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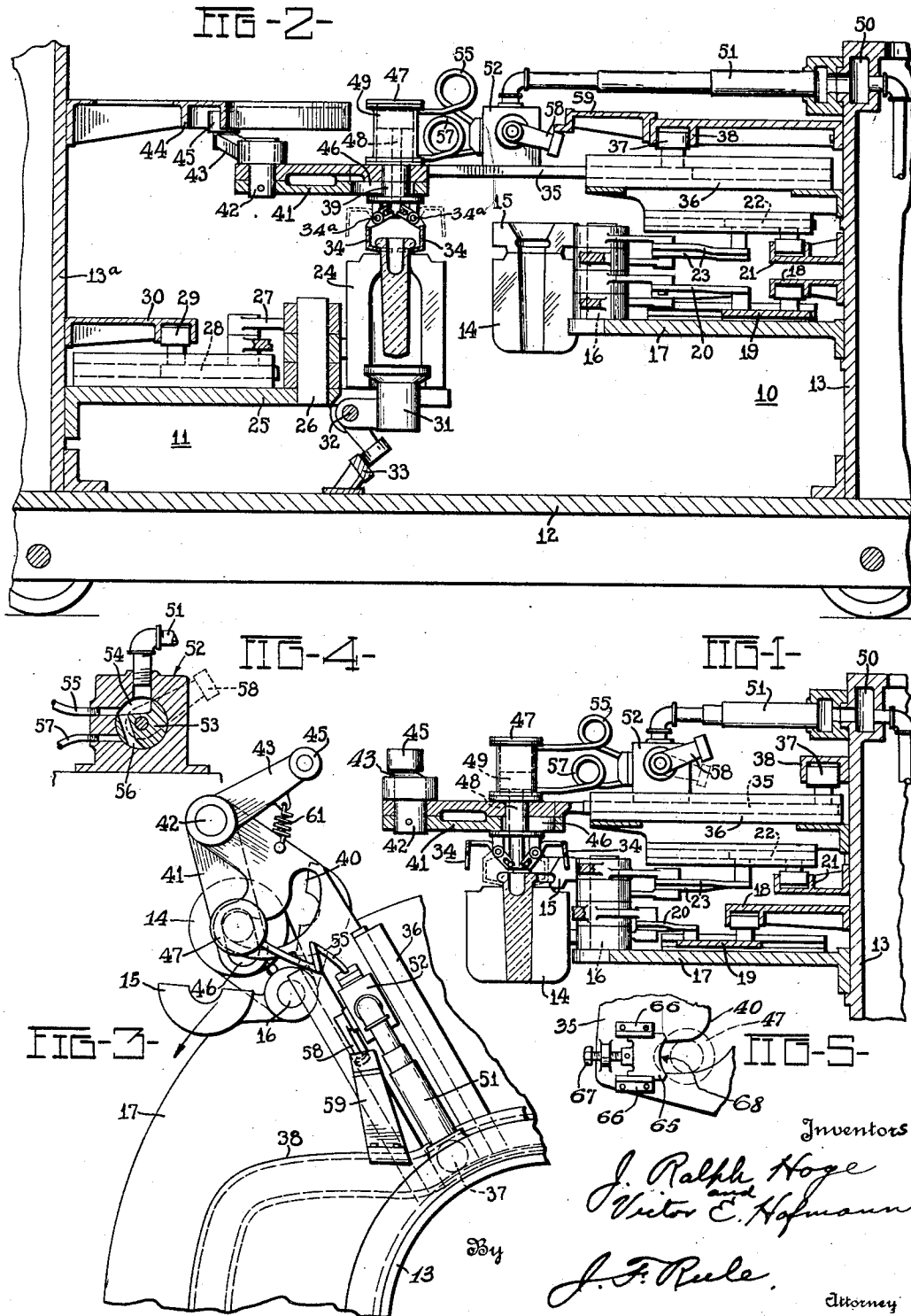
J. R. HOGE ET AL

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GLASSWARE FORMING MACHINE

Filed Jan. 9, 1930

2 Sheets-Sheet 1



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FIG-6-

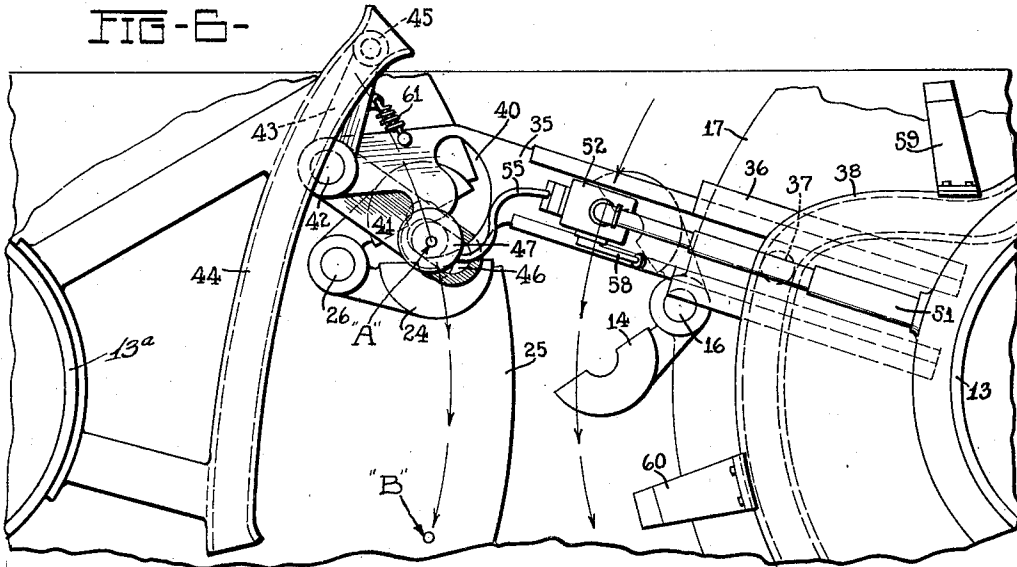


FIG-7-

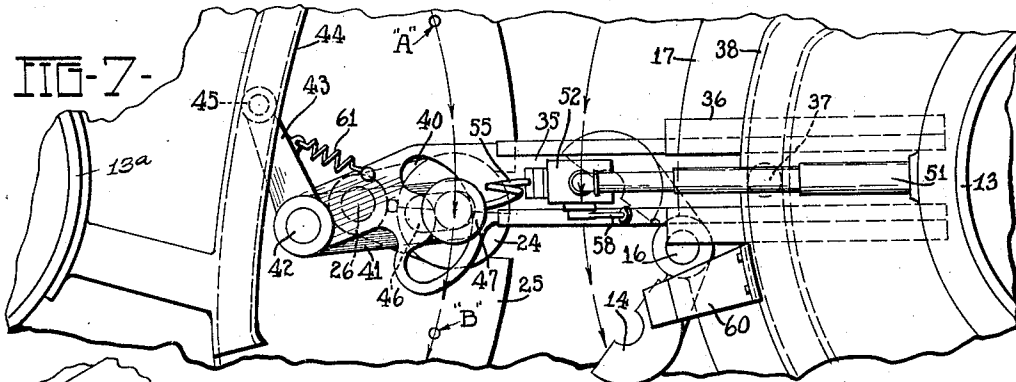
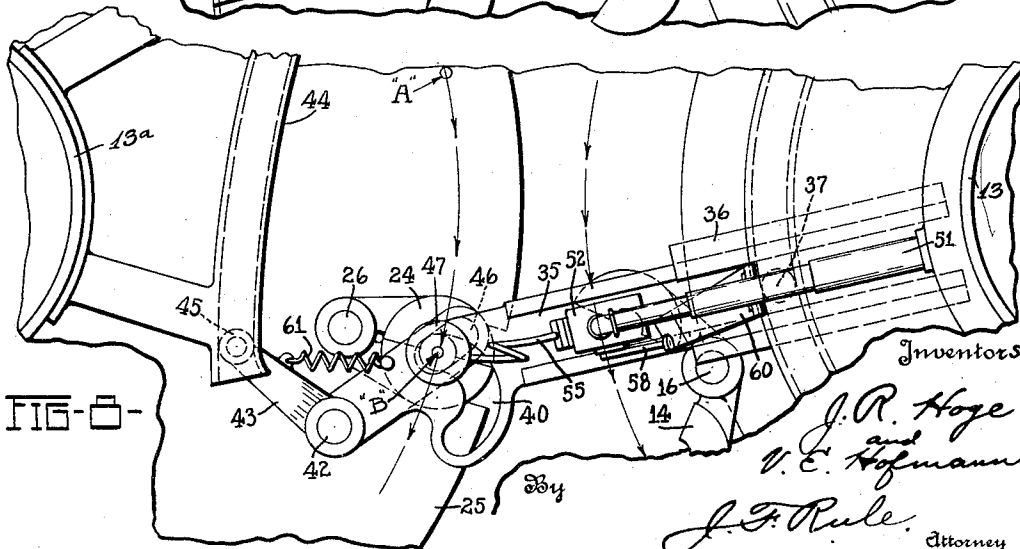


FIG-8-



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# UNITED STATES PATENT OFFICE

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## GLASSWARE FORMING MACHINE

Application filed January 9, 1930. Serial No. 419,555.

The present invention relates to improvements in glassware forming machines and more particularly to machines in which articles of glassware are partially formed in molds on one table and then transferred to finishing molds on another table for the purpose of final shaping. In machines of the above character, as well as others, continuous rotation of the tables is of considerable advantage in that both production and general operating conditions are greatly improved as compared with machines in which the tables rotate intermittently or in a step by step fashion. In continuously rotating machines comprising separate blank mold and finishing mold tables, more or less difficulty has been encountered in the past in effecting transfer of blanks or parisons from one mold to the other without distorting or checking portions of the blanks.

An object of the present invention is the provision of transfer means involving exceptionally simple mechanism capable of transferring blanks or parisons from the blank molds to the finishing molds without detrimentally effecting the blank or parison formation.

Another object is the provision of a simple form of blank transfer mechanism individual to the blank molds and operating in a fashion precluding the necessity for rapid opening and closing of the blank molds and finishing molds respectively. In other words, the available period of time for transferring blanks or parisons is sufficiently lengthened to avoid the necessity for imposing severe strains on the operating mechanism such as exists where the mold opening and closing devices must operate quickly because of the almost prohibitively short space of transfer time.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a vertical sectional elevation through one head or unit of the blank mold table in a position just in advance of the transfer station.

Fig. 2 is a vertical sectional elevation show-

ing the blank mold and finishing mold at the transfer station.

Fig. 3 is a fragmentary plan view showing a blank mold unit in a position in advance of the blank transfer station.

Fig. 4 is a detail sectional view of the control valve for the air motor which actuates the blank gripping tongs.

Fig. 5 is a fragmentary plan view showing a construction whereby the normal position of the tongs may be adjusted.

Fig. 6 is a fragmentary plan view of the blank and finishing mold tables, showing the transfer mechanism supporting a blank in position to be enclosed in a finishing mold.

Fig. 7 is a view similar to Fig. 6 showing the finishing mold closed about the blank.

Fig. 8 is a view similar to Fig. 7 showing the transfer mechanism and finishing mold about to leave the transfer station.

The machine embodying our invention is illustrated as comprising a blank mold table 10 and finishing mold table 11, said tables arranged side by side upon a base 12 and adapted to rotate continuously about stationary central columns 13 and 13<sup>a</sup> rising from said base. These tables rotate in opposite directions so that their adjacent sides move substantially in the same direction to thereby facilitate transfer of blanks or parisons from one table to the other without interrupting operation of the machine as a whole. Continuous rotation of the tables may be obtained through any conventional means such as illustrated in numerous available patents.

In more or less general terms, the blank transfer mechanism constituting our invention comprises a main supporting arm individual to a blank or gathering mold and a tong carrier mounted on the outer end of said arm, said arm and carrier together adapted to carry blanks radially beyond the path of travel of the blank molds into coincidence with the path of the finishing molds. The tong carrier is of such construction and so connected to the support and other devices that it travels in the path of and with the finishing molds a distance sufficient to per-

mit proper transfer of the blanks to said molds.

In the machine with which our transfer mechanism is shown, the blank mold table 10 carries an annular series of blank forming units, each comprising partible co-operating blank and neck molds 14 and 15 respectively, pivoted to a vertical hinge pin 16 rising from a rotary spider 17, the latter mounted on the central column 13. The blank mold 14 is opened at regular time intervals by a stationary cam 18 operating through a slide 19 and suitable links 20, as is customary. The neck mold 15 is alternately opened and closed at regular time intervals by a cam 21 operating through a slide 22 and links 23, the latter suitably connected to the mold sections. Mold charges of molten glass may be delivered to the blank and neck molds in any preferred manner and transformed into blanks which are to be placed in finishing molds 24 on the finishing mold table 11. Since the means for gathering the mold charges and forming blanks forms no part of our invention and may embody any of a wide variety of suitable mechanism, illustration of such feature has been omitted herein.

The finishing mold table 11 (Fig. 2) includes a rotary spider 25 carrying an annular series of partible finishing molds 24, each of which is pivoted to a vertical hinge pin 26 and connected through links 27 to a slide 28, the latter carrying a cam roll 29 running in a stationary cam 30. This cam is shaped to alternately open and close the finishing mold at regular time intervals. A bottom plate 31 is associated with each finishing mold 24, being pivoted to a horizontal hinge pin 32 on the spider 25. A stationary cam 33 raises the bottom plate 31 just before the finishing mold completely closes about a blank or parison. Blowing mechanism (not shown) of conventional or any preferred form, may be associated with the finishing molds for the purpose of expanding blanks therein to the shape of articles of glassware being produced.

The transfer mechanisms which constitute our invention are individual to the blank molds, carried by the blank mold table and rotate therewith. Each mechanism includes a pair of tongs 34 or holder (Figs. 1 and 2) which engage the neck portion of blanks after the neck mold 15 opens, and upon complete opening of the blank mold 14 carries the blank or parison radially outward away from said blank and neck molds to a position wherein said blanks or parisons may be enclosed in the finishing molds 24. During closing of the finishing molds about the blanks or parisons suspended from the tongs 34 or jaws, the latter are directly above and in register with the corresponding finishing mold and moving in the path of travel of the latter in order that the available period

of time for the blank transfer operation may be considerably lengthened as compared with general practice. Such transfer is accomplished by a construction including a horizontal arm 35 spaced circumferentially from and a short distance above a blank mold and mounted in guideways 36 extending radially of the blank mold table 10. This arm 35 supports a carrier 39 for the tongs 34 which engage the blanks or parisons to be transferred from one table to the other. Radial reciprocation of the arm 35 at regular time intervals is necessary in order to alternately project and retract the tongs whereby the latter carry blanks or parisons to point "A" (Fig. 6) and then move away from the finishing mold table at point "B" after completion of the blank transfer operation. Such radial reciprocation of the arm 35 is obtained by means of a cam roll 37 provided at the inner end of said arm and running in a stationary continuous cam 38, the latter mounted on the central column 13 of the blank mold table and shaped to project the arm 35 and tongs 34 thereon from the position shown in Fig. 3 to that in Fig. 6. Such projection of the arm places the tongs 34 directly over and in register with an open finishing mold 24.

Both mold tables are rotated continuously at the same angular speed, and in order that the blanks may be transferred without distortion and ample time given for effecting the transfer operations without subjecting any parts of the machine to undue strains, the tongs 34 are caused to move in a path coincident with that followed by the finishing mold during the transfer, namely, a path concentric with the axis of the finishing mold carriage from the point "A" to the point "B". The tongs are also caused to travel at the same speed as the finishing mold. The mechanism and its operation by which such movement of the tongs is effected will now be described.

The tongs are supported on a tong carrier 39 which in turn is movably supported on the arm 35. The path of movement of the carrier 39 relative to the arm 35 is determined by an arcuate cam slot 40 formed in the outer portion of said arm and extending transversely thereof. The tong carrier 39 is moved along the slot 40 by means of a rock arm 41 keyed to a rock shaft 42 journaled in the outer end of the arm 35. The carrier 39 extends through a slot 46 in the rock arm, said slot being elongated to permit the necessary movement of the carrier lengthwise of the rock arm under the control of the cam slot 40. The rocking movements of the arm 41 are controlled by a stationary cam 44 on which runs a cam roll 45 on a rock arm 43 secured to the rock shaft 42. A spring 61 (Fig. 6) connected at its ends to the rock arm 43 and the arm 35, respectively, holds the tong carrier 39 at the forward end of the

slot 40, except when under the influence of the cam 44.

As shown in Fig. 6, the arm 35 has been projected to bring the tong carrier 39 to the point "A" in register with the finishing mold center. As the mold carriages advance to the Fig. 8 position the rock arm 43 under the control of the cam 44, swings the arm 41 and moves the tong carrier 39 along the slot 40 from the forward end thereof (Fig. 6) to the rear end (Fig. 8). This movement of the tong carrier relative to the arm 35 may be considered as a component of two movements. The first of these is a movement radial to the blank mold carriage and is such that the tong carrier is made to move in the arc "AB". During the movement from the Fig. 6 position to the Fig. 7 position, the tong carrier is moving inwardly toward the center of the blank mold table and reaches its innermost position (Fig. 7) at the point where the said arc is nearest to the center of the blank mold table. The movement of the tong carrier is then outward until the point "B" is reached (Fig. 8). The primary function and purpose of the cam slot 40 is to keep the tong carrier in the arc "AB" during the transfer period. The second movement of said component is a movement of the tong carrier transversely of the arm 35, the primary purpose of which is to cause the tong carrier to advance at the same speed as the finishing mold table so that it will coincide or register with the blank mold center during the transfer period. The rate of this transverse movement of the tong carrier relative to the arm 35 is determined by the shape of the cam 44 which is designed to maintain such registry of the tong carrier and finishing mold during the travel from point "A" to point "B."

That portion of the cam track 38 in which the cam roll 37 runs during the transfer period is herein shown concentric with the axis of rotation of the blank mold table, so that there is no radial movement of the arm 35 during such period. It will be understood, however, that this section of the cam may be modified to produce sufficient radial movement of the arm 35 to maintain the tong carrier in the arc "AB" during the transfer, without moving said carrier lengthwise of the rock arm 41.

Alternate opening and closing of the tongs or jaws of each transfer mechanism is obtained by means of an air motor 47 which is secured to the upper side of the tong carrier 39 and moves with the latter in the arcuate slots 40 and 46. The piston rod 48 on the piston 49 of said motor is connected at its lower end to the tongs 34 in such fashion that vertical reciprocation of said rod oscillates the jaws 34 about the hinge pins 34<sup>a</sup> through which the latter are connected to the carrier 39. Air under pressure for operating

the motor 47 is obtained from any suitable source of supply and delivered through a chamber 50 in the central column of the blank mold table and thence through telescopic pipes 51 to a valve box 52, the latter mounted on the upper side of the arm 35. This valve box 52 (Figs. 2 and 4) includes a rotary valve 53 provided with a port 54 which at times provides communication between the pipe 51 and the flexible pipe 55 leading to the upper end of the motor 47. A port 56 in said valve 53 at times provides communication between the pipe 51 and the flexible pipe 57 leading to the lower end of the air motor 47. A valve lever 58 suitably connected to the valve 53 is alternately raised and lowered to admit air under pressure for the purpose of moving the piston 49 up and down and actuating the tongs 34. A cam or trip 59 (Figs. 2 and 6) actuates the valve lever 58 to close the tongs about the exposed upper end of the blank or parison before the blank mold 14 opens. Another cam or trip 60 arranged adjacent the point "B" actuates said lever 58 immediately after a finishing mold 24 has closed about a parison, for the purpose of opening the tongs 34 preparatory to retracting the latter from the transfer position.

In operation, the arm 35 of each transfer mechanism is normally held in its innermost position as shown in Figs. 1 and 3 and the tong carrier 39 together with the tongs occupy a position at one end of the arcuate slot 40 over and in register with the corresponding blank and neck molds 14 and 15 respectively. A coil spring 61 connecting the arms 43 and 35 yieldingly holds said tong carrier as just described. As a blank mold approaches the position shown in Figs. 1 and 3, the neck mold is opened by the cam 21, leaving the neck or finish portion of a blank over and projecting above the closed blank mold 14. Immediately the valve lever 58 is swung downward by means of the cam 59 or trip (Fig. 2) causing air under pressure to move the piston 49 upwardly and close the tongs 34 about the exposed upper end of the blank. This blank gripping operation is immediately followed by opening of the blank mold 14 and projection of the arm 35 radially outward a distance sufficient to place the blank at point "A" (Fig. 6) in register with a finishing mold. The cam roll 45 forming part of the mechanism for swinging tong carrier 39 immediately enters the stationary cam 44, the latter in turn imparting movement to the carrier 39 lengthwise of the arcuate slot 40 whereby the tongs 34 and blank suspended therefrom move in a path coincident with that traveled by said finishing mold during its movement between points "A" and "B" during which movement said finishing mold completely closes about the blank and raised bottom plate. Complete

closing of the finishing mold is immediately followed by opening of the tongs 34 resulting from upward movement of the valve lever 58 due to contact with the cam 60 or trip. The cam 38 retracts the arm 35 and parts associated therewith to the radial position shown in Fig. 3 preparatory to starting another blank transfer operation as just described. The coil spring 61 again places the motor 47 and tongs therebeneath as shown in Figs. 1 and 3.

In Fig. 5 is shown a construction whereby the normal position of the tong carrier 39 may be adjusted to obtain absolutely accurate register of the tongs and neck and blank molds. This construction comprises an end block 65 mounted in slideways 66 on the arm 35, said block being adjustable to vary the effective length of the slot 40. An adjusting screw 67 is provided so that the block may be set where necessary. An arcuate recess 68 formed in one edge of the block contacts with the lower end of the motor 47 of the carrier 39 when the latter is in its normal position.

Modifications may be resorted to within the spirit and scope of the appended claims.

What we claim is:

1. In a machine for forming glassware, the combination of two continuously rotating tables, a blank mold on one table, a finishing mold on the other table, means individual to the blank mold for transferring blanks from the blank mold to the finishing mold, said means comprising a pair of tongs adapted to support a blank, means on the blank mold table for projecting the tongs radially of said table to a position over and in register with a finishing mold, means for causing the tongs to travel in a horizontal plane relative to the projecting means and thereby follow the path of the finishing mold, means to close the finishing mold about the blank, and means operating to release the blank from the tongs after the finishing mold has closed.

2. In a glassware forming machine, annular series of blank and finishing molds arranged side by side and rotating continuously about vertical axes, means moving with the blank molds for transferring blanks from said molds to the finishing molds, said means comprising a blank holder, a support for the holder, means providing pivotal and sliding connection between the holder and support, means for projecting the support to carry the holder from a position over and in register with a blank mold to a corresponding position relative to a finishing mold, yielding means normally retaining the holder against movement relative to the support, cam mechanism for causing sliding and swinging movement of the holder during a predetermined period of travel to cause the latter to move in register with a finishing mold, means for transferring a blank from

the holder to the finishing mold during travel of the holder and finishing mold in register with each other, said holder comprising a pair of tongs, an air motor for alternately opening and closing the tongs, and a cam controlled valve for controlling the supply of air under pressure to the motor.

3. In a machine for forming glassware, the combination of two continuously rotating tables, a blank mold on one table, a finishing mold on the other table, means traveling with the blank mold table for transferring blanks from the blank mold to the finishing mold, said means comprising a support mounted for movement radially of the blank mold table, a blank holder, means providing pivotal and sliding connection between the holder and support, means for projecting the support to carry the holder from a position in register with a blank mold to a corresponding position relative to a finishing mold, cam means in part associated with the finishing mold table to effect sliding and swinging movement of the holder relative to the support to maintain register of the holder and finishing mold during a predetermined distance of travel, means for closing the finishing mold about the blank, and means for then releasing the blank from said holder.

4. In a machine for forming glassware, the combination of two continuously rotating tables, a blank mold on one table, a finishing mold on the other table, means traveling with the blank mold table for transferring blanks from the blank mold to the finishing mold, said means comprising a support mounted for movement radially of the blank mold table, a blank holder, means providing pivotal and sliding connection between the holder and support, means for projecting the support to carry the holder from a position in register with a blank mold to a corresponding position relative to a finishing mold, cam means in part associated with the finishing mold table to effect sliding and swinging movement of the holder relative to the support to maintain register of the holder and finishing mold during a predetermined distance of travel, means for closing the finishing mold about the blank, means for then releasing the blank from said holder, said holder comprising a pair of tongs, an air motor slidingly mounted on the support and operatively connected to the tongs, and means for actuating the motor at regular time intervals to alternately open and close the tongs.

5. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of

said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, and means for transferring a blank from the tongs to the finishing mold while said tongs and mold register with each other.

6. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, means for transferring a blank from the tongs to the finishing mold while said tongs and mold register with each other, an air motor mounted on and movable with said carrier for alternately opening and closing the tongs, and automatic means regulating and controlling operation of the motor.

7. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, means for transferring a blank from the tongs to the finishing mold while said tongs and mold register with each other, and yielding means normally holding the carrier and tongs in such position with respect to the arm that the tongs and blank

mold are in register with each other when said arm is fully retracted.

8. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, means for transferring a blank from the tongs to the finishing mold while said tongs and mold register with each other, and means normally holding the carrier and tongs in such position with respect to the arm that the tongs are in radial alignment with the corresponding blank mold.

9. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, means for transferring a blank from the tongs to the finishing mold while said tongs and molds register with each other, and a cam controlled swinging lever for causing the holder to move in said curved path.

10. In a glassware forming machine, blank and finishing mold tables arranged side by side and continuously rotating about vertical axes individual thereto, a blank mold on one table, a finishing mold on the other table, blank transfer means mounted for the greater part on the blank mold table and comprising an arm mounted for reciprocation radially of said table, a tong carrier mounted for movement along a curved path transversely of said arm, tongs suspended from the carrier, means for alternately opening and closing the tongs, means for moving the arm to



thereby place the tongs in register with the finishing mold, means for moving the carrier and tongs along said curved path relative to the arm during a predetermined period of travel to thereby maintain register of the tongs and finishing mold, means for transferring a blank from the tongs to the finishing mold while said tongs and molds register with each other, a cam controlled swinging lever for causing the holder to move in said curved path, and yielding means normally holding the lever in position to cause register of the holder and blank mold when the arm is retracted.

11. In a machine for forming glass articles, the combination of a continuously rotating blank mold carriage, a blank mold thereon, a continuously rotating finishing mold carriage, a finishing mold thereon, said carriages arranged side by side, an arm mounted on one of said carriages, a parison transfer device supported on said arm, means for projecting said arm radially outward, and cam controlled means for moving the transfer device relative to said arm in a direction transverse thereof.

12. The combination of a continuously rotating blank mold table, a blank mold thereon, a continuously rotating finishing mold table, a finishing mold thereon, said tables arranged side by side, an arm mounted on the blank mold table, a transfer device carried by said arm, means for projecting said arm radially outward and thereby causing the transfer device to carry a parison from the blank mold to the finishing mold, a cam, and operating connections between the cam and the transfer device for moving the latter relative to said arm in a direction transverse thereof and thereby causing the transfer device to advance during a transfer period at the same speed as the finishing mold.

Signed at Toledo, Ohio, this 7th day of January, 1930.

JOHN RALPH HOGE.  
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