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PRESS MOLD AND MEANS FOR COOLING THE MOLD

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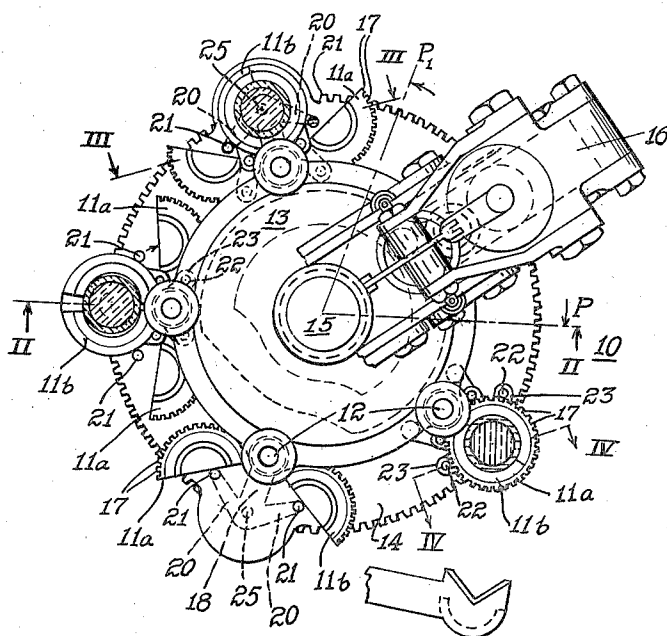


Fig. 1.

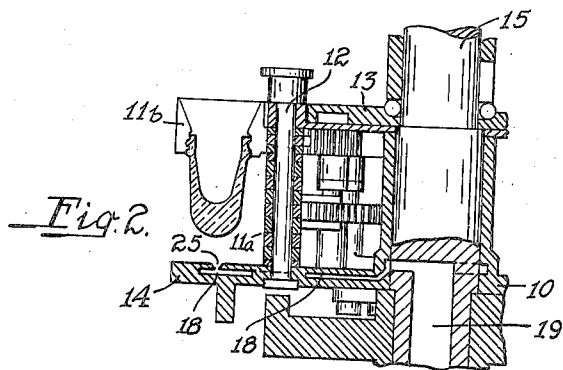


Fig. 2.

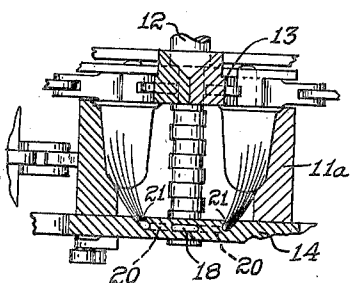


Fig. 3.

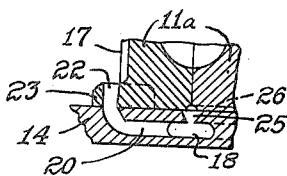


Fig. 4.

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PRESS MOLD AND MEANS FOR COOLING THE MOLD

Frank L. O. Wadsworth, deceased, late of Pittsburgh, Pa., by Mildred M. Wadsworth, administratrix, Pittsburgh, Pa., assignor to Ball Brothers Company, Muncie, Ind., a corporation of Indiana

Original application March 4, 1935, Serial No. 9,133. Divided and this application June 1, 1937, Serial No. 145,668

4 Claims. (Cl. 49—40)

This invention relates to glassware forming machines of the press and blow type and more particularly to improvements in the press molds for such a machine, and is a division of a pending application Serial No. 9,133, filed March 4, 1935, by Frank L. O. Wadsworth, deceased.

The primary object of this invention is to provide press or parison molds for a forming machine which will have materially increased heat conduction, an accelerated heat radiation and latent heat absorbing means whereby the mold is maintained at the desired temperature at all times and the speed of the forming machine may be materially increased.

The speed of operation of glass forming machines is limited by the permissible rise in temperature of the press or forming molds and in order to attain the highest possible speed of operation means have been provided for rapidly carrying away the heat transmitted to these units from the molten glass by or through the combined agencies of a materially increased conduction, accelerated radiation and latent heat absorption (vaporization), all of which effectively cooperate in attaining the desired cooling action. To obtain increased conduction the molds themselves and the table supports therefor are made unusually heavy and massive and this is made possible, in the practice of the invention, by moving the supporting tables for the molds continuously and, consequently, avoid the kinetic inertial effects which present troublesome problems in the operation of a "start and stop" machine and which can only be minimized by keeping the moving parts as light as possible.

Accelerated radiation and the consequent dissipation of the heat by such radiation are secured in two ways: first, by providing the external surfaces of the mold sections with closely spaced vertical ribs or fins which are preferably formed by cutting away the outer hard shell of the mold casting and, second, by then subjecting this surface to an oxidizing or sulphidizing treatment to produce a dull, dead black finish having a very high coefficient of radiation.

Provision is also made for successively subjecting the interior and exterior surfaces of the opened and closed press mold sections to continuous blasts of cooling fluid which are all directed upwardly in order to supplement and not oppose the effects of natural convection currents.

One exemplification of the present mold and table construction is illustrated in the accompanying drawing, wherein—

Figure 1 is a top plan view of a press mold

table equipped with molds made in accordance with the invention and provided with my improved cooling means;

Fig. 2 is a section taken on line II—II of Fig. 1;

Fig. 3 is an enlarged detail section on the line III—III of Fig. 1; and

Fig. 4 is an enlarged detail section on the line IV—IV of Fig. 1.

Referring to the drawing, 10 indicates the press table of a glassware forming machine having a series of press or parison molds thereon, each of which comprises a body section 11a and a neck ring section 11b. The body sections 11a and the neck ring sections 11b are each journaled on a common pintle bolt 12 which is journaled at its ends in the top and bottom platforms 13 and 14 of the press mold table 10, and each of the mold sections is opened and closed in the usual manner. The mold table 10 is mounted for rotation around a central column 15 which also carries a press plunger mechanism 16 for forming or pressing the charges delivered to the molds 11a—11b into parisons.

In order to increase dissipation of heat by radiation, the body sections 11a of the molds are provided, on their outer surfaces, with vertically extended ribs or fins 17 which are preferably formed by cutting away the outer shell of the mold casting. To further increase the radiation of the body sections 11a, the finned castings are subjected to an oxidizing or desulphidizing treatment to produce a dull, dead black finish which has a high coefficient of radiation.

To obtain a forced convection cooling of both the inner and the outer surfaces of the body sections 11a of the press molds, the lower platform 14 of the table 10 is provided with a plurality of radially disposed rectangular passageways 18 which are in constant communication at their inner ends with a central opening 19 in the lower end of the table supporting column 15. The radial passageways 18 terminate at their outer ends in laterally extending branches 20 that lead to upwardly inclined and outwardly flared apertures 21 in the surface 14 on which the molds are supported and on which the bottoms of the body sections 11a slide as they are moved from their opened to closed positions, and vice versa.

The apertures 21 are so located that when the body sections 11a of the press molds are opened they are adapted to direct currents of cooling fluid against the inner sides of said sections (see Fig. 3) and when the press molds are closed the apertures 21 register with openings 22 in lugs 23 that are attached to the lower ends of the body sec-

tions 11a (Fig. 4). The openings 22 in the lugs 23 are so shaped as to deflect the currents issuing from the apertures 21 upwardly and inwardly over the ribs or fins 17 forming the corrugated outer surfaces of the closed mold section 11a.

The outer ends of the passages 18 may also be provided, if desired, with flared apertures 25 which are positioned in axial alignment with the centers of the mold sections 11a—11b and which serve when the body sections 11a are opened to direct currents of fluid upwardly against the lower end of the suspended parison blanks and thereby aid in both supporting and cooling such parisons as they pass from the pressing zone to the transfer station. The flared apertures 25 also serve, when the mold sections are closed, to permit the cooling fluid to impinge against the bottom surfaces of the body sections 11a and to escape through shallow radially cut grooves 26 formed therein.

A suitable cooling fluid, such as air, charged with a mist of vaporizable liquid is supplied to the central opening 19 in the table column 15 from any suitable source and in any desired manner such, for example, as by attaching the outlet port of a suitable blower, not shown, to the passage 19 by a suitable delivery pipe. With such an arrangement the air can be readily impregnated with a fog of finely divided liquid particles from a spray of liquid injected into the inlet port of the blower. When such a mixture of air and fog impinges on the heated mold surfaces, the latter are very effectively cooled both by forced convection currents and by the immediate vaporization of the liquid particles.

With the improved mold construction the accelerated cooling of the mold units by increased conduction, radiation, convection and vaporization action increases very materially (in some cases by 100% or more) the possible rate of output of the forming machine per mold, and thereby a much larger production from a given number of forming units is obtained or conversely the same output from a smaller number of these units is obtained. In either case the operating efficiency of the machine is substantially increased and the size of the machine per unit of output is materially reduced.

From the foregoing description of the invention, it is apparent that the invention may be applied to any type of forming machine in which molten glass charges are subjected to a pressing action while the charge of glass is retained in a mold and that the feature of forced convection currents may be used independently, either with or without a mold having a ribbed or high heat radiating outer surface.

For these reasons, it is not desired to limit this invention to any particular species of construc-

tion which has been described as exemplary of the present improvements or to have these improvements defined in any less comprehensive way than is warranted by the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for fabricating glassware, a mold having separable body sections, means for opening and closing said body sections, a member over which said body sections slide during opening and closing, said member having spaced ports therein arranged to direct a current of cooling medium against the inner surfaces of said sections when said mold is opened, and means on said body sections adapted to cooperate with said ports when said mold is closed for directing cooling medium over the outer surfaces of said body sections.

2. In a machine for fabricating glassware, a mold having separable body sections, means for opening and closing said body sections, a member over which said body sections slide during opening and closing, said member having ports therein arranged so as to direct a current of cooling medium against the inner surface of each body section when said mold is open, and a lug on each body section and having an opening therein for registering with one of said ports when said mold is closed whereby cooling medium is directed against the outer surfaces of said body sections.

3. In a machine for fabricating glassware, a mold having separable body sections, means for opening and closing said sections, vertically extending radiating fins on the outer surface of each such body section, and a mold supporting member over which said sections slide during opening and closing, said member having spaced ports therein arranged to direct cooling medium upwardly in contact with said radiating fins when said mold is closed.

4. In a machine for fabricating glassware, a mold having separable body sections, means for opening and closing said sections, vertically extending radiating fins on the outer surface of each such body section, a mold supporting member over which said sections slide during the opening and closing, said mold supporting member having ports therein arranged to direct a current of cooling medium against the inner surfaces of said body sections when said mold is opened, and a lug on each body section and having an opening therein for registering with one of said ports when said mold is closed whereby cooling medium is directed upwardly in contact with said radiating fins.

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