Nov. 1, 1927.

1,647,532

E. H. LORENZ

GLASS BLOWING MACHINE

Filed Sept. 1, 1922

Fig. 2.

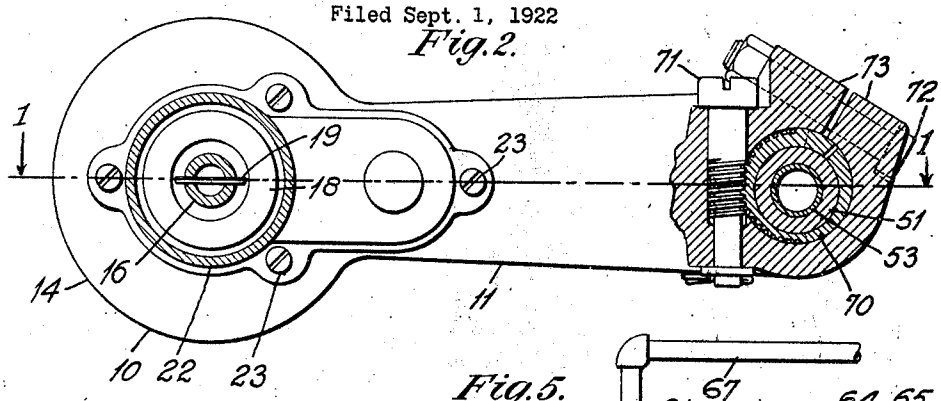


Fig. 5.

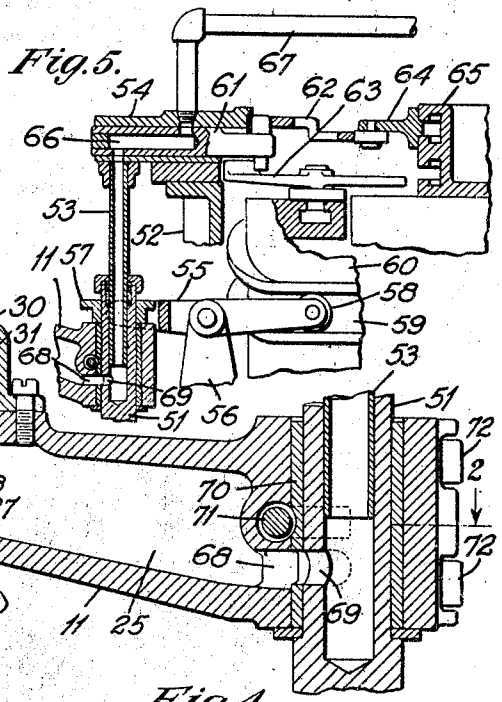


Fig. 1.

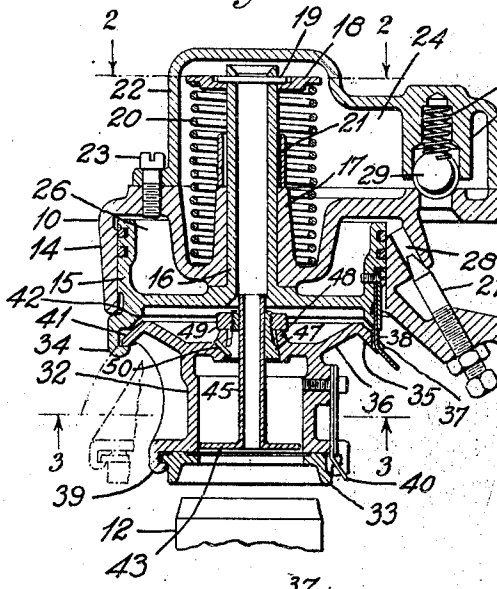


Fig. 4.

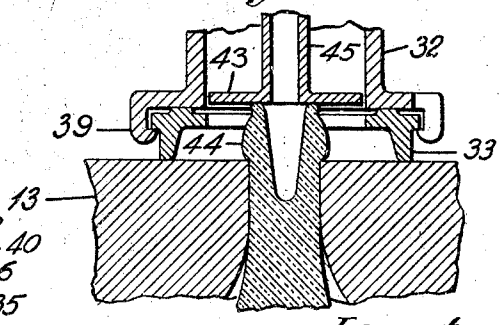
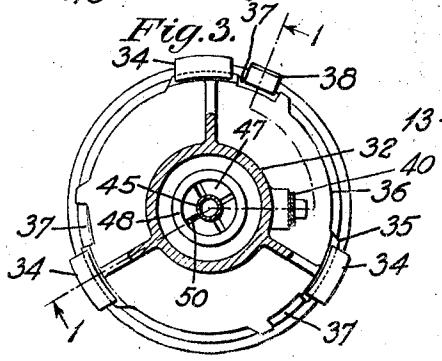


Fig. 3.



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UNITED STATES PATENT OFFICE.

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GLASS-BLOWING MACHINE.

Application filed September 1, 1922. Serial No. 585,638.

This invention relates to glass blowing machines, its object being to provide an improved blowhead, which among other things is adapted to utilize compressed air from a single source of supply to produce different pressures for the blowing and holding down operations of the blowhead. This differential pressure is automatically maintained throughout any changes in the pressure of the air supply, whereby the blowing pressure is prevented from overcoming the holding down pressure and consequently the blowhead remains firmly seated upon the mold throughout its blowing operations.

The compressed air for the blowing and holding down operations of the blowhead is periodically admitted from a supply source to a chamber from which the separate supplies are taken for said blowing and holding down operations, by means synchronized to admit the air to said chamber in proper time relation to the time the blowhead is brought into position to cooperate with the mold.

The invention also includes a freely adjustable blowhead portion, which when moved into engagement with the molds automatically becomes adjusted to properly seat itself thereon regardless of any slight angular or lateral variations in the position of the molds or the blowhead from time to time. The invention further includes improved means for manually adjusting the blowhead to accurately center it with the molds by shifting it transversely thereof and also improved means for automatically moving the blowhead up and down into cooperative relation with successive molds.

Further objects will appear from the following description, taken in connection with the accompanying drawing illustrating one embodiment of the invention.

Figure 1 is a sectional elevation of a blowhead, taken on line 1—1 of Figs. 2 and 3;

Fig. 2 is a plan view, in section, on line 2—2 of Fig. 1;

Fig. 3 is a bottom view, in section, taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged detail section showing the application of the blowhead to the finishing mold; and

Fig. 5 is a fragmentary sectional elevation of a portion of the mechanism for raising and lowering the blowhead, and for controlling the supply of air thereto.

Blowheads embodying the present invention may be used with or adapted to different types of glass making machines, including those in which the blowheads and the molds are carried on a revolving turret, and the blowheads are swung into and out of engagement with the molds for the different blowing operations at the several stations provided.

The blowhead 10 is carried on the outer end of an arm 11 and is adapted to cooperate, first with the parison mold or neck ring 12 for counterblowing the blank or parison, (Fig. 1) and thereafter with the blow mold 13 for imparting the finishing blow to the bottle. (Fig. 4).

The blowhead includes a cylinder 14 in which is mounted a piston 15 having a hollow stem 16, slidably mounted in the bearing 17 on the cylinder head. Secured upon the upper end of the piston stem is a washer 18, which is held in position by a pin 19 removably inserted through the stem 16. A spring 20 is interposed between the washer and head of the cylinder to maintain the piston in its uppermost position when not in operation, the piston being limited in its downward movement by a stop 21 extending upwardly from the bearing 17. Disposed upon the top of the cylinder is a cap or cover 22, secured by screws 23, the cover, in conjunction with the top of the cylinder, forming an air chamber or passage 24 in free communication with the hollow piston stem 16.

The arm 11 is in the form of a casing or receptacle, thus affording an air chamber 25 from which compressed air is supplied, both for holding the blowhead down upon the mold and for blowing the blank therein.

The supply of air to the piston chamber 26 for holding the blowhead down upon the mold is regulated by an adjustable valve 27 serving to vary the size of the passage 28, whereby the flow of air to the piston chamber may be regulated, as may be required. The air pressure applied through the piston

stem 16 for blowing the bottle is always less than that for holding the blowhead down upon the mold, although both supplies are taken from the common supply chamber 25. This difference is caused by interposing a valve 29 between the chambers 24 and 25, the valve being held down by a spring 30 disposed within a depending boss 31 on the cover 22. The spring is of such a capacity as to permit the valve to open only after or about the time the blowhead is seated upon the mold, at which time the pressure builds up in the chamber 25 sufficiently to overcome the resistance of the spring 30, the strength of which is according to the differential air pressure desired.

By this means separate supplies of air of different pressures are obtained for the blowing operation and for the holding down operation of the blowhead, the differential remaining constant at all times, according to the pressure of the spring 30. If these two air pressures were equal or nearly equal, the blowing pressure might overcome the holding down pressure and cause the blowhead to become unseated upon the mold during the blowing operation.

The piston 15 constitutes a support for a depending freely adjustable device for cooperation with the molds, which will automatically assume correct position upon the molds regardless of any slight angular or lateral variations either in the position of the molds or of the blowhead. This device, which is quickly detachable, is made up of a plurality of relatively movable parts free to assume different positions of adjustment relative to the piston and also relative to each other. This device comprises the air cup 32 and mold cap or ring 33, the former serving as a carrier for the latter. A plurality of lugs 34 extend downwardly from the piston 15, and inwardly beneath lateral projections 35 on the annular portion 36 of the cup 32. The cup may be readily removed from and replaced in the piston by turning it far enough to move the projections 35 out of or into coincidence with the lugs 34. The flange 36 of the cup is provided with a plurality of notches 37, preferably located adjacent the projections 35, one of which is adapted to receive a spring 38 secured upon and extending downwardly from the piston 15, whereby the cup is prevented from accidentally turning and thus becoming displaced from the piston.

The mold cap or ring 33 is detachably carried by the lugs 39 on the cup 32 in the same manner as that just described in connection with the mounting of the cup upon the piston. The ring 33 is prevented from accidental displacement from the cup 32 by a spring 40 secured upon the cup and projecting downwardly into one of a plurality of notches formed in the ring. Sufficient play is provided between the ring 33 and lugs 39 to permit of a slight lateral movement of the ring upon the cup, in order that it may freely accommodate itself to the molds to insure proper contact therewith. Likewise a certain amount of play is provided between the lugs 34 and projections 35 on the flange 36 of the cup in order that the cup may be free to shift laterally upon the piston.

The depending mold cooperating parts carried by the piston, including the cup 32 and ring 33 are mounted for angular movement upon the piston to take care of any angular variations in the position of the molds with respect to the blowhead. The flange 36 of the cup 32 is provided with a spherical seat 41, which is adapted to seat upon the annular inclined surface 42 of the piston, whereby a line-contact is made between the cup and piston to produce an air tight joint to prevent escape of the blowing air, which comes downwardly through the stem 16 of the piston. The center of curvature of the spherical surface 41 is disposed substantially in the plane of the top or sealing surface of the blank mold when the blow head occupies an operative position relative to this mold, as illustrated in Fig. 1, and very close to the top or sealing surface of the blow mold when the blow head occupies an operative position relative to this mold, as illustrated in Fig. 4, whereby tilting movement of the blow head does not displace it laterally to any great extent relative to either of these molds. In other words, the mold engaging surfaces of the blow head are disposed entirely within a sphere defined by a continuation of the curved surface of the socket within which the supporting member 32 is mounted. With this construction, if any mold happens to be slightly tilted, with respect to the blowhead, the cup will similarly tilt upon the piston and align itself with the mold; so that the axes of the cup and mold will be parallel. If any mold is slightly displaced laterally of the blowhead, the clamping ring 33 will shift laterally to a similar extent upon the cup to accommodate itself to the mold and form an air tight joint therewith.

A sealing plate 43 is adapted to lightly engage the top of the parison 44 (Fig. 4) at the time the mold cap 33 is moved into engagement with the mold, whereby the air for blowing the bottle is prevented from escaping around the top. The sealing plate is provided with a hollow stem 45 preferably projecting into the stem 16 of the piston, with sufficient looseness to allow its upper end to swing freely with the cup 32 on its spherical seat 41, when tilted as above described. The sealing plate is supported in the cup 32 by means of a tapered split clamp

or collet 47 surrounding the stem 45, so that when the nut 49, threaded upon the end of the collet, is screwed down upon the boss 48, the split jaws of the collet will clamp the stem. By loosening the nut 49, the sealing plate may be readily adjusted to the desired height, according to the distance the top of the parison or bottle projects above the mold 13. The collet is prevented from turning by means of a pin 50, extending through the boss 48 into the space between two of the jaws of the collets, (Fig. 1).

Since it is desirable to use the blowhead with molds of different proportions to produce articles of ware varying in size, the depending mold cooperating device carried by the piston may be readily removed as a unit and another similar unit of different proportions substituted therefor, as indicated by the larger unit shown in dotted line position in Figure 1.

The arm 11 of the blowhead is clamped upon a hollow shaft 51, the lower end of which is slidably mounted in a bearing (not shown) on a suitably rotated turret 52, (Fig. 5). Telescoped into the hollow shaft 51 is a tube 53, the upper end of which is secured to a valve casing 54, also carried by the turret 52, the shaft 51 being adapted to freely slide upon the tube. To move the blowhead into and out of position to cooperate with the mold, the arm 11 is adapted to be raised and lowered by a lever 55 pivoted on a bracket 56 adapted to be supported by the turret 52. The outer end of the lever is forked and suitably connected with the grooved collar 57 on the upper end of the hollow shaft 51, while the inner end of the lever is provided with a roller 58, adapted to travel in a cam path 59 on a stationary cylinder or casing 60, about which the turret 52 rotates.

The shaft 51 may be oscillated by any suitable means (not shown) to swing the arm 11 so as to move the blowhead into and out of vertical alignment with the mold, in case it is desired to swing the blowhead clear of certain parts of the machine, during the rotation of the turret.

Compressed air for holding the blowhead down and for blowing the blank and bottle is periodically supplied to the chamber 25 in the arm 11 from a distributor or main supply source (not shown). This air is controled by a valve 61 in the casing 54, the valve being moved to open and closed position by suitable means timed to actuate the valve at the proper moment, such means preferably including the upper and lower pivoted members 62 and 63 on the stationary cylinder 60, the members being actuated by a series of wipers 64 on a rotating drum 65, concentric with the casing 60 and turret 52. The air from the distributor is supplied to the valve chamber 66 by means of a pipe 67 and passes downwardly from said chamber through the tube 53 into the supply chamber 25 by way of the registering openings 68 and 69 located respectively in the arm 11 and hollow shaft 51. The opening 69 is elongated in order that the opening 68 may register therewith when the arm is adjusted angularly upon the shaft 51.

Lengthening or shortening of the blowhead arm to adjust it to the mold distance is effected by means of the split eccentric 70, interposed between the arm 11 and shaft. The eccentric is turned by turning the screw 71, the thread of which engages the eccentric as a worm wheel. After adjustment, the arm 11 is clamped upon the eccentric and the eccentric upon the shaft 51 by means of the bolts 72, which extend through the split jaws 73 of the arm, (Fig. 2).

The illustrated embodiment of the invention may be modified in construction, arrangement and operation, to adapt it to different conditions, without departing from the scope of the invention as expressed in the appended claims.

I claim:

1. In combination with a mold having a sealing surface, a blow head cooperating with said mold and comprising a vertically movable support, and a depending member mounted for free tilting movement relative to said support, the center of said tilting movement being disposed substantially in the plane of the sealing surface of said mold when said blow head occupies an operative position with respect thereto.

2. In combination with a mold having a sealing surface, a two-part blowhead cooperating with said mold and having a ball and socket joint connecting said parts, the center of curvature of said joint being disposed substantially in the plane of the sealing surface of said mold when said blowhead occupies an operative position with respect thereto.

3. A blowhead comprising a support having a concave surface, and a member carried by said support and having a coacting convex surface for seating engagement with said concave surface, the center of curvature of said coacting surfaces being disposed substantially in the plane of the lower surface of said member.

4. A blowhead comprising a support having a conical seat, a member having a coacting spherical portion adapted to pivotally engage said seat, and a sealing ring carried by said member for engagement with a mold, the center of pivotal movement of said member being disposed substantially in the plane of said sealing ring.

5. A blowhead comprising a support having a concaved seat, a member having a coacting convexed portion adapted to pivotally engage said seat, and a laterally movable sealing ring carried by said member for en-

gagement with a mold, the center of pivotal movement of said member being disposed substantially in the plane of the top surface of said mold when said blowhead occupies an operative position with respect thereto.

6. In a glass blowing machine, the combination with a blow mold, of a blow head, a fluid pressure device for moving said blow head into and out of operative position with respect to said mold, a single fluid pressure chamber having separate passages leading to the blow head to supply blowing air thereto and to the fluid pressure device to actuate the blow head, and means closing one of said passages and arranged to automatically open when the air in the chamber exceeds a predetermined pressure.

7. In a glass blowing machine, the combination with a blow mold and a pressure operated blowhead, of a pressure chamber having separate supply passages leading to the blowhead for supplying air to move the head into engagement with the mold and to blow the blank therein, an automatic valve for the passage controlling the supply of blowing air arranged to open subsequently to the movement of the head, and means timed to periodically supply compressed air to said chamber for each operation of the blowhead.

8. In a glass blowing machine, the combination with a blow mold and a pressure operated blowhead, of a pressure chamber, means for admitting separate supplies of air from said chamber to the blowhead at different pressures, one of said supplies being applied to operatively position the blow head relative to the mold and the other of said supplies being applied to provide blowing pressure, and means timed to intermittently supply compressed air to said chamber for each operation of the blowhead.

9. In a glass blowing machine, the combination with a blow mold and an air supply chamber, of a pressure actuated blowhead having separate air passages leading to said chamber to admit air to the blowhead for positioning the blow head relative to the mold and provide blowing pressure, a valve for controlling each of said passages, the valve for the blowing air passage being adapted to transmit the blowing air at a pressure below that serving to actuate the blowhead, and means for moving the blowhead toward and from the mold.

10. In a glass blowing machine, the compination with a blow mold and an air supply chamber, of a pressure controlled blowhead, including a cylinder and a piston provided with a plurality of independently movable parts adapted to form a closure for the mold and to accommodate themselves to relative angular and lateral displacement of the axes of the blowhead and the mold, and means for controlling the admittance of separate supplies of air from said chamber to the blowhead at different pressures for actuating the piston and blowing the blank in the mold.

11. In a glass blowing machine, the combination with an air supply chamber and a blowhead, including a cylinder adapted for communication with the chamber, of a piston in the cylinder provided with a plurality of mold cooperating parts, each of which is freely adjustable laterally of the piston, and means positioned exteriorly of the cylinder for admitting air from the chamber to the blowhead at a pressure different from that in the cylinder.

12. In a glass blowing machine, the combination with a blow mold and an air supply chamber, of a blowhead including a cylinder and a piston having a depending freely adjustable device for cooperation with the mold, means for controlling a supply of air from said chamber to the cylinder for actuating the piston, and independent means for automatically admitting a separate supply of air from the chamber to said depending device for the blowing operation at a pressure different from that for actuating the piston.

13. In a blowhead, the combination with a cylinder and a piston, of a depending device connected with the piston comprising a plurality of relatively movable members, each of which is free to be adjusted laterally with respect to the piston and one of which is adapted to form a cap for a mold, a sealing plate carried by one of said members, means for admitting fluid under pressure to the cylinder above the piston and through the sealing plate.

14. In a blowhead, the combination with a cylinder and a piston, of a depending member mounted for free tilting movement relative to the piston, a mold cap mounted for free lateral movement upon said member, and a ware engaging sealing member supported by said depending member.

15. In a blowhead, the combination with a cylinder and a piston, of a depending member mounted for free tilting movement upon the piston, a mold cap mounted for free lateral movement upon said depending member, a ware engaging sealing member, and means for adjustably supporting said sealing member upon said depending member.

16. In a blowhead, the combination with a cylinder and a support therefor, of a piston within the cylinder provided with an annular seat and a plurality of lugs, and a detachable mold cooperating device carried by said lugs, comprising a plurality of relatively movable parts, one of which is mounted for free adjustment upon said seat and another for lateral adjustment with respect to said piston.

17. In a blowhead, the combination with a cylinder and a support therefor, of a pis-

ton provided with an annular seat and a plurality of depending lugs, and a device supported by said lugs for free tilting movement upon said seat and having a freely laterally adjustable portion adapted to form a cap for a mold.

18. In a blowhead, the combination with a cylinder and a piston, of a depending member having a universal connection with the piston, a sealing plate adjustably mounted upon said member, and a second member mounted for lateral movement upon the first member and adapted to accommodate itself to a mold when seating thereon.

19. In a blowhead, the combination with a cylinder and a piston, of a device carried by the piston comprising two relatively movable members one of which is free to adjust itself upon the piston according to the inclination of the axis of the mold and the other to accommodate itself to the lateral position of a mold when seating thereon, a sealing plate carried by one of said members, and means for admitting a supply of fluid to the cylinder to actuate the piston.

20. The combination with a mold, of a support, a blowhead carried thereby for cooperation with the mold, an adjustable eccentric rotatable upon the support and adapted when actuated to shift the blowhead laterally relative to the axis of the mold.

21. The combination with a shaft and a blowhead support having a portion through which the shaft extends, of an adjustable eccentric interposed between the shaft and said support to shift it laterally of the shaft, and means for effecting the clamping of said support upon the eccentric to clamp the eccentric upon the shaft.

22. The combination with a shaft and a blowhead including an arm through which the shaft extends, of an eccentric split-bushing interposed between the arm and shaft, a screw operatively associated with the bushing for turning it to effect lateral adjustment of the arm upon the shaft, and means for clamping the arm upon the bushing to clamp the latter upon the shaft.

23. In combination with a mold having a sealing surface, a blow head cooperating with said mold and comprising a support having a curved recess, a member depending from said support and having a portion shaped to movably engage said recess, and another portion shaped for sealing engagement with said mold, the portion of said member adapted to engage said mold being disposed wholly within the sphere defined by a continuation of the curved surface of said recess.

24. In a glass blowing machine the combination with a blow mold and an air supply chamber, of a pressure controlled blow head, including a cylinder and a piston provided with a plurality of independently movable parts adapted to form a closure for the mold, one of said parts being mounted for tilting movement relative to the axis of the mold and another of said members being mounted for floating movement in a direction transverse to the axis of said first mentioned member to accommodate themselves to relative angular and lateral displacement of the blow head and the mold, and means for controlling the admittance of separate supplies of air from said chamber to said cylinder and said blow head at different pressures for actuating the piston and blowing the blank in the mold.

25. In a glass shaping machine including a mold, the combination of a support having a curved recess therein, and a blow head having a portion shaped for movable engagement with said recess and a portion shaped for sealing engagement with said mold, the plane of the sealing surface of said mold intersecting the sphere defined by a continuation of the curve of said recess when said blow head is in operable engagement therewith.

26. In a glass shaping machine including a blank mold and a cooperating blow mold, the combination of a blow head comprising a support having a curved recess therein, and a portion shaped for movable engagement with said recess, a portion shaped for sealing engagement with said blank mold and a portion shaped for sealing engagement with said blow mold, the planes of said sealing surfaces intersecting the sphere defined by a continuation of the curve of said recess.

27. In a glass shaping machine including a mold, the combination of a support having a curved recess therein, and a blowhead having a portion shaped for movable engagement with said recess, and a portion shaped for sealing engagement with said mold, the latter portion of said blowhead being located between parallel planes disposed normal to the axis of said blowhead and tangent to the sphere defined by a continuation of the curve of said recess.

Signed at Hartford, Conn., this 30th day of August, 1922.

EDWARD H. LORENZ.