Oct. 10, 1939. K. E. PEILER 2,175,407

METHOD AND APPARATUS FOR FEEDING MOLTEN GLASS

Filed Aug. 11, 1936

Fig. 1.

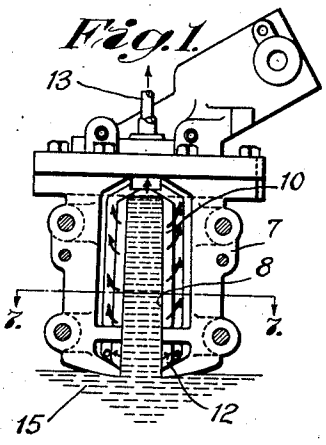


Fig. 2.

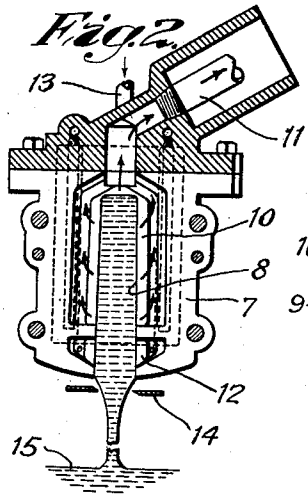


Fig. 3.

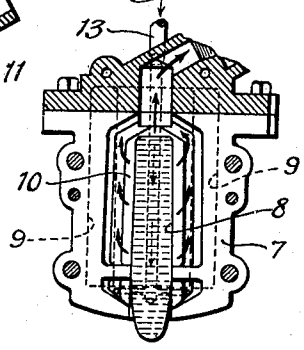


Fig. 4.

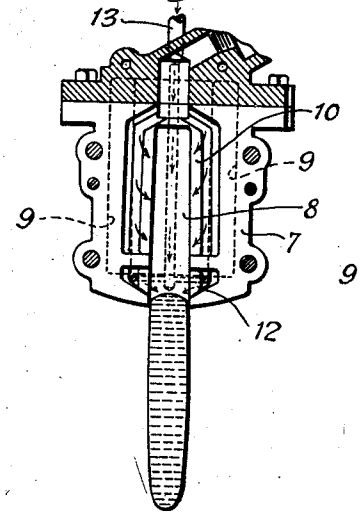


Fig. 5.

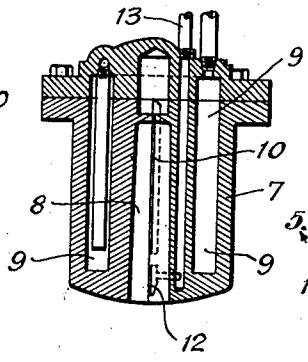


Fig. 6.

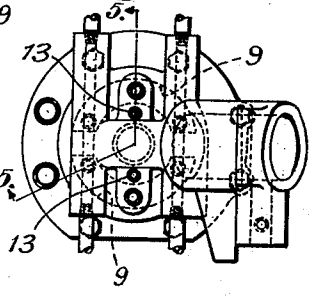
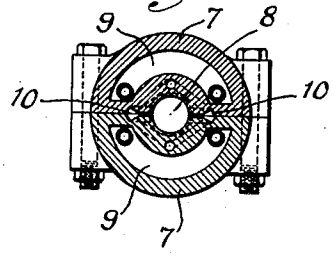


Fig. 7.



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METHOD AND APPARATUS FOR FEEDING MOLTEN GLASS

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Application August 11, 1936, Serial No. 95,317

11 Claims. (Cl. 49—5)

This invention relates to feeding molten glass to molds by the "suction cup" or "suction feeder" method.

Prior proposals for feeding charges by the suction cup method have met with little, if any, success, particularly in the manufacture of narrow neck ware, for the reasons that such proposals have failed to provide the required accurate control of weight, shape and condition of the charges and to provide correct delivery of the charges to the molds.

An object of the present invention is to provide a method and suitable mechanism by which charges of accurately controlled weight and shape, and in suitable condition of temperature and viscosity, may be properly delivered to the molds of a forming machine.

To this end, there is provided a novel one-piece or non-partible suction cup having a cavity, which may be tapered upwardly, and provided with two separately controllable sets of vacuum and air passages communicating respectively with the upper and lower portions of the cup cavity.

There is also provided suitable shears adapted to cut off charges gathered in the cup at a predetermined and preferably a regulable distance below the cup. The cup and shears may be operated and controlled by any suitable mechanism to move the cup and shears and to actuate suitable valves controlling the pressures in the vacuum and air passages.

The provision of two separately controlled sets of passages communicating with the cup cavity is advantageous in that it assures complete and rapid filling of the cavity and the maintenance of contact of the glass with the lower portions of the cavity wall until the charge has been cut off by the shears. It also permits discontinuance of the vacuum created by the lower set of passages and the breaking of the contact of the lower portions of the charge with the lower portions of the mold, while the vacuum in the upper passages is maintained. Thus the charge may be suspended and reshaped within the cup to better fit the mold in which it is to be received. Also the heat condition of the glass is improved through reheating of the surface during the suspension of the charge.

When the charge has been gathered and shaped and the cup moved to its delivery position, the vacuum may be broken, and if desired, pressure applied in the upper set of passages so that the charge will be positively released at the proper time and will fall vertically from the cup without deflection of either end.

In the accompanying drawing,

Figures 1 to 4 illustrate steps of the preferred method, as well as the construction of a cup embodying this invention;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 6;

Fig. 6 is a top view of the structure shown in Fig. 1, and

Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 1.

The drawing omits illustration of the valves and operating mechanism, which structures are per se old in the art and may be employed in any one of a number of different forms.

As illustrated, the cup is of the non-partible type, preferably made of sections 7—7 rigidly bolted together to provide an upwardly tapering glass gathering cavity 8. Passages 9 may be provided in the sections for the circulation of a cooling medium. The upper portion of the cavity 8 is connected by a set of passages 10 to a pipe 11 in which a suitable valve (not shown) may be provided to connect the cavity alternately with a source of vacuum and a source of compressed air. The lower portion of the cavity 8 is connected by passages 12 with a pipe 13 in which may be provided another valve (not shown) by which the cavity may be connected alternately with a source of vacuum and with the atmosphere.

The independent passages communicating with the upper and lower portions of the cup cavity are employed to selectively create in those portions of the cavity the same or different pneumatic conditions.

A pair of shear blades 14 are provided. The shearing mechanism may be of any suitable type, but preferably is adapted to sever the glass connecting the gather in the cup cavity with the glass in the gathering pool at a regulable and predetermined distance below the lower end of the cup.

As indicated in Figs. 1 to 4, the preferred operation of the feeder is as follows:

The cup is moved into contact with the surface of the glass of the gathering pool 15 and vacuum is rapidly created in the cavity by exhaust of air through the passages 10 and pipe 11 and through the passages 12 and pipe 13. This serves to quickly fill the cup with glass whereupon the cup is lifted from the glass. When the cup has been suitably raised, as shown in Fig. 2, shear blades 14 operate to sever the glass connecting the gather to the pool and thus to completely separate a charge the weight and size of which are definitely determined by the cup cavity and the dis-

tance below the cavity at which the shears operate.

The vacuum in passage 12 assures intimate contact of the glass with the lower cup wall and thus assures that the gather is of the proper weight. Without such a provision there is a tendency for the glass to pull away from the lower edges of the cup to a greater or less extent, as the cup is lifted, so that the amount of glass cut off varies more or less from the desired amount.

At or about the time the shears operate, the valve in the pipe 13 is operated to destroy the vacuum and to place the passages 12 in communication with atmospheric pressure. If necessary a slight positive pressure may be applied for a short time. This change in the pneumatic conditions in the passages 12 breaks the contact of the lower portion of the charge and the cup cavity, leaving the charge suspended by its upper portion within and projecting slightly below the cup cavity. While the charge is so suspended, the lower portions of the charge are reshaped by elongation and reduction of section to make the charge more suitable for entry into a parison mold. The beginning of this reshaping is illustrated in Fig. 3.

After the shears have acted, the cup is moved to delivery position (see Fig. 4). As it arrives at that position, the valve in the pipe 11 is operated to break the vacuum in the passages 10 and to introduce compressed air into these passages. This serves to break the contact of the upper portions of the charge with the cup, whereupon the charged drops vertically without being thrown to one side as is frequently the case with cups which are opened to discharge the glass.

If desired, the method and apparatus may be modified by the employment of superatmospheric pressure, in lieu of the atmospheric pressure in the passages 12, if it should appear desirable to increase the pressure effective to free the lower end of the charge from cup contact. Also if desired, atmospheric pressure may be substituted for the compressed air employed in passages 10.

Various other changes and modifications, both in method and apparatus, will suggest themselves to those skilled in the art, and the invention is not to be limited to the particular form of apparatus or particular method here disclosed.

The appended claims are to be construed as broadly as the prior art will permit.

What I claim is:

1. The method of obtaining a charge of molten glass which comprises gathering glass from a supply pool in the cavity of an open-bottomed gathering cup, severing the glass in the cup from the glass of the pool, preshaping the glass charge thus obtained to a shape appropriate to the mold to be fed by maintaining the glass of the upper end portion only of the charge in contact with walls of the cup cavity while the remainder of the charge elongates downwardly by gravity, until the complete charge has the shape desired, and then causing the preshaped charge to drop as an entity from the cavity of the cup for delivery to the mold.

2. The method of feeding a charge of molten glass to a shaping mold, comprising gathering a charge of proper weight from a pool of molten glass into a suction cup, maintaining the lower portion of the charge in intimate contact with the lower portion of the cup, separating the charge from the glass in the pool while such contact continues, breaking the contact of the lower portion of the charge with the cup, suspending the charge so gathered within the cup until it acquires a shape suitable for the mold into which it is to be delivered and delivering the charge to the mold.

3. The method of feeding a charge of molten glass to a parison mold, which comprises gathering a charge of proper weight and of upwardly tapering shape by sucking glass from a supply of molten glass into an upwardly tapering cavity of a suction cup, severing the charge from the glass in the supply, increasing the pressure effective upon the sides of the lower portion of the charge in the cup to break contact between the charge and the lower portion of the cup while maintaining the charge suspended by its upper portion within the cup to permit the charge to elongate and acquire a shape suitable for entry into a parison mold and thereafter delivering the charge as a unit from the cup to the mold.

4. The method of feeding a charge of molten glass to a mold, which comprises dipping into a pool of molten glass a non-partible suction cup having a cavity of greater cross-section adjacent its lower end than thereabove, exhausting the cavity of the cup through independent passages connected to the upper and lower portions of the cavity respectively to rapidly and completely fill the cavity with glass to form a charge having an initial shape corresponding to the said cavity, severing the charge from the glass in the pool, thereafter increasing the pressure in the passages to the lower portion of the cavity to break the contact of the lower portion of said charge with the walls of the cavity, maintaining the charge within the cup while it reheats and elongates, releasing the charge from the cavity and delivering it into the mold.

5. The method of feeding a charge of molten glass to a mold, which comprises gathering from a pool of molten glass a charge of upwardly tapering form in an upwardly tapering cavity of a non-partible suction cup, separating the charge so gathered from the glass in the pool, breaking the contact of the lower portion of the charge with the walls of the cavity by pressure applied through the cup while maintaining contact of the upper portion of the charge and the mold cavity, retaining the charge suspended by its upper portion within the cup until the lower portion of the charge reshapes under the action of gravity to adapt the charge to the mold to which it is to be delivered, then releasing the charge from the cup and delivering it to the mold.

6. The method of feeding a charge of molten glass to a mold which comprises gathering a charge of proper weight by sucking glass upwardly from a supply of molten glass into and completely to the closed upper end of the cavity of a suction cup by an open-bottomed vacuum communicating with the closed end of the cup and then controlling the shaping of the lower end portion of the charge in the cup by a different pneumatic pressure applied to the cup cavity remote from its closed end.

7. The method of obtaining a charge of molten glass which comprises gathering glass from a supply pool into the cavity of an open-bottom gathering cup, severing the glass in the cup from the glass in the pool, changing the shape of the glass charge thus obtained to a shape appropriate to the mold to which the glass is to be delivered by maintaining the glass of the upper end portion of the charge in contact with the walls of the cup cavity by one pneumatic pressure while the contact between the charge and the lower walls of

the mold cavity is controlled by a different pneumatic pressure, and then causing the preshaped charge to drop as an entity from the cavity of the cup into the mold.

8. The method of feeding a charge of molten glass to a mold, which comprises gathering a charge of proper weight by sucking glass upwardly from a supply of molten glass into the cavity of a suction cup by exhaust of air from the cavity through independent passages communicating respectively with the upper and lower portions of the cavity, severing the glass so gathered from the glass in the pool at a predetermined distance below the bottom of the cup, thereafter destroying the vacuum existing in the passages communicating with the lower portion of the cup and admitting air thereinto to free the lower end of the charge from contact with the cup while maintaining the vacuum in the passages communicating with the upper portion of the cup, moving the cup to a charge delivering position, and increasing the pressure effective in the last-named passages to positively discharge the charge from the cup.

9. Apparatus for feeding molten glass in separated mold charges of shapes suitable for entry as units into forming molds, which comprises a non-partible glass gathering suction cup having a cavity of greater cross section adjacent its lower end than thereabove, said cavity being open at its bottom and closed to glass flow at its top, means adjacent the upper portion of the cavity for evacuating the air in the cavity to effect filling of the cavity with molten glass from a supply body at the lower end of the cavity, and means including a passage opening into the lower portion of the cavity for creating a higher fluid pressure in the lower portion of the cavity than in the upper portion thereof to effect a lateral pressure on the lower portion of the charge to shape said lower portion of the charge, whereby a charge may be gathered by suction into the cavity and thereafter held therein by its upper portion while contact of the lower portion of the charge with the walls of the cavity may be broken and the charge thus suspended and shaped.

10. Apparatus for feeding molten glass comprising a suction gathering cup having a glass gathering cavity therein, said cavity being open at its bottom and closed to glass flow at its top, independent pneumatic pressure connections to the upper and lower portions of said cavity respectively to independently vary the pressure conditions effective respectively in the upper and lower portions of said cavity, the pressure connection to the lower portion of said cavity communicating with said cavity from a level adjacent to its lower end for only a minor portion of the length of the cavity.

11. Apparatus for feeding molten glass, comprising a suction gathering cup having a glass gathering cavity therein, said cavity being open at its bottom and closed to glass flow at its top, independent pneumatic pressure connections to the upper and lower portions of said cavity respectively to independently vary the pressure conditions effective respectively in the upper and lower portions of said cavity, the pressure connection to the lower portion of said cavity communicating with said cavity from a level adjacent to its lower end for only a minor portion of the length of the cavity, and the pressure connection to the upper portion of the cavity communicating with the latter for the major part of the length of the cavity.

KARL E. PEILER.