to said lowering means, and means for holding said gripping means with the articles gripped thereby above said dead plate stations during operation of said removing means and prior to operation of said lowering means.

2. In a glassware forming machine having a pair of blow molds in side-by-side alignment and each having a bottom plate for supporting the glass article formed in the mold, a gripper for gripping the finally formed glassware articles on the bottom plates, means for laterally moving said gripper and positioning the gripped articles in

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alignment at right angles to the alignment of the blow molds and elevated above dead plate cooling stations, means for removing previously deposited articles from said dead plate stations while the gripped articles are being transferred laterally from the bottom plates, said gripper holding said articles suspended over said dead plate stations while said removal means return to clearing position, and means for lowering said gripped articles and opening said gripper to deposit said articles at said dead plate stations after said removing means has cleared said stations and has been returned and positioned preparatory to repeating the station clearing movement.

3. Apparatus as recited in claim 2 and wherein said gripper is adjustably carried on a vertical shaft which is mounted for slidable and rotatable movement, said laterally moving means including a rack engaging a pinion gear secured against rotation relative to said shaft, and said means for lowering and opening said gripper including an air-operated piston secured to said shaft and a second piston for opening said gripper.

4. Apparatus as recited in claim 3 and wherein springs continually urge said pistons upward to position the gripper at its gripping elevation relative to the bottom plates and to open said gripper.

5. Apparatus as recited in claim 4 and wherein said gripper includes a pair of commonly pivoted arms connected by links to said piston for opening and closing said gripper.

6. Apparatus as recited in claim 5 and including means for pivotally and laterally adjusting the positions of the gripper arms independently relative to each other.

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7. Apparatus as recited in claim 6 and including adjustable stop means for selectively adjusting the upper position to which the gripper supporting shaft is raised by its spring pressed piston.

8. In a glassware forming machine having a blow mold including a bottom plate, means for gripping a glassware article supported on said bottom plate, means for laterally transferring said gripping means first in a horizontal direction only and for holding the gripped article elevated above a dead plate cooling station, means for removing a like article from said dead plate station, and means operable independently of said lateral transfer means for lowering said elevated article and opening said gripping means to deposit said article after said removing means have cleared the dead plate station.

9. Apparatus as recited in claim 8 and wherein the lateral movement of the gripping means effects approximately 90° rotation of the gripped article about a vertical axis.

10. Apparatus as recited in claim 9 and wherein the lateral movement of said gripping means is effected along approximately 90° of an arc of a circle.

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