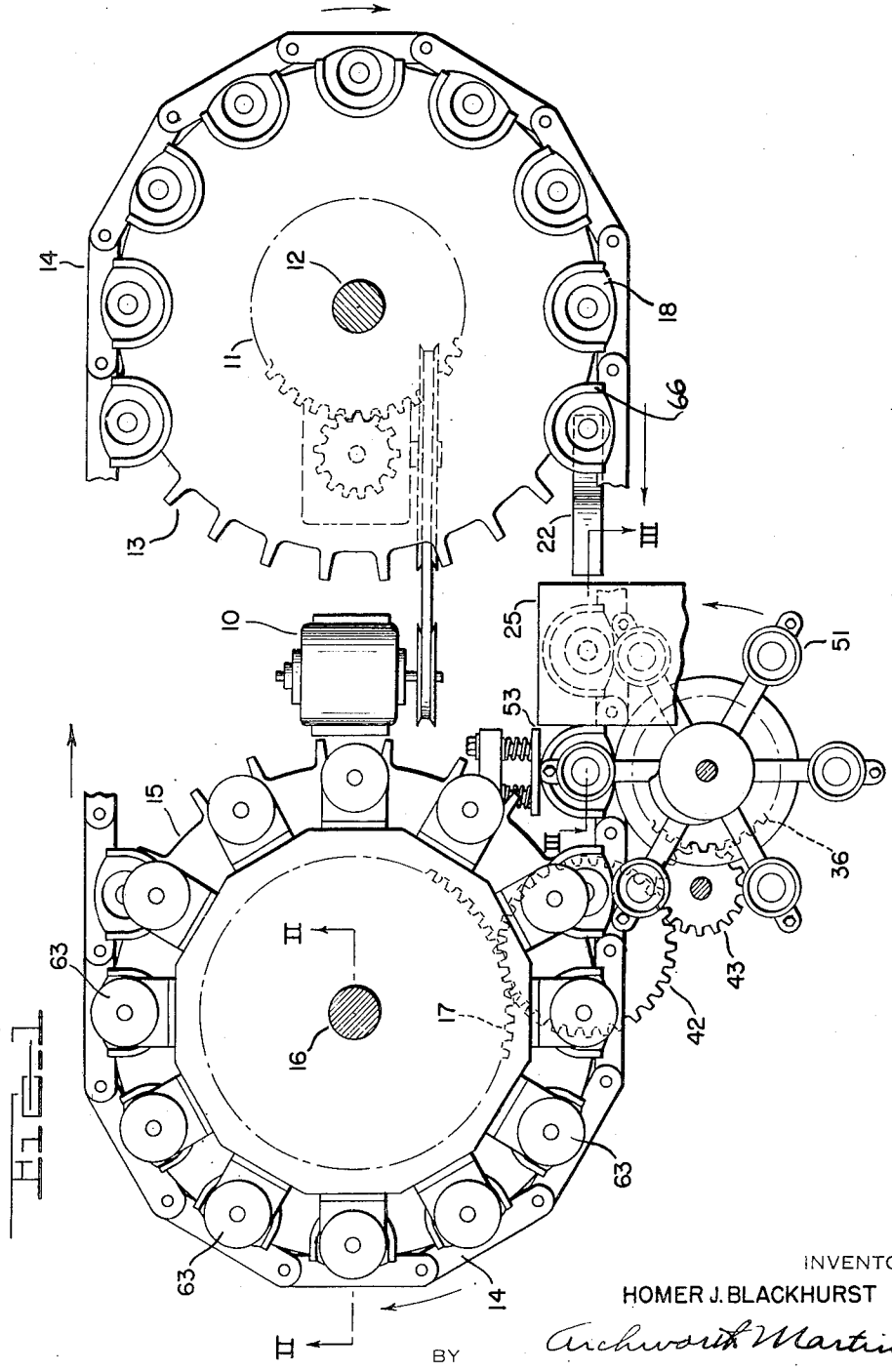
May 16, 1950 H. J. BLACKHURST 2,507,753

FEEDING APPARATUS FOR GLASS-FORMING MACHINES

Filed March 31, 1947 6 Sheets-Sheet 1



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FEEDING APPARATUS FOR GLASS-FORMING MACHINES

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Fig. 2

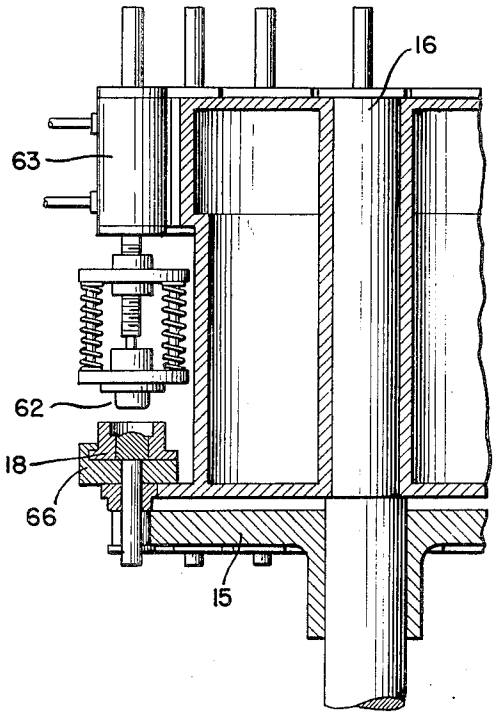
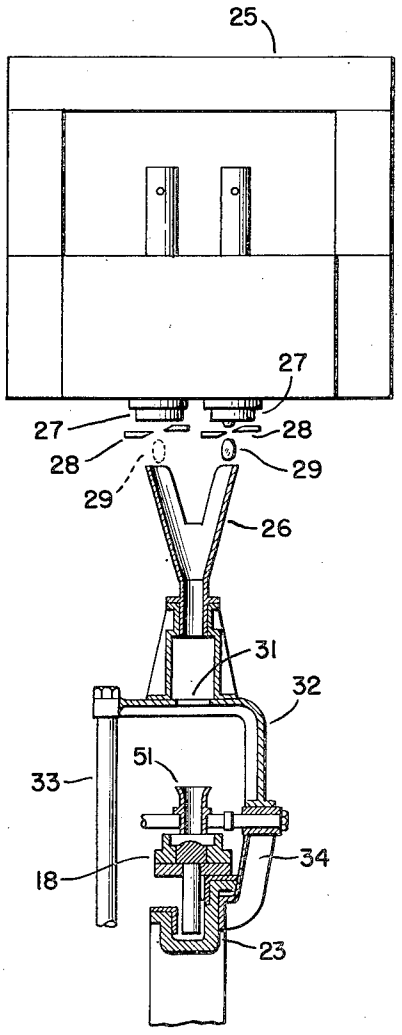


Fig. 3



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FEEDING APPARATUS FOR GLASS-FORMING MACHINES

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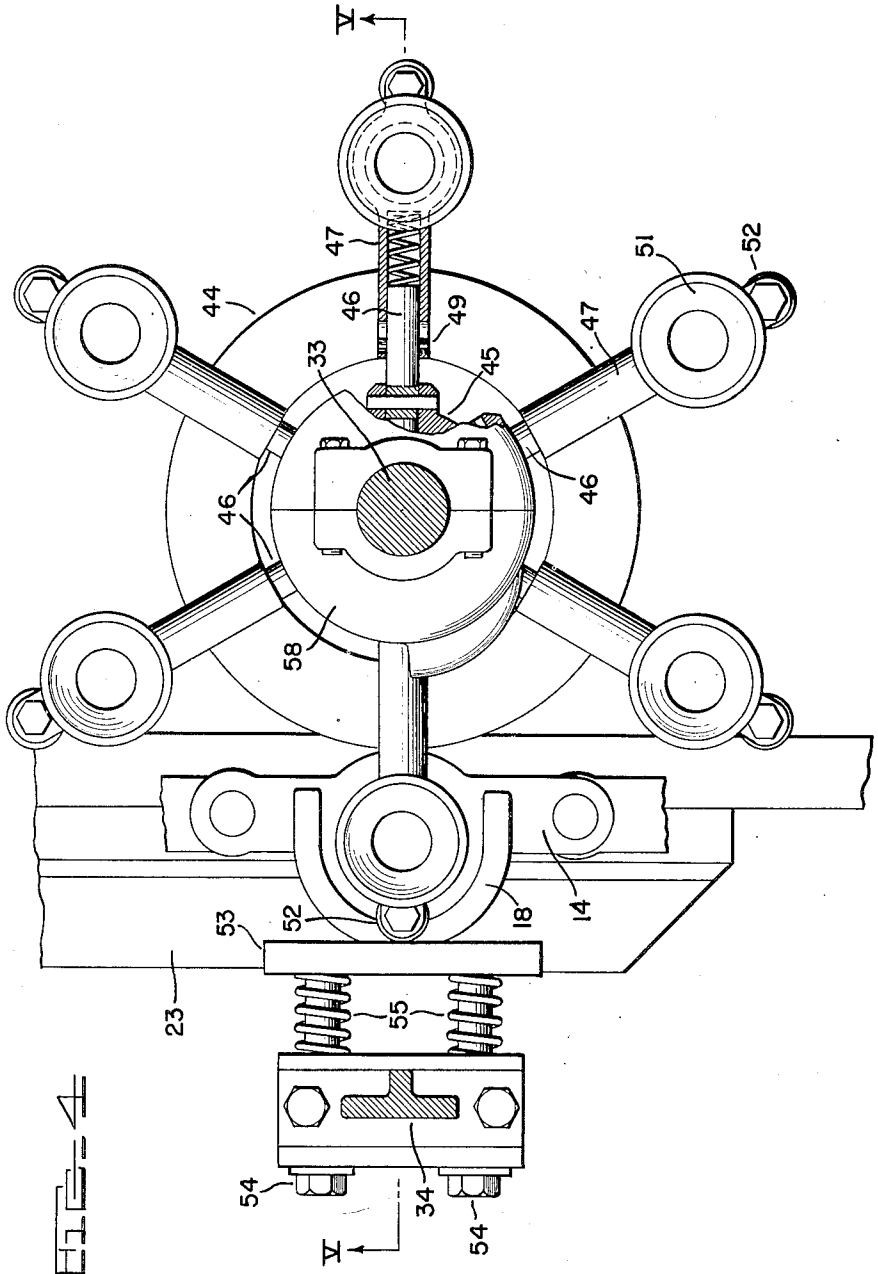

FIG. 4

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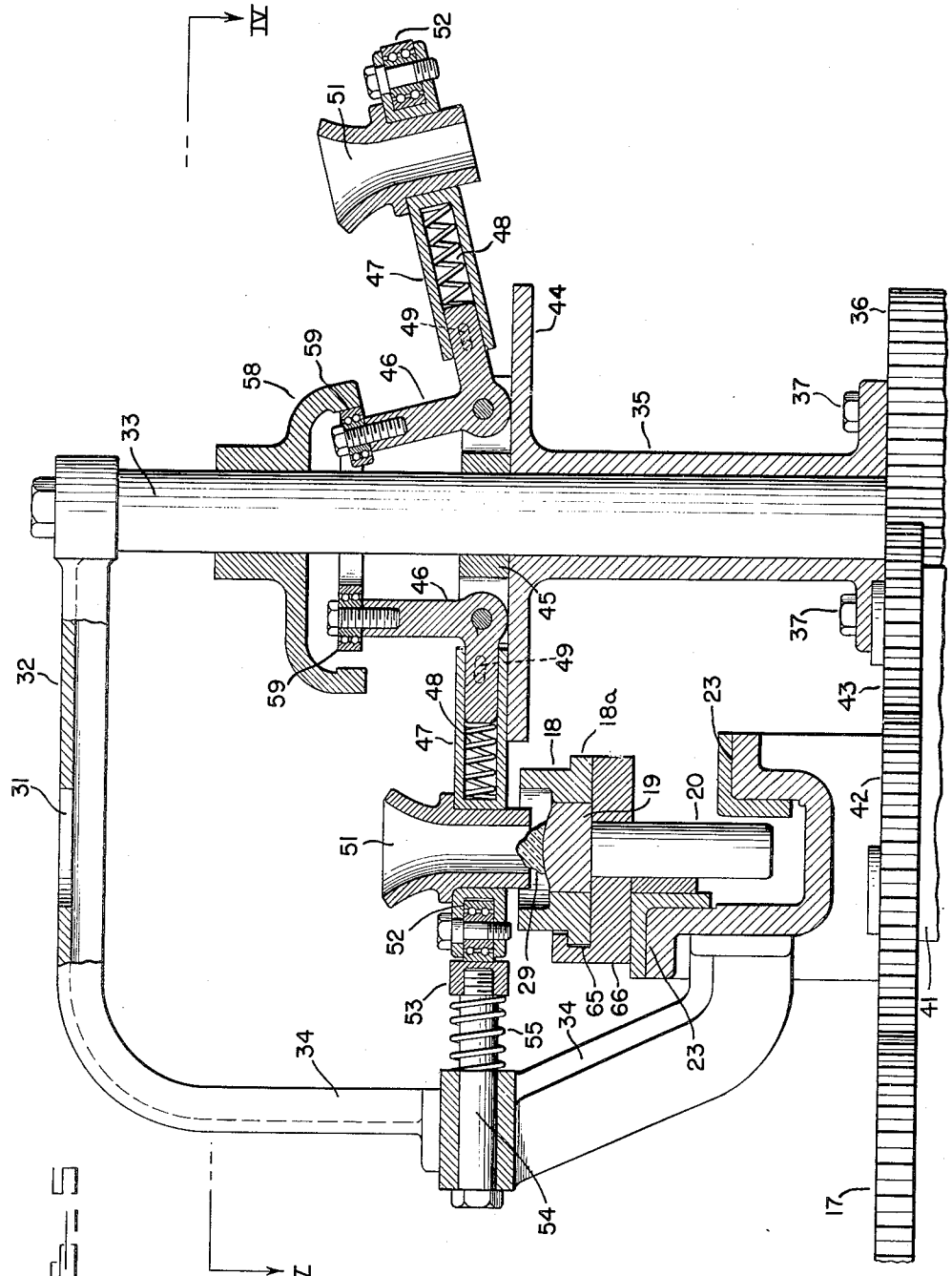

FIG. 5

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FEEDING APPARATUS FOR GLASS-FORMING MACHINES

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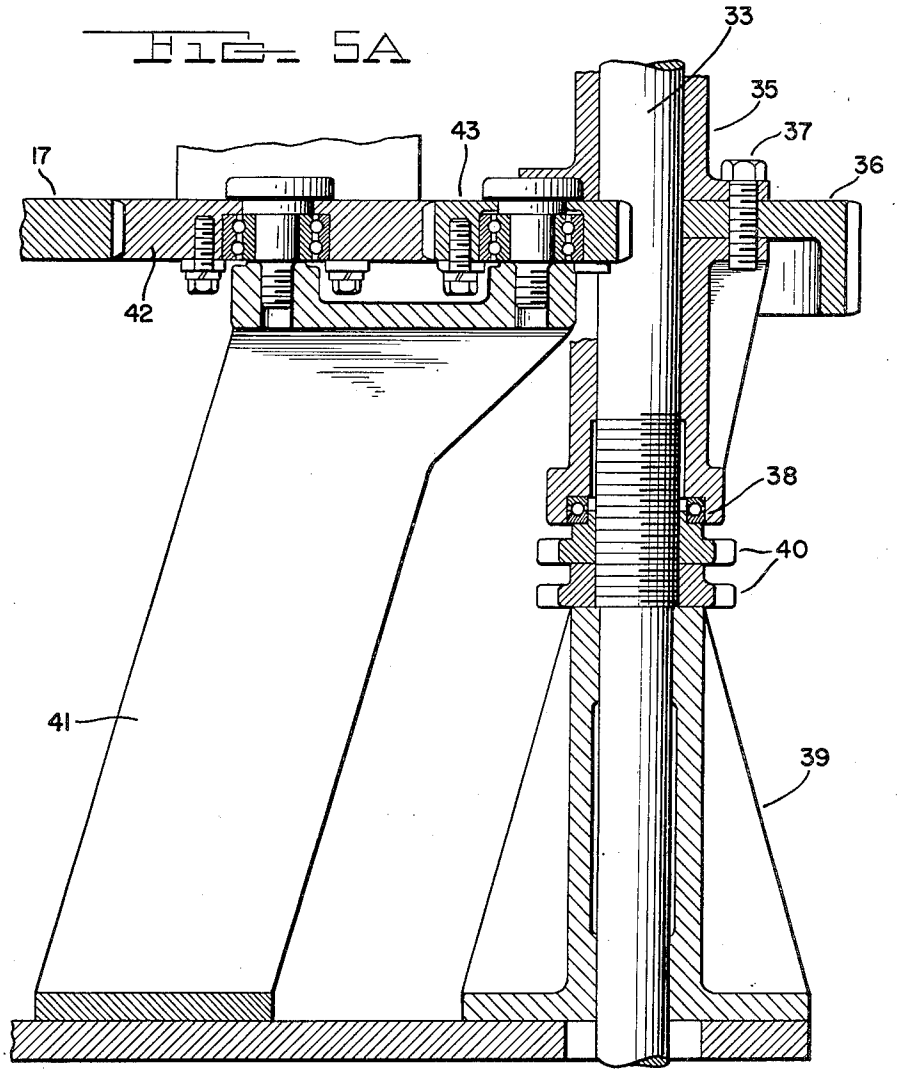
FIG. 5A



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FEEDING APPARATUS FOR GLASS-FORMING MACHINES

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Fig. 6

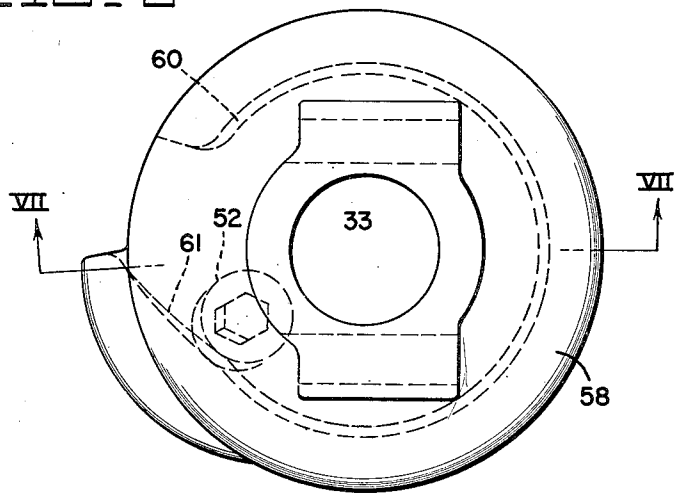


Fig. 7

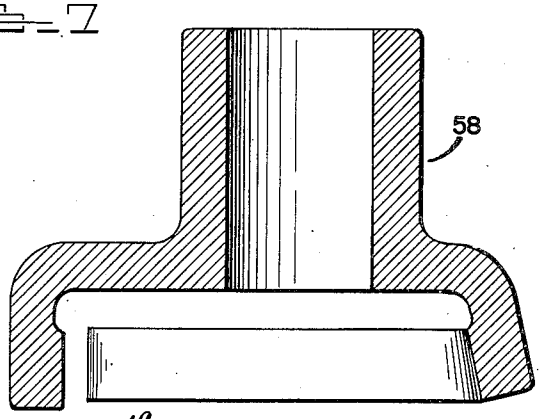
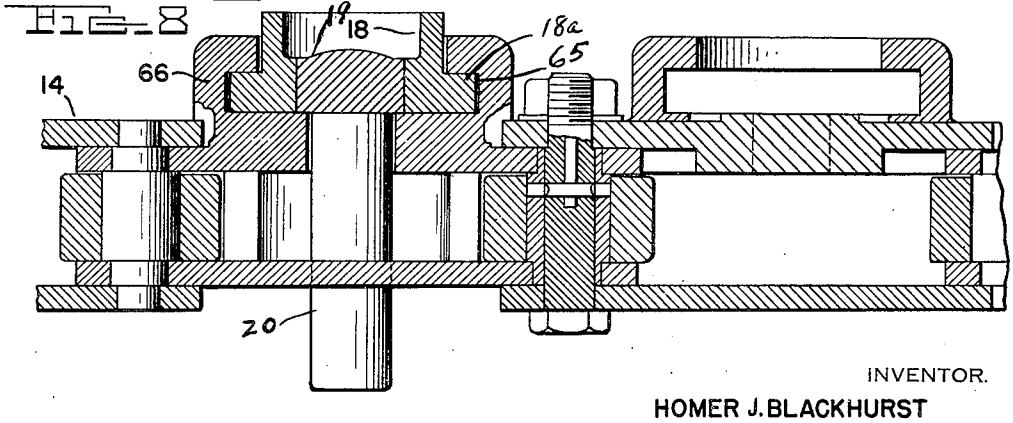


Fig. 8



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Patented May 16, 1950 2,507,753

UNITED STATES PATENT OFFICE

2,507,753

FEEDING APPARATUS FOR GLASS-FORMING MACHINES

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Application March 31, 1947, Serial No. 738,305

4 Claims. (Cl. 49—14)

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This invention relates primarily to apparatus for the feeding or directing of charges or gobs of molten glass to the molds of glass-forming machines, but it will be understood that the invention is capable of use in delivering mold charges to traveling molds of other types of forming machines.

Conventional glass-forming machines are mainly of the indexing or intermittently-moving type, the stopping and starting of these machines to provide pauses for feeding the mold charges and for shaping the charges in the molds not only subjects the machine to shocks, vibrations and excessive wear, but reduces the number of articles which can be formed per minute, as compared to a continuously-moving machine.

While continuously-moving glass-forming machines have heretofore been employed, some difficulty has been experienced in supplying charges of glass to the molds in an efficient and simple manner.

My invention has for its object the provision of apparatus for supplying glass charges to traveling molds, in an improved and simple manner, no matter at what rate the mold carrier is moving, and whereby the glass charges are deposited in a symmetrical or centralized position within the molds, so that when the glass is expanded in the molds, there will be better uniformity of distribution of the glass than is possible where the glass charge is dropped into the mold in a haphazard manner.

As shown in the accompanying drawings, Figure 1 is a sectional plan view of a portion of a glass-forming machine; Fig. 2 is a view on an enlarged scale taken on the line II—II of Fig. 1; Fig. 3 is an elevational view, partly in section, looking in the direction of the arrows III—III of Fig. 1 and showing the outer end of a glass-furnace forehearth and a sectional view through the mold-charge delivering apparatus; Fig. 4 is a plan view, on an enlarged scale, of a portion of the glass-charging apparatus of Fig. 1, taken on the line IV—IV of Fig. 5; Fig. 5 is a view taken on the line V—V of Fig. 4; Fig. 5A is an extension of the lowerpart of a portion of Fig. 5; Fig. 6 is an enlarged plan view of the funnel-shifting cam ring of Fig. 5, on a still further enlarged scale; Fig. 7 is a view taken on the line VII—VII of Fig. 6, and Fig. 8 is a sectional view, on an enlarged scale, through the mold conveyor of Fig. 1, showing the manner in which the molds are incorporated therein.

While the invention is capable of use in connection with glass-forming machines of either

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the press type, the press-and-blow type, or the narrow neck bottle type, and in connection with forming machines of either the turret or rotating table type, or of the conveyor chain type, I have herein shown my invention as applied to a simple form of machine of the conveyor chain type, wherein the ware is formed simply by pressing the mold charges of softened glass in the molds, during uninterrupted travel of the molds.

As shown more clearly in Fig. 1, the machine comprises a motor 10 for driving a gear wheel 11 and its shaft 12, the shaft carrying a sprocket wheel 13 near its upper end. A sprocket chain 14 is driven by the sprocket wheel 13 and passes around also a sprocket wheel 15 that is mounted on a shaft 16 which carries, on a lower portion thereof, a gear wheel 17 which, in turn, drives gearing for moving the glass-directing funnels as will be hereinafter explained. Press molds 18, having vertically-movable bottoms 19 provided with plunger-like extensions 20 for raising the molds bottoms to eject press ware from the mold as by a stationary cam rail 22 that is positioned below the path of the conveyor chain, may all be of conventional form. Also usual guide tracks or guide rails 23 are provided (Figs. 3 and 4) to afford vertical support to the conveyor chains.

As shown more clearly in Fig. 3, molten charges of glass are supplied from a forehearth or boot 25 of a glass-melting furnace, to a spout 26. The forehearth is here shown as provided with two feeding orifices 27 through which there is regulated flow of glass. As the glass emerges from the orifices, it is sheared by shears 28 to form mold charges 29. The shears will be operated in any suitable and usual manner, in time relation to movement to the molds and the operation of the pressing plunger or other glass-shaping element. Sometimes, one feeder orifice will be sufficient, but where the forming machine is moved at a rate to from perhaps 100 or more articles per minute, two feeder orifices will probably be required.

The spout 26 is of generally Y-form, so that it will catch charges of glass from either orifice and direct them to a central opening 31 through a bracket 32, the glass then falling into the funnels to be hereinafter described. The bracket 32 (Fig. 5) has one end anchored to a stationary upright column 33, and has a leg 34 connected to one of the guide rails 23 that supports the conveyor.

A tubular shaft 35 (Fig. 5) is journaled on the

stationary post 33 and has secured to its lower end, a wide-faced gear wheel 36, by screws 37. The tubular sleeve 35 is supported at its lower end (Fig. 5A) by an anti-friction bearing 38 and a base 39, the shaft and the parts carried thereby being vertically adjustable by nuts 40 that have screw-threaded connection with the post 33. The gear wheel 17, through gear wheels 42 and 43, drives the gear wheel 36 and the shaft 35. A fixed post 41 supports the bearings for the gear wheel 42—43.

The tubular shaft 35 at its upper end has a wide flange or table 44 that carries and has rigidly secured thereto a spider 45 in which are pivotally mounted levers 46 of bell-crank type.

Each of the cranks 46 has a funnel-carrying arm 47 that is yieldably projected outwardly by a spring 48, the arm having pin-and-slot connection at 49 with its crank. A funnel 51 is carried by each arm, and each arm at its outer end is provided with an anti-friction roller 52.

The rollers 52 are engageable with a guide plate or bar 53 during a portion of the annular travel of the funnels and while they are, in effect, overlapping the path of travel of the mold conveyor. The funnel-carrying arms 47 are of such length that normally they would project the funnels somewhat beyond the center line of mold travel when the molds are passing the funnel carrier. In order to provide for parallel travel of the funnels and the molds during the time that glass charges are passing through the funnel and into the mold, the bar 53 is mounted in such position that it will engage the rollers 52 as soon as their respective funnels are centered over the molds, and the springs 48 will be compressed by the bar 53 to effect such parallel travel. The bar 53 is mounted on bolts or screws 54 that are slidably supported by the bracket member 34, the bar being provided with back-up springs 55 that are of greater strength than the spring 48.

This arrangement not only gives adequate time for a mold charge to be guided from the moving funnels into the moving molds but, since the funnels move in the same direction as the molds during their travel in the overlapping portions of their paths, the funnels impart forward movements to the mold charges, so that the charges can be deposited in the centers of the molds instead of being caught against the rear sides of the molds as would be the case if they were simply dropped into the molds. The gearing 17, 42, 43 and 36, of course, insures synchronism of funnel travel with mold travel.

It will be understood that the shears 28 are operated by a suitable timer in timed relation to the travel of the mold carrier and the funnel carrier, such synchronism of shear operation and mold travel being effected by means well known in the glass-forming art. Where the mold carrier or conveyor is moving at a very rapid rate, the shears 28 will be operated alternately to insure a sufficiently rapid supply of mold charges. At slower speeds, one of the feeding orifices 27 can be closed and its shear left out of operation. The spout 26 is, of course, made wide-faced, so that it can receive mold charges from both orifices.

In order to permit movement of the funnels 51 into the molds somewhat as shown in Fig. 5, I provide a cam ring or collar 58 that is secured to the stationary post 33 and has its camming surface engageable with rollers 59 that are on the upper legs of the crank levers 46. When a funnel approaches the position shown in Fig. 5, above a mold and is about to receive a mold charge through the opening 31 from the spout 26, the roller will pass out of engagement with the camming surface of the ring 58, at 60 (Fig. 6), thus allowing the funnel to move down into the mold somewhat. As the funnel-guiding roller 52 approaches the other end of the guide bar 53, the roller 52 will enter upon the raised surface of the camming ring, at 61, thus lifting the funnel out of the mold as shown at the right hand side of Fig. 5 and permitting continued travel of the mold without interference from the funnel.

To adapt the funnels to molds of various heights, the nuts 40 will be adjusted on the post 33 to raise and lower the tubular shaft 35. The cam collar 58 can similarly be adjusted on the post.

When each mold has passed the guide bar 53 and reaches the sprocket 15, the glass will be pressed in the mold by a plunger 62, to shape the glass, by a piston and cylinder 63 or other device for raising and lowering the plunger. Fluid pressure will be admitted to the upper and lower ends of the cylinder to move the plunger into the mold and to raise it, this operation being controlled by a suitable timer to synchronize with the movement of the molds, as is common in devices of this character. It will be understood, of course, that forming devices other than the pressing plungers 62 may be provided on the turret which carries the cylinders 62.

The drawings also disclose a novel mounting of the molds, whereby they can be conveniently removed from the conveyor chain, and also will be automatically centered by the pressing plungers 62 during glass-shaping operations. To this end, the sides of the molds 18 have flanges 18*a* that will slide into grooves 65 in blocks 66 of generally semi-circular form (Figs. 1 and 5) that are carried by the conveyor links, so that when the mold bottoms 19 and their stems 20 are lifted out, the mold sides 18 can be slid from the conveyor, for the substitution of other molds. There is some clearance between the flange 18*a* and the wall of the groove 65 (Fig. 5), so that when the slightly tapered press plunger 62 enters the mold (Fig. 2), there can be some slight shifting of the mold wall sidewise, to center it with respect to the axis of the plunger.

I claim as my invention:

1. Apparatus for feeding glass charges to molds that are mounted for continuous traveling movement, comprising funnels positioned in a plane above the path of mold travel, a device rotatable about a vertical axis that is located adjacent to said path, for moving the funnels in an annular path that overlaps the path of mold travel for a substantial distance along said path, means for rotating said device in synchronism with traveling movement of the molds, means for periodically raising and lowering the funnels, and means for so shifting the funnels radially of said axis, during movement of the molds and the funnels and in timed relation to said raising and lowering, that the funnels will successively move in parallelism with the molds while traveling said distance and glass charges fed to the funnels will be deposited in the molds during said parallel travel.

2. Apparatus for feeding glass charges to molds that are mounted for continuous traveling movement, comprising funnels positioned in a plane above the path of mold travel, a device rotatable about a vertical axis that is located adjacent to said path, for moving the funnels in an annular

path that overlaps the path of mold travel for a substantial distance along said path, means for so shifting the funnels radially of said axis and maintaining them in a given horizontal plane, during movement of the molds and the funnels, that the funnels will successively move in parallelism with the molds while traveling said distance and glass charges fed to the funnels will be deposited in the molds during said parallel travel, and means for raising and lowering the funnels relative to the molds, while traveling in other portions of their annular path.

3. Apparatus for feeding glass charges to molds that are mounted for continuous traveling movement, comprising a column positioned to one side of the path of travel of the molds, for rotation on a vertical axis, funnel-supporting arms carried by the column and projecting radially therefrom, funnels carried by the arms, means yieldably holding the funnels in a predetermined radial position relative to the column, the annular path in which the funnels are moved being located in a plane above the molds, a part of said path overlapping the path of mold travel, means for shifting the funnels radially of the column and in a horizontal plane during movement along said part of the funnels path, to positions at which they successively move in parallelism with the path of mold travel, whereby mold charges may be guided by the funnels into the molds during said parallel movement, and means for lowering the funnels successively as they come into said position of parallelism with the molds and for raising them when they approach the end of said parallel path of travel.

4. Apparatus for feeding glass charges to molds that are mounted for continuous traveling movement, comprising a vertical shaft positioned to one side of the path of travel of the molds, a tubular column rotatable on the lower portion of the shaft, funnel-supporting arms pivotally carried by the column and projecting radially therefrom, the arms being provided with vertical extensions at their inner ends, funnels on the outer ends of the arms, means operable during travel of the funnels in their annular path, for shifting them radially of the column, in a horizontal plane, to direct their movements into parallelism with the mold travel, through a portion of said path, and camming means on the said vertical shaft and engageable with said extensions, for raising the funnels as they leave said portion of the path and for lowering them as they enter this portion of their path.

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