March 16, 1926. 1,577,131

R. LA FRANCE

BOTTLE MACHINE

Original Filed May 24, 1919 4 Sheets-Sheet 1

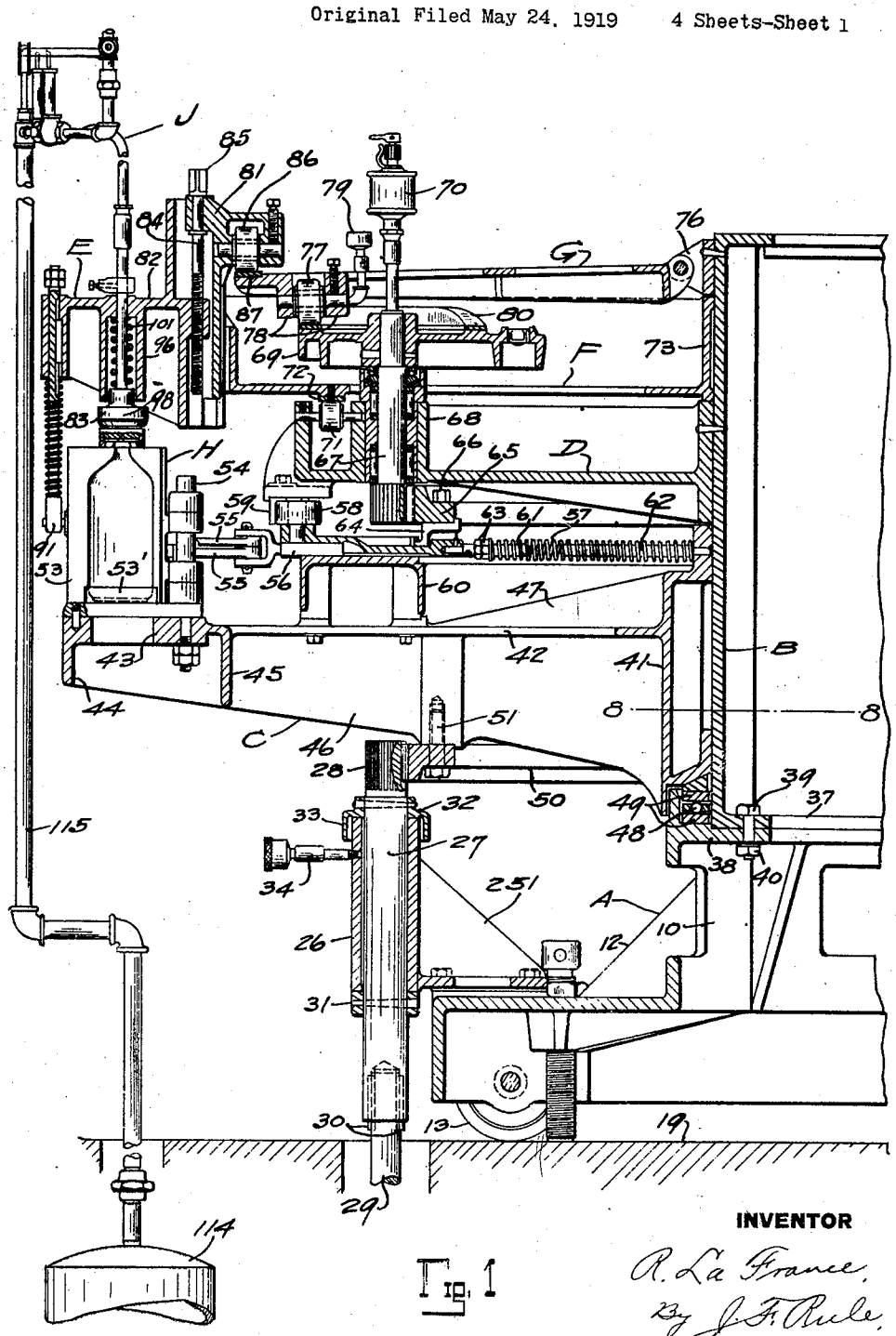


Fig. 1

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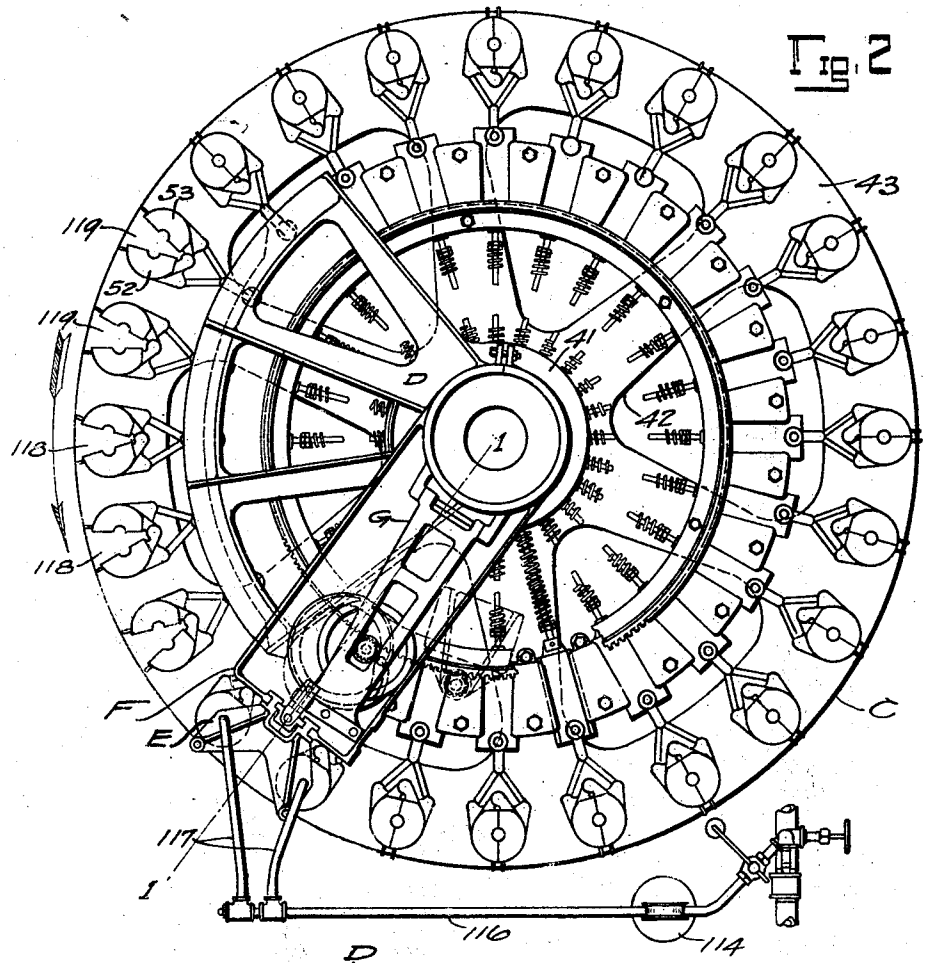
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R. LA FRANCE

BOTTLE MACHINE

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Fig. 2



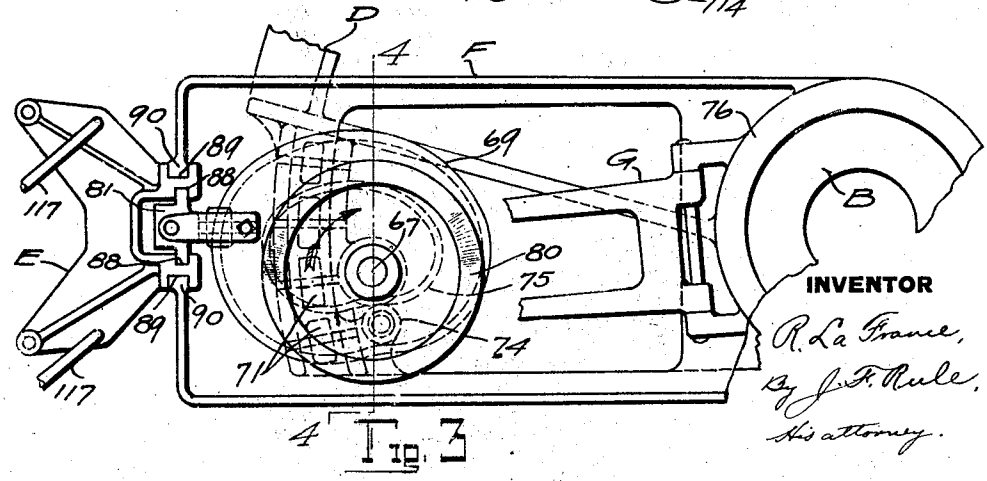


Fig. 3

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BOTTLE MACHINE

Original Filed May 24, 1919 4 Sheets-Sheet 3

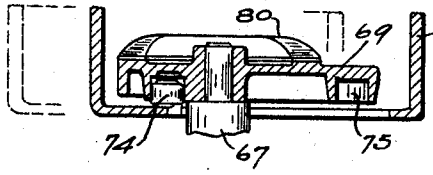
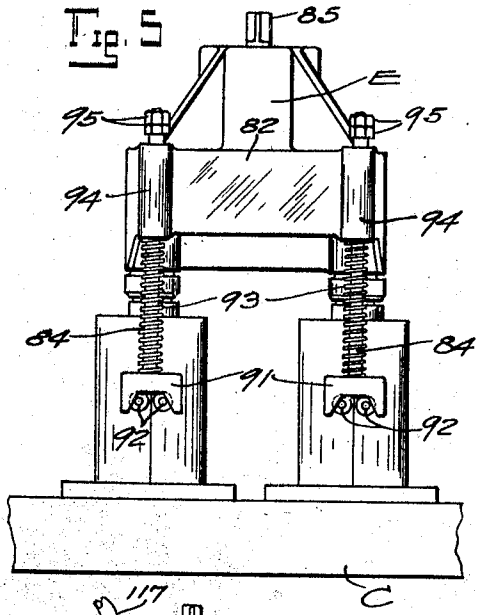


Fig. 4

Fig. 5



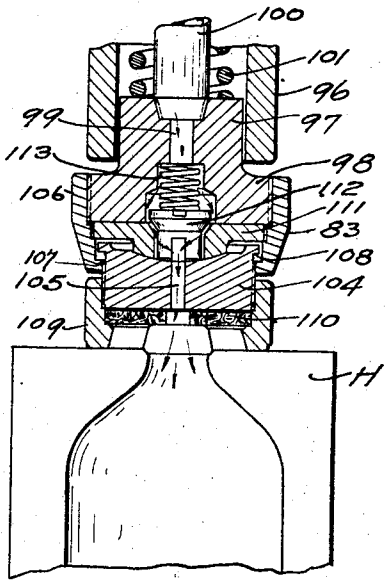


Fig. 6

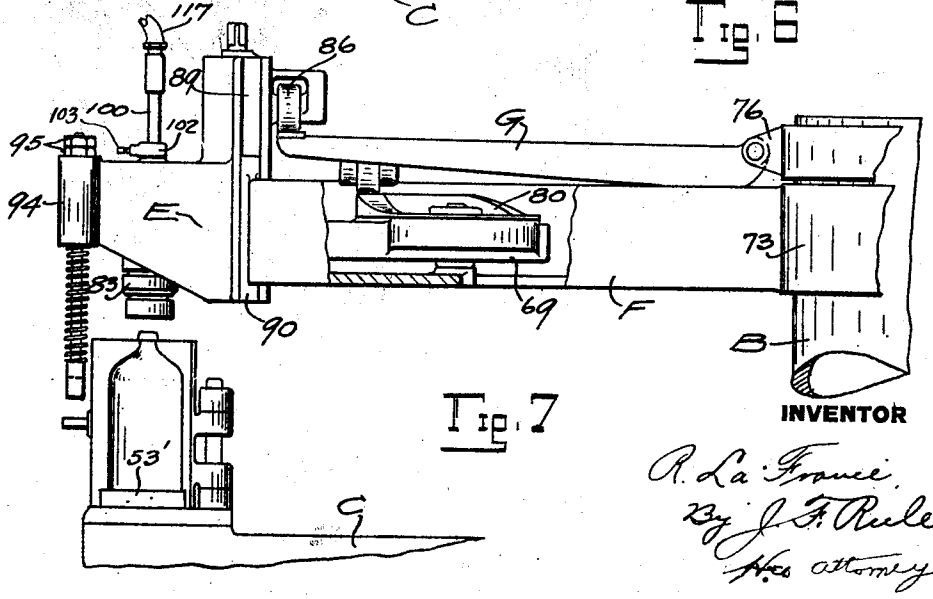


Fig. 7

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March 16, 1926. 1,577,131

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BOTTLE MACHINE

Original Filed May 24, 1919 4 Sheets-Sheet 4

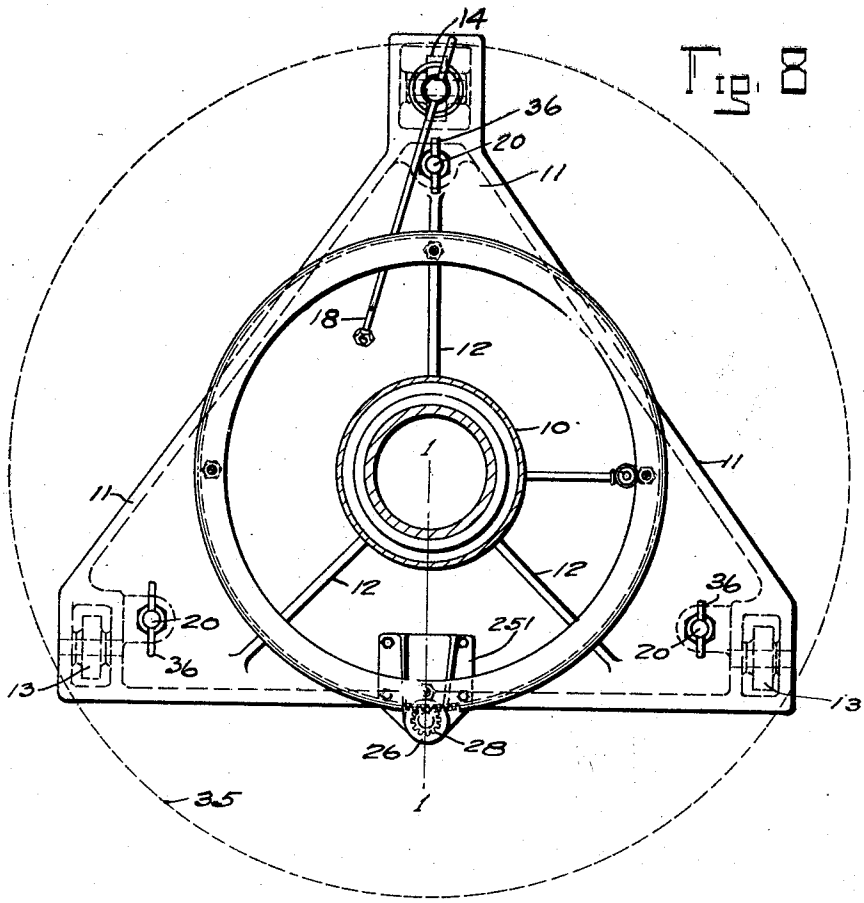


Fig. 8

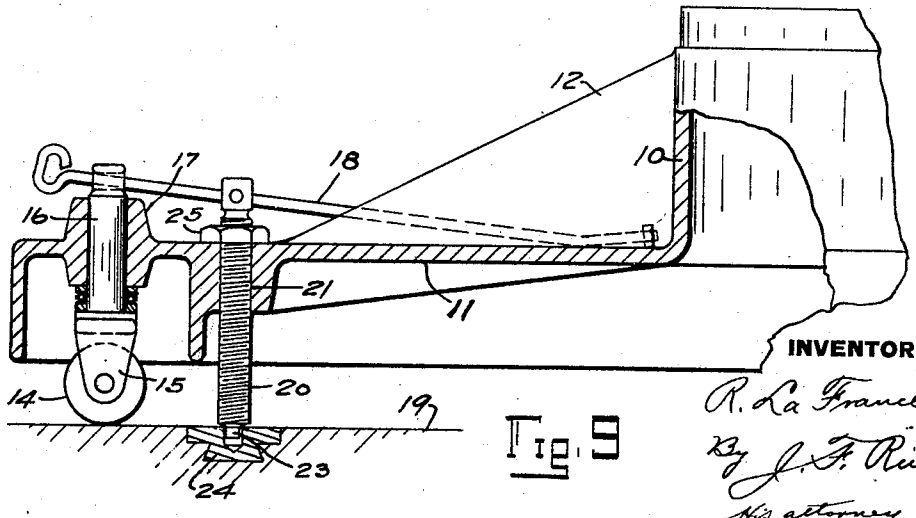


Fig. 9

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Patented Mar. 16, 1926. 1,577,131

UNITED STATES PATENT OFFICE.

RICHARD LA FRANCE, OF TOLEDO, OHIO, ASSIGNOR TO THE OWENS BOTTLE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

BOTTLE MACHINE.

Application filed May 24, 1919, Serial No. 299,430. Renewed March 21, 1924.

To all whom it may concern:

Be it known that I, RICHARD LA FRANCE, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented new and useful Improvements in Bottle Machines, of which the following is a specification.

The present invention relates to machines for reshaping or preventing distortion of bottles or other glass containers after they are discharged from the usual finishing molds in which they are blown. It is customary to discharge the bottles from the finishing molds while they are still very hot and in a somewhat plastic state. In making certain kinds of bottles, such as "siphons" or other bottles of considerable size and weight, the bottles are not always sufficiently hardened or set when the finishing molds are opened to retain their shape, or support their own weight without partially collapsing or becoming distorted.

The primary object of the present invention is to overcome this difficulty and for this purpose there is provided a machine comprising a set of re-forming molds to receive the bottles when they are taken from the usual blowing molds. The re-forming molds, which may be mounted on a continuously rotating mold table, are closed on the bottles and air pressure supplied through blow heads which are applied to the molds in succession to re-blow the bottles to their normal shape if they have become distorted. The air pressure is maintained in each mold for a short interval only, but the bottles are supported in the molds for a longer time, during which they cool sufficiently to retain their shape when the molds are open, permitting them to be transferred to the leer.

A further advantage of the present invention is that it permits the bottles to be taken from the usual blow molds while hotter than would otherwise be permissible. The length of time the bottles are required to remain in the blow molds is thus reduced and the output of the machine correspondingly increased.

The present application discloses certain subject matter disclosed and claimed in my co-pending application Serial Number 420,905, filed November 1, 1920, glass blowing machines.

The various features of the invention will be more fully understood upon reference to the following description taken in connection with the accompanying drawings, while the scope of the invention will be more particularly pointed out in the appended claims.

In said drawings:

Figure 1 is a partial sectional elevation of a machine constructed in accordance with the present invention, the planes of section being vertical and indicated by the lines 1—1 of Figs. 2 and 8;

Figure 2 is a plan view of the entire machine;

Figure 3 is a plan view of the blow-head supporting arms showing particularly the cam by which said arms are actuated;

Figure 4 is a transverse section of said cam and one of said supporting arms, the plane of section being indicated by the line 4—4 of Fig. 3;

Figure 5 is a front view of the blow-head and associated molds, illustrating particularly the locking device for holding the separable parts of the molds together;

Figure 6 is a view illustrating one-half of a mold with a bottle in position and the associated air supply passage and control valve in the blow-head, the latter being shown in vertical section;

Figure 7 is a side elevation of a portion of the machine illustrating particularly the blow-head and its associated parts in raised position above the molds;

Figure 8 is a plan view of the base, the center column being shown in section taken on a plane indicated by the line 8—8 of Fig. 1;

Figure 9 is a sectional view of a portion of the base showing particularly the retaining screws by which the machine is held in a fixed position upon the floor.

Throughout these views like characters refer to like parts.

Referring to the drawings in detail, A designates the base of the machine; B a center column supported upon the base; C a rotary mold carrying table, rotatable about the center column; D a fixed support or cam segment projecting from the center column into proximity to the mold path; E a blow-head having a cyclic movement into and out of engagement with the molds; F an oscillating arm for giving the blow-head its horizontal movement; G an oscillating arm for giving the blow-head its vertical movement; H the molds upon the table

C; and J connections for supplying air under pressure to the blow-head E.

The base A consists of a suitable metal casting having an upwardly extending annular portion 10 and outwardly extending flat portions 11. Webs 12 unite these two portions and give strength to the base while keeping its weight at a minimum. The general shape of the base in plan is triangular and at two corners of the triangle small wheels 13 are journaled on horizontal axes. At the third corner a small caster wheel 14 is journaled in a caster 15 whose stem 16 is journaled in a boss 17 formed in the horizontal portion of the base. A rod 18 having a nut or head on its inner end extends through an opening in the upper end of the stem 16 and by means of this rod the stem 16 may be turned to steer the machine as it is being moved about over the floor 19. When the machine has been moved into position for operation, it is held in such position by screws 20 which enter sockets set in the floor. These screws are located adjacent to the wheels 13 and 14, and, in each instance, threaded through an opening in a boss 21 formed in the portion 11 of the base, as clearly illustrated in Fig. 9. The upper end of the screw 20 is provided with a capstan head and the lower end with a projecting point 23 which is adapted to enter an opening in a socket 24 suitably secured to the floor 19, preferably by being set into it, as clearly illustrated in Fig. 9. When the machine has been positioned the screws 20 are turned down so as to enter the socket members 24. If desired, this action may be continued until the base is raised clear of the wheels 13 and 14 or until it is raised sufficiently to take the strain off of those wheels. A lock nut 25 on each screw serves to hold the screw against displacement by any vibration of the machine when in operation. That portion of the base opposite the caster wheel 14 is provided with a bracket 251 (Figs. 1 and 8) having a sleeve 26 which serves as a hanger for a short vertical shaft 27 which terminates at its upper end in a pinion 28 and at its lower end in a socket for the reception of the end of a drive shaft 29. When the machine is in proper position the shafts 27 and 29 are coupled by inserting the latter into the former as described and driving one or more keys 30 into keyways formed in the two shafts. This coupling of the two shafts may be accomplished in various ways. If the shaft 29 is vertically movable, then all that is necessary is to move it up into the socket end of the shaft 27 and key the parts together. If the shaft 29 is fixed then the coupling may be accomplished by removing and replacing the bracket 25, together with the shaft 27, when the machine has been brought into correct position. The shaft 27 is prevented from having a vertical movement by collars 31 and 32 which are firmly secured to it. The collar 32 is also provided with a skirt 33 which surrounds the upper end of the sleeve 36 and keeps dust or moisture from the bearing. A grease cup 34 is also screwed into an opening in the sleeve 26. This cup furnishes lubricant for the shaft 27. In Figure 8 the position of the table C relative to the base A is shown by the dotted line 35. In that figure also, the capstan heads upon the screws 20 are shown provided with short rods or handles 36 for use in turning screws.

The central column B consists of a metal casting of cylindrical form which is provided with a flange 37 at its lower end which fits against a cooperating flange 38 on the base A. The column and base are secured together by means of bolts 39 which pass through these flanges and are firmly secured in place by nuts 40.

The table C is a large circular casting having a central hub 41, a series of spokes or arms 42 and a flat peripheral portion 43. These parts are strengthened by annular ribs 44 and 45, and radial ribs 46 and 47. The hub fits closely against the outer surface of the column B and is supported by the base A. Ball bearings 48 are interposed between the hub 41 and the base A so as to reduce friction. These bearings lie between rings 49, as clearly illustrated in Fig. 1. A circular rack 50 is secured to the webs 46 upon the under side of the table C at suitable points by any suitable means as screws 51. This rack is positioned so as to mesh with the pinion 28. With this construction it will be apparent that as the driving shaft 29 rotates, the pinion 28 and rack 50 will cooperate to rotate the table C.

The molds H are carried on the peripheral portion 43 of the table C and as there shown each mold is composed of halves or sections 52, 53 and a bottom plate 53′. These sections are pivotally mounted upon a vertical pivot 54. Each section is connected by a link 55 to a reciprocating member 56 which is normally pressed outward by a spring 57 and which may be moved inward by means of a cam wheel 58 engaging a cam track 59 upon the under side of the stationary arm D. Whenever a mold is occupying a position in which the associated wheel 58 is in engagement with the cam track 59 the mold sections are moved about their pivot 54 into the open position illustrated at the left in Fig. 2. Whenever the wheel 58 passes out of engagement with the cam track 59, then the sections of the mold are forced together by the spring 57 into the closed position illustrated at the right in Fig. 2. The reciprocating member 56 is guided in its to and fro movements by radial guides upon the annular member 60 secured to the upper surface of the table

C. The spring 57 is coiled about the guide rods 61 and 62. The latter rod is secured at its inner end to the hub 41. The former rod is secured at its outer end to the reciprocating member 56. Nuts 63 are positioned on the rod 61 and may be screwed back and forth to vary the adjustment of the spring 57. When the nuts are screwed to the right, as viewed in Fig. 1, the force of the spring 57 is increased, and when screwed to the left, the force of the spring is decreased. At points between the reciprocating members 56, the annular member 60 is provided with projections or brackets 64 to which a second annular rack 65 is secured by means of screws 66. This rack, like the rack 50, moves with the table C but instead of being used to drive the table it is used to drive a vertical cam shaft 67 journaled in a bearing 68 in the stationary frame D. This cam shaft projects up through an opening in the oscillating arm F and carries the cam 69 which is used in oscillating the arm F horizontally and the arm G vertically. The bearing for the cam shaft is lubricated by means of a lubricant passing down from the oil cup 70. The outer end of the web D is provided with a series of rollers 71 upon which the oscillating arm F rides. The latter is provided with a wear plate 72 on its under side for engagement with the rollers 71.

The arm F is provided with a hub 73 which is fitted upon the column B so that the arm is free to rotate. This rotation, however, is limited by cam 69 as we shall see. The arm F is provided with a cam wheel 74 which travels in a cam track 75 on the under side of the cam 69. The cam track is shaped, as clearly illustrated in dotted lines in Fig. 3, so that as the cam 69 rotates, the arm F will be reciprocated to and fro through a short arc, and its movement will be facilitated by the anti-friction rollers 71, heretofore referred to.

The arm G is pivoted to a bracket 76 secured to the column B. The pivotal connection is such that the arm G is free to move in a vertical direction. This arm is provided with a roller 77 journaled in bearings formed in projections 78 extending from the under side of the arm. In this instance, the bearings are lubricated from an oil cup 79. The roller 77 travels on the cam surface 80 upon the cam 69. This surface is circular with reference to the axis of the cam but is shaped to raise and lower the roller 77 as the cam is rotated. The shape of this portion of the cam is shown more particularly in Figs. 1, 4 and 7.

The blow-head E consists of a blow-head frame, comprising the parts 81 and 82, and a head proper 83. The latter makes direct contact with the molds and supplies air under pressure directly to the bottles in the molds to reblow them. The two parts of the frame, which are preferably castings, are adjustably connected and serve as the connecting means between the head 83 and the oscillating arms F and G, the part 81 directly engaging said arms and the part 82 carrying the head. The relative positions of the parts 81 and 82 may be adjusted by means of a threaded rod 84 which is journaled to rotate in the part 81 without longitudinal movement but has threaded engagement with an opening in the part 82. As the rod 84 is rotated, by the application of a wrench or other suitable tool to its head 85, the parts 81 and 82 of the blow-head are adjusted vertically with reference to each other. The part 81 carries a roller 86 which is free to travel in a horizontal direction upon the track 87 located upon the upper side of the outer end of the arm G. This same part 81 moves in guide ways 88 in the part 82, as illustrated more particularly in Fig. 3, and the latter part is provided with guide ways 89 which are engaged by guiding projections 90 upon the adjacent portion of the arm F.

From this description it will be seen that the blow-head E will be raised whenever the outer end of the arm G is raised by the cam surface 80. Likewise, it will be reciprocated horizontally whenever the free end of the arm is reciprocated by reason of the engagement of its cam wheel 74 with cam track 75. These cam surfaces are so positioned that the blow-head has a cyclic movement from a starting point down to the molds, then along with the molds while in its lower mold-engaging position, then upward away from the molds and finally back in an elevated position to the starting point. This movement is made up of the component horizontal and vertical movements furnished by oscillations of the arms F and G.

When the blow-head E descends into position where its heads 83 engage the molds then the spring pressed yokes 91 (Figs. 1 and 5) are moved downward to engage projections 92 upon the divided halves of the mold to force those halves together and, in in each instance, to lock the mold in its closed position. As clearly shown in Fig. 5, the inner surfaces of the locking member 91 are inclined inward and upward and consequently as the yoke moves downward, the projections 92 are moved together and the parts of the mold are firmly held closed. In each instance, the yoke 91 is secured to the lower end of a rod 93 which passes through a vertical guide way 94 in the part 82 of the blow-head E, and adjusting nuts 95 are screwed on its upper end to properly adjust the position of the yoke with reference to the head. In the cyclic movement of the head E, the yokes 91 engage the pro-

jections 92 to lock the molds at the time when the head is moving downward toward the molds. These locks remain in locking engagement during the travel of the head in contact with the molds and do not leave that engagement until the head moves upward away from the molds just prior to returning to its starting point.

The blow-head E is preferably provided with two heads 83 which engage the molds and through which air under pressure is supplied to bottles in the molds. In the case of each of these heads, a tubular extension 96 on the under side of the part 82 of the head provides a guide way for the shank 97 of a plug-like member 98. This latter member forms part of the head 83 and is provided with an air passage 99. The latter is in communication with the interior of a pipe or tube 100 which extends freely through an opening in the part 82 so as to be movable relative to it. This movement in one direction is brought about by a coiled spring 101 which surrounds the tube 100 and bears at one end against the plug member 98 and at its other end against a portion of the part 82. The movement of the tube 100 under the influence of the spring 101 is limited by a stop 102 which is in the form of a sleeve surrounding the tube 100 and secured in adjusted position by set screw 103. When in limiting position, the stop 102 engages the upper face of the part 82 of the head E. The movement of the rod 100 in opposition to the spring 101 is brought about by the engagement of the head 83 with the mold at the time the blow-head E descends. The complete head 83 includes not only the plug-like member 98 but also the member 104 which is provided with a central air passage 105 and has a lost motion connection with the plug 98. The lost motion is provided by means of a ring 106 which carries at its lower end a flange 107 which cooperates with a flange 108 upon the upper end of the member 104. The member 104 is also provided with a ring 109 which directly engages the mold H, and between the flanged end of this ring and the member 104 is an apertured asbestos member 110 which comes directly into engagement with the end of the bottle within the mold. The aperture in the latter member registers with the passage 105. The flanged ring 106 also secures the valve seat 111 in place in tight engagement with the under side of the plug 98. With this construction, the parts 104, 109 and 110 have a free limited movement with reference to the parts 98, 106 and 111. A valve 112 is located in an enlargement of the air passage 99 and is normally forced downward by a spring 113 into engagement with the seat 111. However, when the head 83 is moved downward into engagement with the mold H, the member 104 is moved upward into engagement with the lower end of the valve 112, and the latter is thereby raised from its seat against the pressure of the spring 113 and air is free to pass from the tube 100 through the passage 99 past the valve and out through passage 105 into the bottle in the mold.

Air under pressure is supplied to the tube 100 through any suitable connections J. In the present instance a supply tank 114 is shown connected by pipes 115 and 116 to flexible tubes 117 which are connected to the tubes 100.

In operation, the table C is continuously rotated. The result of this rotation is to give the blow-head the cyclic movement as heretofore described and at the same time open and close the molds at the points indicated in Fig. 2. When the machine is thus running an attendant takes the more or less plastic bottles from the machine in which they have been blown—and from which they are taken before they are sufficiently cooled to retain their shape—and places them in the open molds H in the receiving positions 118, shown more particularly in Fig. 2. The molds with the bottles in them then pass on to a point adjacent to the blow-head E. At this point the cam track 59 terminates and the molds are closed through the action of the associated springs 57. Then the blow-head descends upon the molds and the yokes 91 securely lock them in closed position. As the blow-head E descends each head 83 engages the upper end of a mold and by moving the member 104 upward opens the valve 112 and air under pressure flows into the bottle in the mold. This application of air reblows the bottle and restores it to normal shape if it has become distorted. The mold cavities of the molds H are preferably the same size and shape as those of the molds from which the bottles have been transferred, or may be slightly larger.

While this reblowing is taking place the molds continue their travel and the blow-head travels with them. Finally, the blow-head is withdrawn from the molds and the members 104 of the heads 83 return to normal and allow the valves 112 to close and thus shut off the air supply. The molds with their reblown bottles in them continue their travel until the point is reached where the molds are again opened by the cam track 59 engaging the cam wheel 58. This occurs when the molds reach the first of the delivery positions 119. When these positions are reached, an attendant removes the bottles from the machine. During their travel from the blowing position to the discharge position the bottles have become sufficiently cooled to retain their shape when taken

from the machine. The operation is continuous, as will be apparent from the description given. In a machine constructed on the lines herein disclosed, the arm G may be given a movement of about three degrees in order to move the blow-head into and out of engagement with the traveling molds. The descent of the head occurs just after it begins its travel in the same direction as the molds and its rise occurs just before it reaches the end of its movement in that direction. This action is brought about by properly arranging the cam surfaces upon the cam 69. In the embodiment of the machine on the lines depicted in this application I find that satisfactory results are obtained by maintaining the blow-head in blowing position upon the bottles during a travel of the molds through approximately seven inches. The extent of movement of the arm G and the period of rotation during which blowing occurs are, of course, matters well within the skill of the engineer or designer planning the machine. The figures given are, therefore, merely illustrative of what I found to be satisfactory in practice.

It will be apparent that in carrying out my invention, many alterations and changes may be made in the parts disclosed without departing from the spirit and scope of the invention. I aim to cover all such alterations and modifications by the terms of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A bottle machine comprising molds traveling in a substantially horizontal plane, an oscillating arm movable in a substantially horizontal plane, an oscillating arm movable in a substantially vertical plane, a blow-head carried by said arms and subject to the movement of both, said blow-head being positioned above the traveling molds and operative to engage said molds during a portion of their travel, and means for supplying air under pressure to the bottles in the molds during such engagement.

2. In a bottle machine, a support, an arm mounted on said support so as to move in a horizontal plane, a cam and connections for oscillating said arm, a second arm mounted on said support so as to move in a vertical plane, a cam and connections for oscillating said second arm, and a blow-head carried by said arms, said head being free to move vertically with reference to said first arm and horizontally with reference to said second arm, whereby it is given a cyclic movement in response to the oscillations of said arms.

3. In a bottle machine, a support, vertically and horizontally movable blow-head supporting arms mounted on said support, cams and connections for giving each of said arms an oscillatory movement, the one vertically and the other horizontally, a blow-head having a part provided with air connections and a second part for engaging said arms, guiding means on said horizontally movable arm for guiding said second part vertically, a track on said vertically movable arm over which said second part travels horizontally, and means for adjusting the relative positions of said parts.

4. In a bottle machine, a main support, vertically and horizontally movable blow-head supporting arms mounted on said main support, an auxiliary support extending from said main support outward beneath said arms, a track and rollers on said auxiliary support and said horizontally movable arm for facilitating the oscillatory movements of said arm, a shaft carried by said auxiliary support, a cam on said shaft having cam surfaces coacting with said arms to give them their respective oscillatory movements, and a blow-head carried by said arms and subject to their oscillatory movements.

5. In a bottle machine, the combination of divided molds, means to cause the molds to travel continuously in a closed path, automatic means for opening and closing said molds at definite points in their travel, a blow-head, automatic means for bringing said head into engagement with said molds and causing it to travel with the molds for short periods when said molds are closed, and means actuated in response to the movement of said head to firmly lock the molds in position by their engagement with said head.

6. A reshaping and cooling machine constructed and adapted to receive hollow glass articles of finished form as delivered from a forming machine and while they are too soft and plastic to maintain their shape, and reshape and cool said articles, said reshaping machine comprising divided molds traveling in a closed path and conforming in size and shape to said articles as discharged from the forming machine, automatic means for opening and closing said molds at different points in their travel, a blow-head, automatic means for giving said head a cyclic movement from a starting point down into engagement with said the closed molds, along with said molds while thus in engagement, upward away from said molds, and back to the starting point out of engagement with said molds, and means for supplying air to said articles in the molds during such periods of engagement.

7. A reshaping and cooling machine constructed and adapted to receive hollow glass articles of finished form as delivered from a forming machine and while they are too soft and plastic to maintain their shape, and reshape and cool said articles, said re-

shaping machine comprising a mold table, automatic means to rotate it, divided molds on said table conforming in size and shape to said articles of finished form, automatic means responsive to the rotation of said table to open and close said molds at definite points in their travel, a blow-head, automatic means for bringing said head into engagement with a mold while the latter is closed, and causing it to travel with the mold during a definite portion of the travel of the mold and then withdraw, means for supplying air under pressure to said head, a valve for controlling the supply of air under pressure from said head to the article in the mold with which the head is engaged, and means for automatically opening said valve during the engagement of said head with the mold.

In testimony whereof, I hereunto subscribe my name this 20th day of May, 1919.

RICHARD LA FRANCE.