MACHINE FOR FORMING SEALED PLASTIC CONTAINERS FROM DEFORMABLE MATERIAL IN SHEET FORM

Donovan H. Pollitt and Philip G. Hawe, Lansing, Ontario, Canada, assignors to Campbell Manufacturing Company Limited, Lansing, Ontario, Canada

Application September 18, 1948, Serial No. 49,922

3 Claims. (Cl. 18—5)

1
This invention relates to improvements in machines for forming sealed plastic containers and more particularly to improvements in machines having rotatable dies for forming such containers from a deformable material in sheet form, and has for its chief object the provision of an improved and simplified machine to produce liquid centres for golf balls and the like.

It is a further important object of this invention to provide a simplified machine to produce liquid centres for golf balls and the like continuously and in an expeditious manner, without the necessity of injecting or introducing the liquid charge in each centre individually.

Another object of the invention is the provision of a machine for forming sealed plastic containers which obviates “creeping” of the sheet plastic stock material during the continuous operation in which the containers are formed.

Still another object of the invention is to provide simplified means, which may conveniently operate in a bath of liquid, for seating the sheet stock material in the mould cavities prior to sealing the containers.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in conjunction with the accompanying drawings, wherein like characters of reference indicate corresponding parts throughout the several views and wherein:

Figure 1 is a top plan view of the machine showing the mould cavities in the position of rectification;

Figure 2 is a vertical section on the line 2—2 in Figure 1;

Figure 3 is an end view in the direction of the arrow A in Figure 1 with the tank in section;

Figure 4 is a vertical section on the line 4—4 in Figure 1, also showing diagrammatically a pair of associated idler rollers; and

Figure 5 is a detailed sectional view of a male die.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 5 designates a frame structure. Molds 7 and 9 are each provided on their peripheries with the desired number of mold cavities 10 and 10' respectively, which are integral with the respective molds. The mold cavities 10 and 10' are preferably shaped in the form of a smooth hemisphere but may of course take the form of any desired depressed configuration. The mold cavities 10 and 10' on each of the molds have a flat bottom, but may of course take the form of any desired depressed configuration.

The die rolls 16 and 16' are preferably shaped in the form of a smooth hemisphere but may of course take the form of any desired depressed configuration. Between the mold cavities 10 and 10' on each of the molds the surface of each mold is provided with combs 11 and 11' constituted by areas having lateral raised ridges or equivalent projections, the purpose of which will subsequently appear.

The moulds 7 and 9 may be caused to rotate by means of the gears 12 and 12' which are also mounted on the shafts 9 and 9' respectively and which are driven through the driving gear 13 by suitable driving means 14 connected to the gear 13 by the shaft 15. Meshing with the gears 12 and 12' are the gears 16 and 16' mounted on shafts 17 and 17' respectively. Also mounted on the shafts 17 and 17' are the die rolls 16 and 16', respectively, which respectively carry on their peripheries the male dies 19 and 19'. The latter may be integral with the die rolls 16 and 16' but in the preferred embodiment of the invention are each separately formed with a shank 20 (Fig. 4) which projects into the body of the die rolls 16 and 16' and is held therein by a friction fit or other suitable means. In the side of the shank 20 is provided a drainage hole 21 communicating with the axil passage 22, which further communicates with a desired number of drainage ports 23 in the male dies 19 and 19'. The centre of the hole 20 coincides with the lower edge of the die 16 or 16' and a depression 24 is formed in the surface of each roll 16 and 16' to coincide with the holes 21 in each of the male dies 19 and 19'.

The surface of the die rolls 16 and 16' between the male dies 19 and 19' is raised to form roller surfaces 25, the purpose of which will be hereinafter apparent. The roller surfaces 25 may be integral with the die rolls 16 and 16' but are preferably formed of separate curved plates of the desired thickness suitably secured to the die rolls.

The system of gears comprising gears 13, 12, 12', 16 and 16' and the diameters of the rotatable molds 7 and 9 and of the die rolls 16 and 16' are so arranged that the molds and rolls rotate in predetermined complementary engagement in a manner which will now be described. The rotatable molds 7 and 9 are mounted in a manner such that the respective mold cavities 10 or 10' on one of the molds 7 or 9 occupy the same rotative angular position, but in an opposite direction, with respect to the corresponding mold cavities on the other mold. Mold cavi-
ties 10 and 10' therefore coincide along the centre line 27 shown as a dotted line in Fig. 4. Similarly, the die rolls 18 and 18' are mounted in a manner such that the male dies 19 and 19' occupy the same rotative angular position, but in an opposite direction, with respect to the mold cavity 10 and 10', respectively, and the male dies 19 and 19' are so shaped that they will enter the mold cavities 10 and 10' and have the effect of seating therein a sheet plastic material passed between the mold 8 and the die roll 18 and between the mold 8' and the die roll 18'.

Idler rollers 28 and 28' are respectively mounted at each side of the frame structure 8 and above the same on shafts 29 and 29', which are journaled in a suitable mechanical structure. The idler rollers carry stock or plastic material in rolled sheet form and enable the ribbon-like plastic strips 30 and 30' to be fed to the rotatable molds 8 and 8' under such tension as to cause the strips to closely hug the circumference of the molds. The composition of strips 30 and 30' is such as to be suitable for the intended purpose, and is preferably of vulcanized rubber, which is moldable and capable of being sealed by the application of pressure. The width of the strips 30 and 30' is preferably substantially the same as the width d of the rotatable molds 8 and 8'.

In the operation of the invention, the strips 30 and 30' are fed underneath the molds 8 and 8' respectively between the molds and the die rolls 18 and 18', the complementary surfaces of the molds and of the die rolls being spaced apart a distance less than the total thickness of the strips. The function of the combs 11 and of the raised rolling surfaces 26 of the die rolls 18 and 18' will now be apparent. Since the combs 11 and the roller surfaces 26 are spaced apart a distance less than the combined thickness of the strips 30 and 30' and are arranged in such a manner that the combs register with the rolling surfaces during rotation, the effect of the rolling surfaces therefore will be to press the deformable plastic strips 30 and 30' against and between the projections of the combs 11, and they thereby will eliminate all tendency for the strips to "creep" on the surface of the molds 8 and 8'. The strips 30 and 30' consequently will be fed continuously and uniformly around the rotatable molds 8 and 8' as the motion of the driving gear 13 is transmitted to the molds and to the die rolls 18 and 18' as hereinabove described.

In the passage of the strips 30 and 30' between the rotatable molds and the die rolls, the portions of the strips which cover the mold cavities 10 and 10' are seated in the respective mold cavities by the male dies 19 and 19'. The ports 22 and the passage 22 are provided to allow entry of the fluid as each male die is subsequently drawn away from the seated plastic strip, and thereby to prevent the formation of a vacuum which might unseat the plastic strip. The consistency of the plastic strips 30 and 30' is such that they normally remain seated in the mold cavities until the latter have been rotated to their coincident position along the centre line 27, and the effect of the combs 11 and rolling surfaces 26 is to prevent unseating the plastic strips by "creepage" on the mold which would otherwise be caused by the tension under which the strips are fed to the molds.

This point coincident raised sealing rims 31 at the outer edges of the mold cavities 10 and 10', which are spaced apart a distance less than the combined thickness of the strips 30 and 30' have the effect of sealing the plastic strips 30 and 30' together at the edges of the mold cavities within the bath of liquid, thereby enclosing within the sealed portion the liquid centre 32. A series of liquid centres 32 is thereby produced, connected by those portions of the plastic strips 30 and 30' which have been sealed together by the pressure of the combs 11.

Upon the completion of the molding process, the plastic liquid centres are subjected to the usual processing to give them the desired resiliency and toughness.

It is thought that the construction and use of the invention will be apparent from the above description of the various parts and their purpose. It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention and the scope of the subjoined claims.

What we claim as our invention is:

1. In a machine for forming sealed plastic containers for liquid, a receptacle adapted to contain a liquid, a pair of molds journaled for rotation within the receptacle, each mold having peripherally placed mold cavities complementary to the mold cavities of the other, said molds being arranged in peripheral adjacency, a pair of die rolls each journaled for rotation in peripheral adjacency with one of the molds, each die roll having male dies protruding from its periphery and adapted to register with the mold cavities in one of the mold members, means whereby the molds and die rolls may be rotated in synchronization and two strips of deformable material may each be carried first between one of the molds and one of the die rolls for the formation of pockets therein by the male dies and then may be carried between the molds and pressed into contact with and sealed at the edges of the mold cavities to the other strip below the surface of the liquid in the receptacle, and in interfering surfaces on the molds and die rolls located between the mold cavities and between the male dies for temporarily attaching the strips of deformable material to the peripheral edges of the receptacle to prevent creepage of the strips relative to the periphery of the molds and thus prevent unseating of the formed pockets from the mold cavities prior to sealing.

2. A machine for forming sealed plastic containers for liquid from strips of rubber and like deformable material having in combination a receptacle adapted to contain a liquid, a pair of molds journaled for rotation within the receptacle and each having peripherally placed mold cavities complementary to the mold cavities of the other, rotatable die rolls each associated with one of the molds, means for temporarily attaching the strips of deformable material to the peripheral edges of the receptacle to prevent creepage of the strips relative to the periphery of the molds and thus prevent unseating of the formed pockets from the mold cavities prior to sealing.
formed in the peripheral surfaces of the molds between the mold cavities, rolling surfaces on the peripheral surfaces of the die rolls and adapted to register with the combs during rotation, the said rolling surfaces being adapted to compress the strips of deformable material between the combs and the rolling surfaces and temporarily attach the strips to the combs to prevent relative peripheral motion between the molds and the deformable material and thus preventing unsealing of the formed pockets from the mold cavities prior to sealing.

3. A machine for making golf ball centres and the like from strips of rubber and like deformable material, comprising a receptacle adapted to contain a liquid, juxtaposed molds journaled for rotation within the receptacle and each having peripherally placed mold cavities complementary to the mold cavities of the other, rotatable die rolls each associated with one of the molds, male dies protruding from the peripheries of the die rolls and adapted to enter the mold cavities in the molds, means whereby the molds and die rolls may be rotated in synchronism and two strips of deformable material may each be carried first between one of the molds and one of the die rolls for the formation of pockets therein by the male dies, and then may be carried between the molds and pressed into contact with and sealed at the edges of the mold cavities to the other strip, combs formed in the peripheral surfaces of the molds between the mold cavities, rolling surfaces on the peripheral surfaces of the die rolls and adapted to register with the combs during rotation, the said rolling surfaces being adapted to compress the deformable material between the combs and the rolling surfaces and temporarily attach the strips to the combs to prevent relative peripheral motion between the molds and the deformable material and thus prevent unsealing of the formed pockets from the mold cavities prior to sealing, the said male dies having central open drainage ports communicating through a drainage hole with the liquid in the container whereby the liquid in the container may flow into the mold cavities when the male dies are withdrawn therefrom.

DONOVAN H. POLLITT.
PHILIP G. HAYE.

REFERENCES CITED

The following references are of record in the file of this patent:

**UNITED STATES PATENTS**

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,402,293</td>
<td>Heist</td>
<td>Jan. 3, 1922</td>
</tr>
<tr>
<td>1,624,849</td>
<td>Steele et al.</td>
<td>Apr. 12, 1927</td>
</tr>
<tr>
<td>1,639,430</td>
<td>Gammeter</td>
<td>Aug. 16, 1927</td>
</tr>
<tr>
<td>1,943,145</td>
<td>Ruegenberg</td>
<td>Jan. 9, 1934</td>
</tr>
<tr>
<td>2,120,328</td>
<td>Ferngren</td>
<td>June 14, 1938</td>
</tr>
<tr>
<td>2,152,101</td>
<td>Scherer</td>
<td>Mar. 29, 1939</td>
</tr>
<tr>
<td>2,219,978</td>
<td>Pittenger</td>
<td>Oct. 29, 1940</td>
</tr>
<tr>
<td>2,497,212</td>
<td>Donofrio</td>
<td>Feb. 14, 1950</td>
</tr>
</tbody>
</table>