J. F. RULE.

METHOD AND MEANS FOR FORMING AND TRANSFERRING GOBS OF MOLTEN GLASS.

APPLICATION FILED OCT. 1, 1919.

1,413,788.

Patented Apr. 25, 1922.

3 SHEETS—SHEET 1.

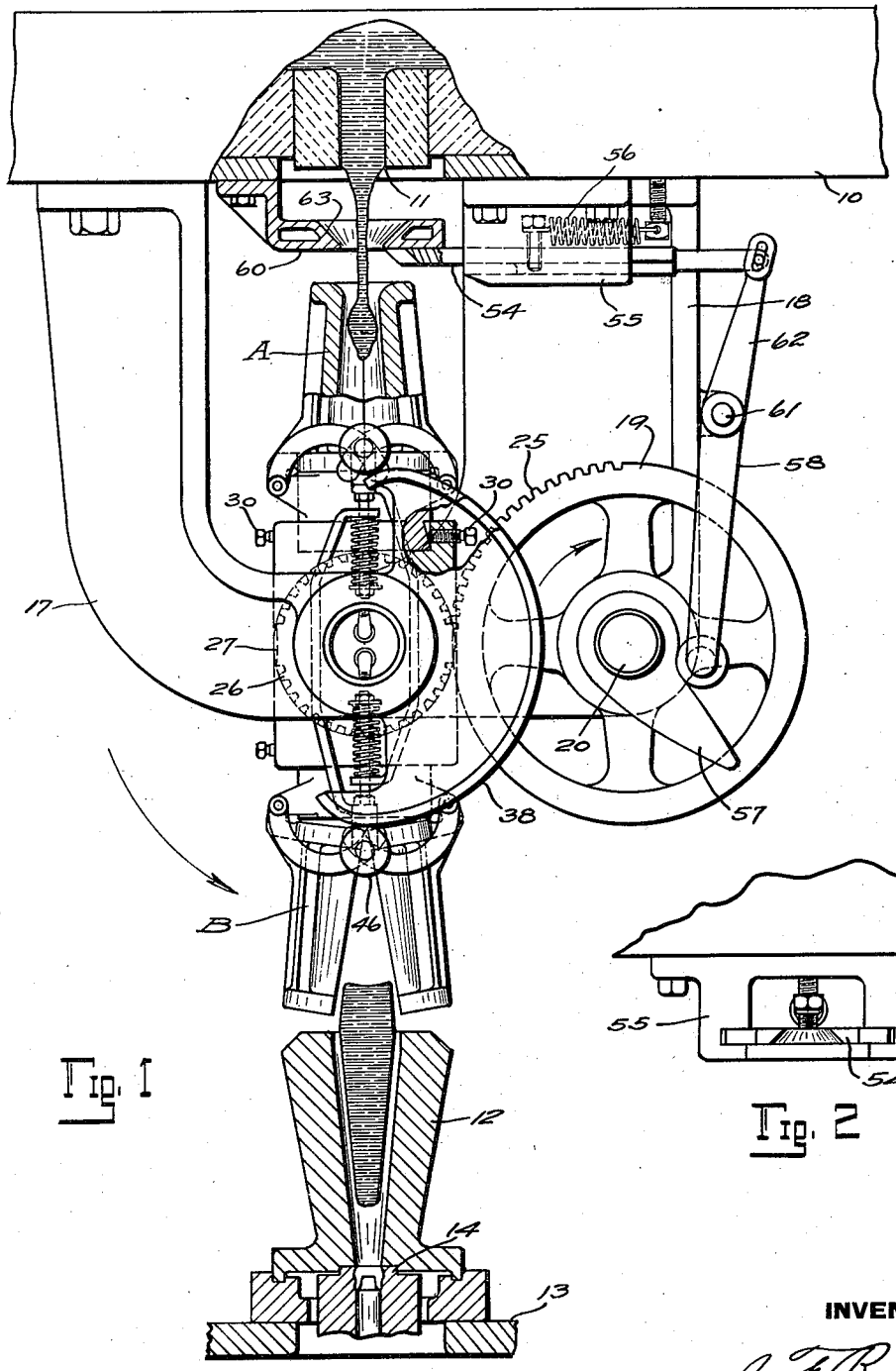


Fig. 1

Fig. 2

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WITNESS

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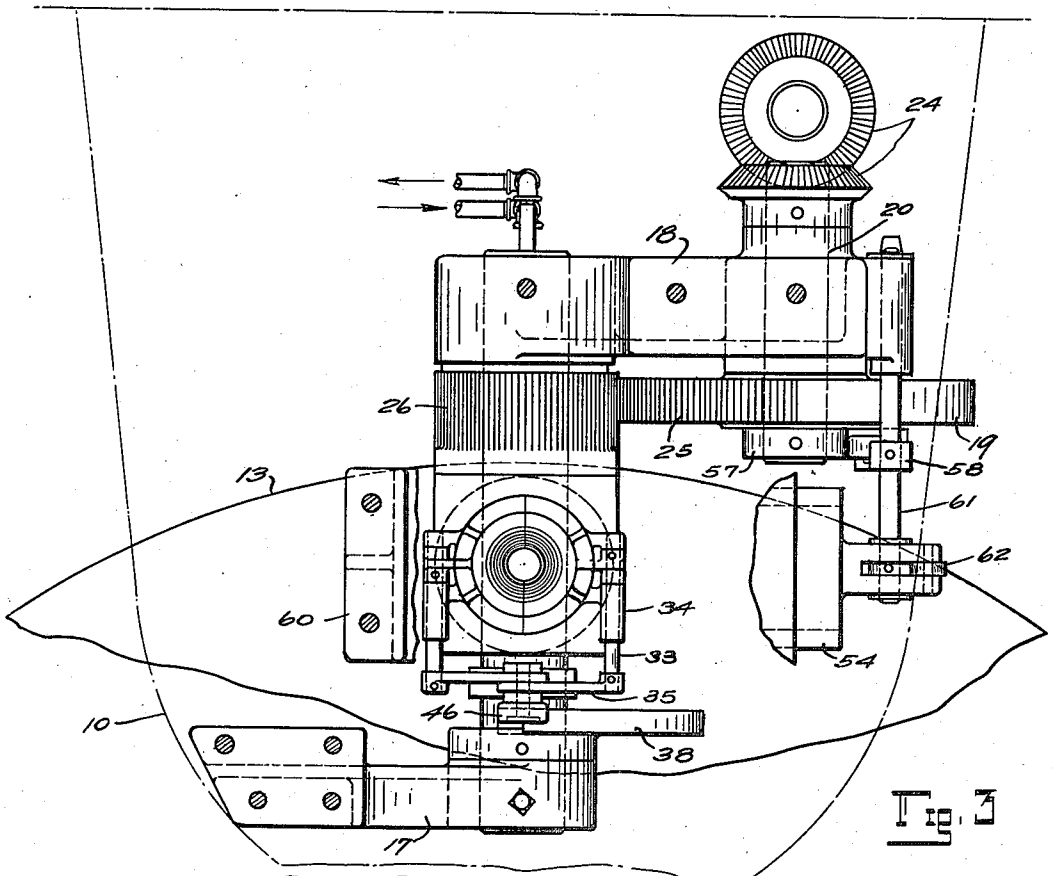


Fig. 3

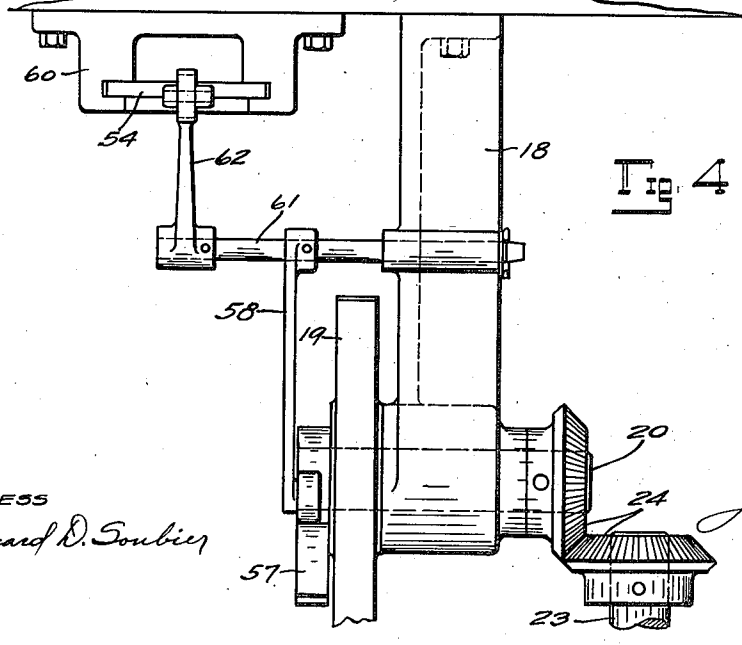


Fig. 4

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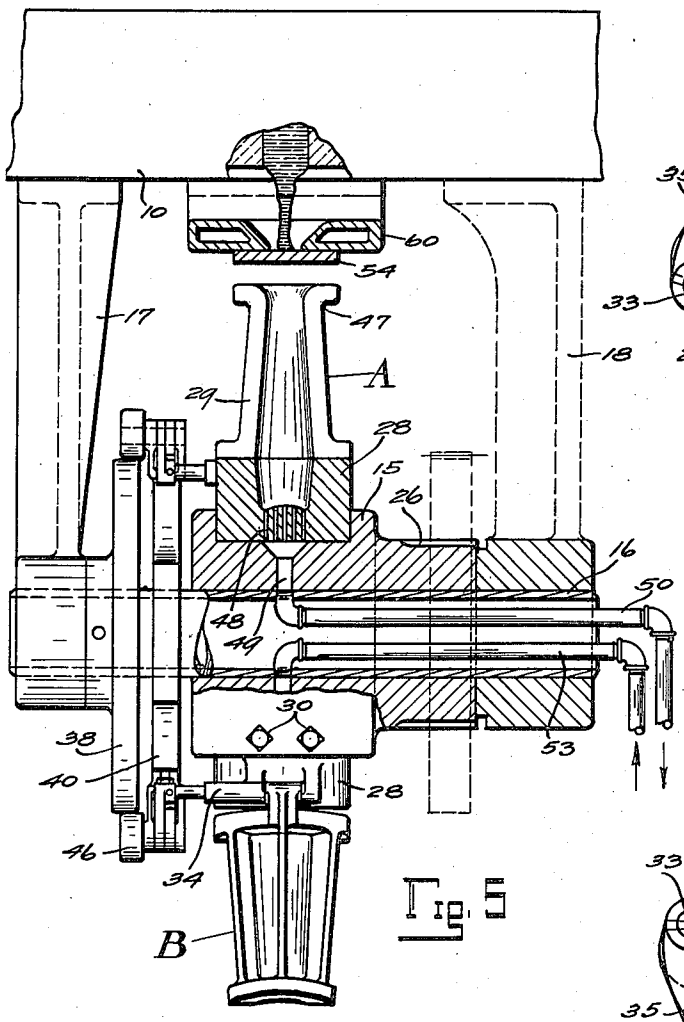


Fig. 5

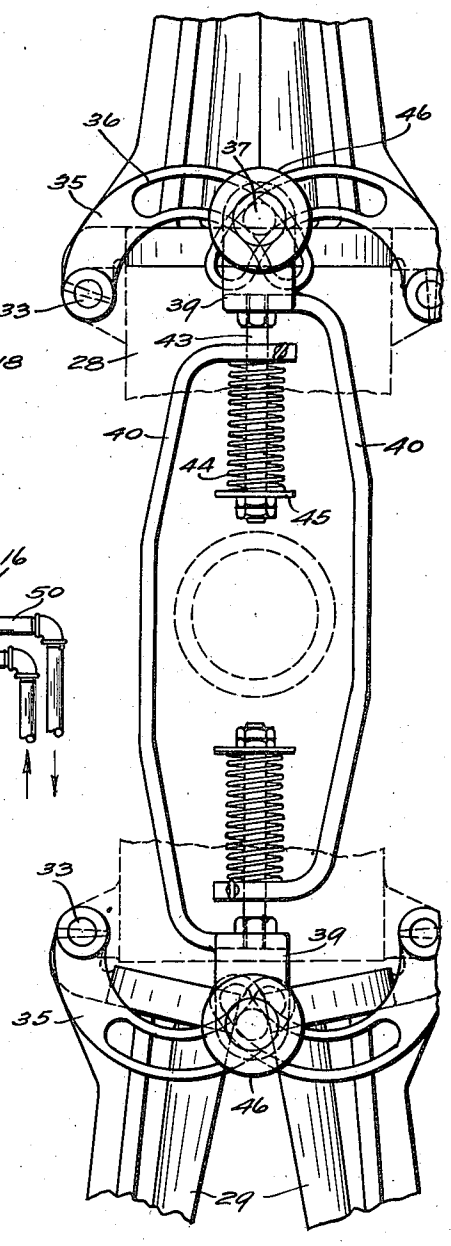


Fig. 6

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UNITED STATES PATENT OFFICE.

JOHN F. RULE, OF TOLEDO, OHIO, ASSIGNOR TO THE OWENS BOTTLE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

METHOD AND MEANS FOR FORMING AND TRANSFERRING GOBS OF MOLTEN GLASS.

1,413,788. Specification of Letters Patent. Patented Apr. 25, 1922.

Application filed October 1, 1919. Serial No. 327,648.

To all whom it may concern:

Be it known that I, JOHN F. RULE, 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 Methods and Means for Forming and Transferring Gobs of Molten Glass, of which the following is a specification.

My invention relates to mechanism by which a flowing stream of molten glass is segregated and formed into individual masses or gobs and transferred to the molds of a pressing or blowing machine. The mechanism comprises transfer cups which receive the flowing glass and form it into elongated gobs, means to sever the gobs from the flowing stream, and means to invert the cups and transfer the gobs to the molds.

An object of the invention is to provide for suitable formation and temperature conditions of the gob. In the form shown, the invention is particularly adapted for supplying gobs to inverted molds of bottle forming machines. For this purpose the transfer cups are formed with the upper ends of the gob forming cavities narrower than the lower ends, so that when the cup is inverted to discharge the gob, the smaller end will enter the mold first and form the neck end of the bottle. The outer or open end of the gob forming cavity being more restricted than the body portion thereof, also assists in preventing the gob from being prematurely discharged by the action of gravity and centrifugal force as the cup is inverted. The cup is made in sections automatically separated to drop the gob as the cup reaches its inverted position.

Suitable means are provided for exhausting the air from the inner end of the cup while it is receiving its charge to thereby assist in shaping the gob to the cup which may be formed to give one end of the gob substantially the shape of the finished article. The use of a partial vacuum also assists in holding the gob in the cup while the latter is being inverted. Air under pressure may be supplied to assist in expelling the gob from the inverted cup.

Other features and advantages of the invention will appear hereinafter.

In the accompanying drawings,—

Figure 1 is a part sectional elevation of mechanism embodying the principles of my invention.

Figure 2 is a fragmentary view showing the cutter in end elevation.

Figure 3 is a plan view of the mechanism with parts broken away and the outline of the furnace indicated in broken lines.

Figure 4 is a side elevation of the operating means for the cutter.

Figure 5 is a part sectional side elevation of mechanism shown in Figure 1.

Figure 6 is a front view on a larger scale of the sectional transfer cups, and means for opening and closing them.

The molten glass may be supplied from a continuous melting tank having a boot or extension 10 provided with an outlet opening 11 in the bottom thereof. The glass flows from said opening into transfer cups A and B in which it is formed into suitably shaped gobs and by which the gobs are transferred to molds 12. These may be the molds of a glass forming machine of usual or approved construction, comprising a mold table 13 which is rotated to bring the molds successively into gob receiving position. As shown in Figure 1, the mold 12 is a blank mold of a bottle forming machine, the mold being in inverted position with its upper end open to receive the charge. A neck mold section 14 is shaped to form the neck end of the bottle.

The transfer cups A and B are mounted on a carrier 15 which is rotatable about a horizontal stationary shaft 16 mounted in bracket arms 17 and 18 depending from the supporting frame of the boot 10. The carrier 15 is intermittently rotated through angles of 180 degrees so that at each rotation one transfer cup is moved from receiving position to discharging position, and the other cup from discharging to receiving position. The mechanism for rotating the carrier comprises a continuously rotating gear wheel 19 keyed to a shaft 20 to which motion is transmitted from a drive shaft 23 (Fig. 4) through bevel gears 24. The gear wheel 19 has gear teeth 25 extending along a portion of its periphery, and intermeshing with gear teeth on a mutilated gear 26 formed on the hub of the carrier 15. At each complete rotation of the gear 19 the carrier 15 is rotated a half revolution and then held stationary by one of the locking

surfaces 27 thereon interlocking with the smooth portion of the gear 19. The parts are preferably so proportioned that the transfer cups are stationary a greater portion of the time and are quickly rotated for transferring the gobs.

Each transfer cup comprises a base or bottom section 28 and hinged sections 29, the latter being separable to permit the gobs to be readily discharged. The base 28 is seated in a recess formed in the carrier and is clamped in position by set screws 30 (Fig. 1). By loosening the set screws the cup may readily be removed. The cup sections 29 are keyed to pivot pins 33 journalled in lugs or bearing sleeves 34 on the base 28. Rock arms 35 also keyed to the pins 33 are provided with slots 36 to receive an operating pin 37 which extends through a slot in each arm. It will be seen that the movement of the operating pin 37 toward and from the base 28 will serve to open and close the cup sections. Such movement of the pin 37 is controlled by a stationary cam 38. Each of the pins 37 is mounted on a block 39 to which is attached an arm 40, each of said arms extending from its block 39 to a point adjacent the opposite block 39. To each block is attached a rod 43 on which is mounted a coil spring 44 bearing at its outer end against a washer 45 on said rod and at its inner end against the end of the arm 40 carried by the opposite block 39. The springs 44 being under compression tend to move the operating pins 37 inward and thereby hold the transfer cups closed. As a cup swings from its receiving position it is thus held closed until it nears the discharging position (cup B Fig. 1) when a cam roll 46 on the pin 37 engages the cam 38 and forces the pin 37 outward against the tension of its spring 44, thereby separating the cup sections and permitting the gob to drop into the mold directly beneath. As the transfer cup moves from discharging position back to receiving position it may be held open by the cam 38, or the latter may be formed to permit a gradual closing of the cup sections. The upper end of the cam is deflected inwardly sufficiently to release the cam roll 46 and permit the cup sections to be held together.

The gob forming cavity of the transfer cup is tapered as shown, so that at the most restricted point 47 it is considerably narrower than near its base. The outer end of the cup cavity may be flared outwardly to guide the glass into the cup. It will be seen that the form of the transfer cup is such that the gob will be given an elongated tapered form, conforming substantially to the tapered mold cavity. The shaps of the cup also serves to prevent a premature discharge of the gob as the cup swings rapidly downward to discharging position. That is to say, the gob is prevented from being thrown out by gravity and centrifugal force. The shaping of the gob in this manner to conform to the shape of the mold is important because it permits a substantially uniform distribution of the surface layer of the gob when the latter is blown in the mold, said layer having been cooled by contact with the walls of the transfer cup. This results in an even distribution of the glass when blown in the molds, so that the walls of the finished article are of uniform thickness throughout. Other defects due to unequal surface chilling of the gob are also avoided.

The bottom or inner end of the cup cavity may be given substantially the shape of the bottom of the bottle or article to be formed therefrom. The cup section 28 is provided with small openings 48 extending therethrough and communicating with an opening 49 extending through the carrier 15. When the cup is in receiving position, said opening 49 is in register with a vacuum pipe 50 which extends through the hollow shaft 16 and is connected with any suitable means for exhausting the air. The exhaustion of the air from the cup while the glass is flowing thereinto causes the gob to take the shape of the cup cavity, prevents air being entrapped, and causes the glass to be compacted by the atmospheric pressure. When the transfer cup swings down to discharging position the passageway 48, 49 is brought into communication with a pressure pipe 53 so that air under pressure is admitted to the bottom of the cup and assists in quickly expelling the gob.

The mechanism for severing the glass comprises a knife blade 54 slidable horizontally in bearings in a bracket 55 mounted on the bottom of the boot. The knife is held in retracted position by a spring 56 and is projected to sever the glass by means of a cam 57 on the shaft 20. The cam operates an arm 58 fixed to a rock shaft 61 to which is also attached a rock arm 62 connected at its outer end to the cutter. The knife blade 54 is in sliding contact with the bottom of a plate 60 formed with a passageway 63 having flared walls. The knife is advanced to sever the glass as or just before the transfer cup commences its movement away from receiving position. The oncoming stream of glass is temporarily supported on the knife blade while the transfer cups are changing position, the passageway 63 forming with the knife a temporary receptacle for the glass.

It will be observed that the portion of the glass which last enters the transfer cup and therefore forms the hottest portion of the gob, enters the mold first and forms the neck

end of the bottle. This is desirable because of the comparatively rapid cooling of the glass in the neck mold and the difficulty of properly shaping the neck unless the glass is very hot. This portion of the glass is also practically free from the chilling effect of the cutter as the glass drops away from the cutter instantly as it is severed. The neck end of the bottle is, therefore, free from objectionable shear marks.

Modifications may be resorted to within the spirit and scope of my invention.

What I claim is:

1. The combination with a mold, of means for forming an elongated gob of plastic glass hotter at one end than the other, said gob being tapered toward said hotter end, and means for introducing said gob lengthwise into the mold, the hotter end first.

2. The combination of a mold, a transfer receptacle, means for flowing molten glass into the receptacle, the latter having an elongated gob forming cavity tapered toward the receiving end, and means to discharge the gob from said receiving end into the mold, whereby the smaller end of the gob enters the mold first.

3. The combination of a gob forming receptacle open at its upper end to receive molten glass, said receptacle having a gob forming cavity tapered upwardly and inwardly, and means to invert the receptacle and discharge the gob.

4. The combination with means to flow a stream of molten glass, of a transfer receptacle positioned to receive said stream, the inner walls of said receptacle being inclined upwardly and inwardly to form a tapered gob forming cavity, and means to invert said receptacle to discharge said gob.

5. The combination with means to flow a stream of molten glass, of a transfer receptacle positioned to receive said stream, the inner walls of said receptacle being inclined upwardly and inwardly to form a tapered gob forming cavity, and means to invert said receptacle to discharge said gob, the upper extremity of said walls being outwardly flared.

6. The combination with means to flow a stream of molten glass, of a partible transfer receptacle positioned to receive said stream, the inner walls of said receptacle being inclined upwardly and inwardly to form a tapered gob forming cavity, and means to invert and open said receptacle to discharge said gob.

7. The combination of a partible gob forming receptacle open at its upper end to receive molten glass, and means to invert and open the receptacle.

8. An elongated gob forming receptacle open at one end to receive a charge of molten glass, the inner walls of said receptacle being flared outwardly from the receiving end toward the base, and means to discharge the gob from said receiving end without distorting the gob.

9. The combination with means to flow a stream of molten glass, of a gob forming transfer cup having an elongated gob forming cavity restricted adjacent its upper receiving end and of larger diameter below said restricted portion, means to sever the flowing glass after a charge has been received in said receptacle, and means to invert the open ended receptacle and discharge the gob.

10. The combination with means for flowing a stream of molten glass, of a transfer cup beneath the flow, open at its upper end to receive the glass, said cup comprising separable sections, means to invert the cup, and means to separate said sections to discharge the gob, said cup being open at its receiving end during inversion and of restricted diameter adjacent said end to prevent premature discharge of the gob.

11. The combination of a partible gob forming cup, means to present the cup open end up to receive molten glass and to invert and open it to discharge a gob, and means for evacuating the inner end of the cup cavity during filling and inversion.

12. The combination of a partible gob forming cup, means to present the cup open end up to receive molten glass and to invert and open it to discharge a gob, and means to supply air under pressure to the cup cavity during discharge.

13. The combination of a partible gob forming cup, means to present the cup open end up to receive molten glass and to invert and open it to discharge a gob, means for evacuating the inner end of the cup cavity during filling, and means to supply air under pressure to the cavity during discharge.

14. The combination of a receptacle for molten glass having a discharge orifice, severing means beneath the orifice, partible transfer cups, a drive shaft, and means whereby each revolution of the drive shaft will operate the severing means, move one cup from receiving position with open end up beneath the severing means to inverted discharging position and open it, and move another cup from discharging position to receiving position and close it.

15. The combination of a receptacle for molten glass having a discharge orifice, a bottle blank mold having a downwardly tapering cavity shaped to form a neck at the bottom, and means to form glass issuing from said orifice into a gob tapering towards the end last to issue and deliver the gob small end down into the mold.

16. The combination of a receptacle for molten glass having a discharge orifice, a

bottle blank mold having an elongated downwardly tapering cavity shaped to form a neck at the bottom, and means to form glass issuing from said orifice into an elongated gob tapering towards the end last to issue and deliver the gob small end down into the mold.

17. The combination of a receptacle for molten glass having a discharge orifice, means for severing the stream issuing from said orifice into successive portions, a bottle blank mold having a downwardly tapering cavity shaped to form a neck at the bottom, and means to form a portion into a gob tapering toward the end last to issue from the orifice and deliver the gob small end down into the mold.

18. The combination of a receptacle for molten glass having a discharge orifice, means for severing the stream issuing from said orifice into successive portions, a bottle blank mold having an elongated downwardly tapering cavity shaped to form a neck at the bottom, and means to form a portion into an elongated gob tapering towards the end last to issue from the orifice and deliver the gob small end down into the mold.

19. The combination with a receptacle for molten glass having an outlet opening, of a mold below said opening open at its upper end and formed with an elongated tapered mold cavity smaller at the lower end than the upper end, gob transferring apparatus between said flow opening and mold comprising a carrier, transfer cups at the opposite sides of said carrier, said cups having gob forming cavities shaped to conform substantially to the form of the mold cavity, means to intermittently rotate said carrier and swing the transfer cups alternately from receiving position to discharging position, and means to sever the glass and support the oncoming stream during said rotation of the cup carrier.

20. The combination of a transfer cup comprising a base and sections hinged to said base, said sections having inner walls converging from the base toward the outer end of said sections and forming with the base a tapered cavity, said sections being hinged to the base and separable to permit the discharge of a gob of glass with a support for said cup and means for turning said support to hold the cup base downward in receiving position and base upward in discharging position.

21. The method which consists in flowing molten glass, forming it into an elongated tapered gob hotter at the tapered end than the other, and introducing the gob, tapered end first, into a mold.

22. In the manufacture of bottles the process comprising flowing molten glass from a receptacle, forming the glass into elongated gobs each tapered towards the end last to issue from the receptacle, and introducing the gobs small end first into neck down blank molds.

Signed at Toledo, in the county of Lucas and State of Ohio, this 27th day of September, 1919.

JOHN F. RULE.