

Oct. 21, 1941.

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2,259,508

MEANS FOR THE MANUFACTURE OF CONTAINERS

Filed July 3, 1939

3 Sheets-Sheet 1

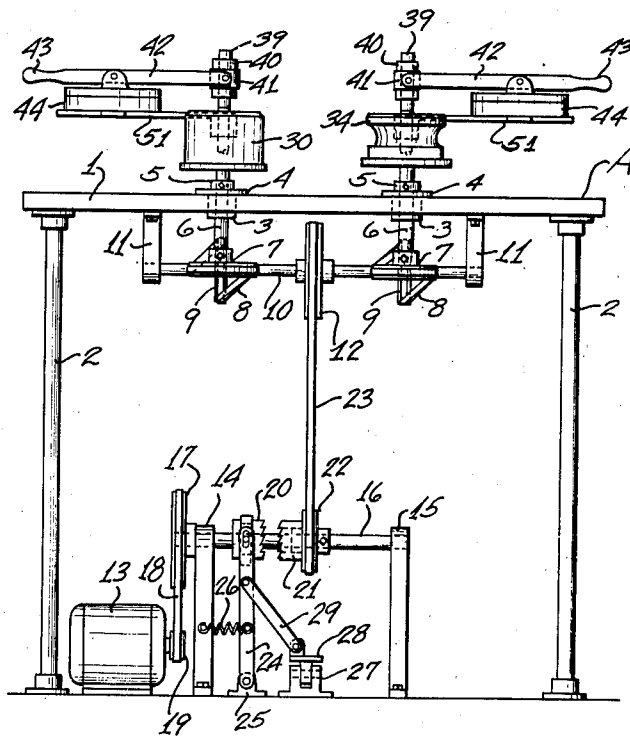


FIG. 1.

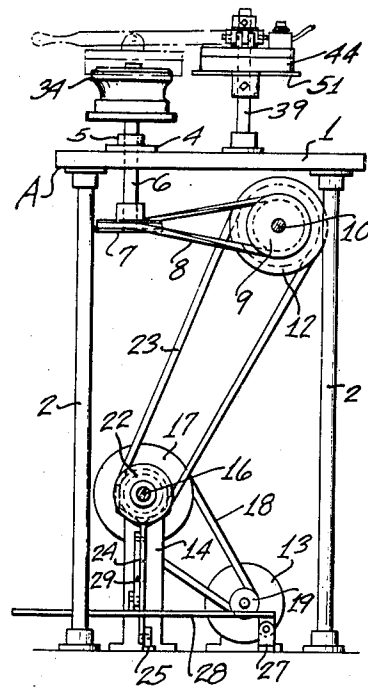


FIG. 2.

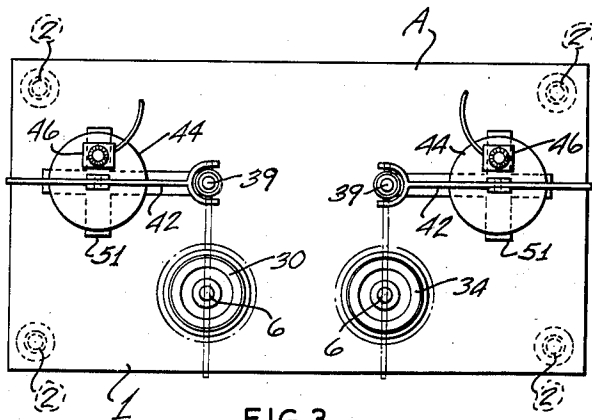


FIG. 3.

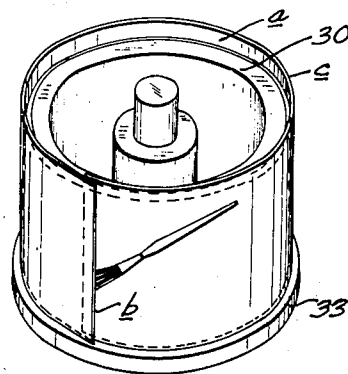


FIG. 4.

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3 Sheets-Sheet 2

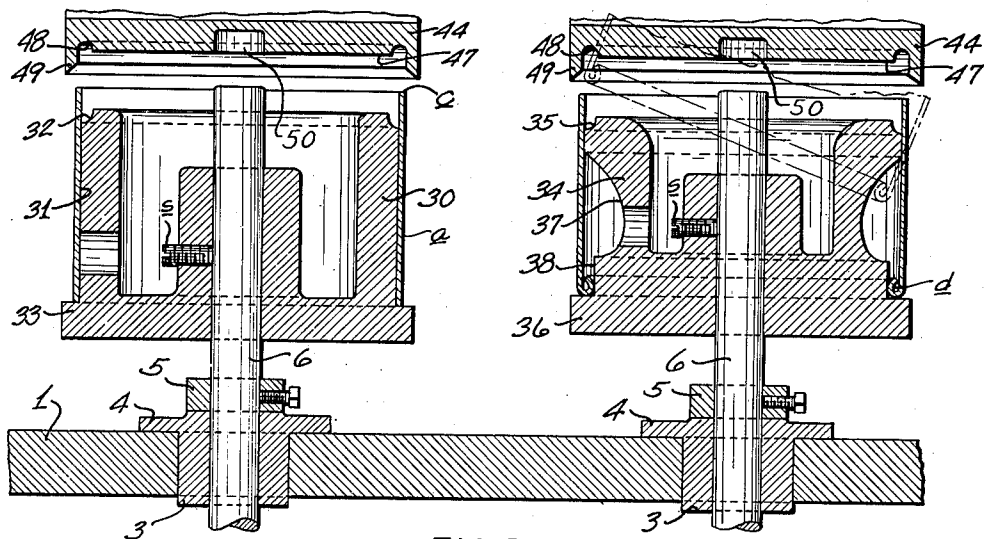


FIG. 5.

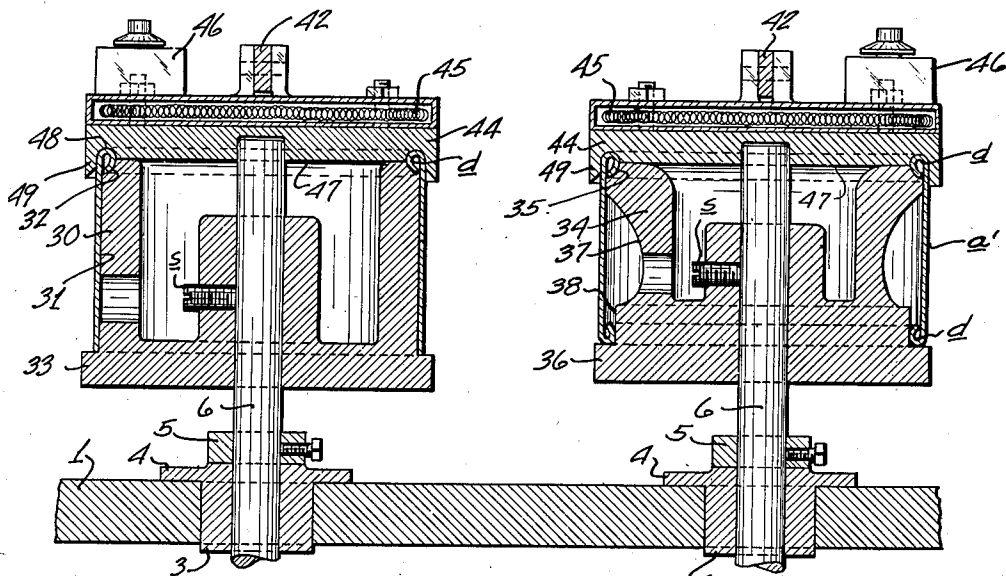


FIG. 6.

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3 Sheets-Sheet 3

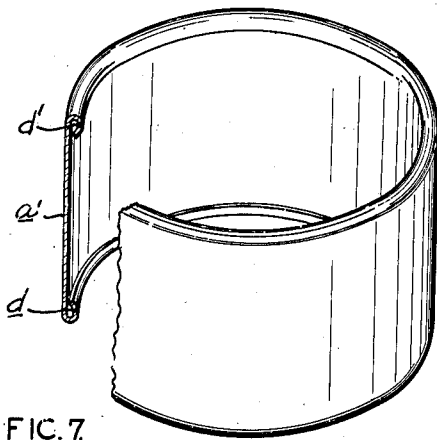


FIG. 7.

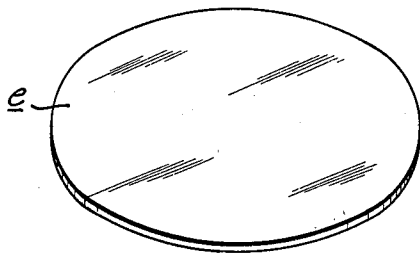


FIG. 8.

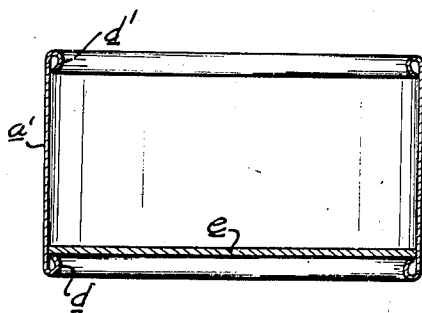


FIG. 9.

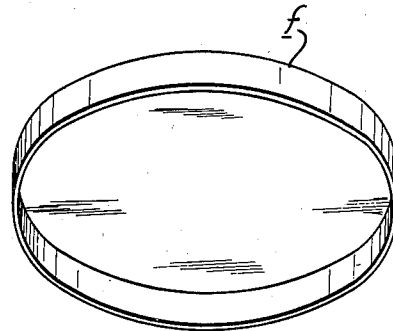


FIG. 10.

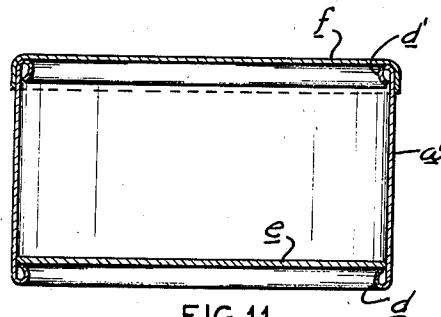


FIG. 11.

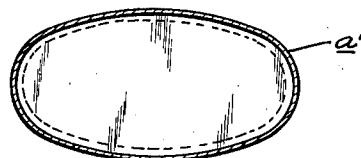


FIG. 12.

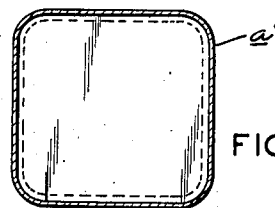


FIG. 13.

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UNITED STATES PATENT OFFICE

2,259,508

MEANS FOR THE MANUFACTURE OF CONTAINERS

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Application July 3, 1939, Serial No. 282,601

10 Claims. (Cl. 18—1)

This invention relates to methods and means for the manufacture of containers and, more particularly, to transparent containers formed of so-called "synthetic plastic" materials.

My invention has for its primary objects the provision of methods and means for the manufacture of containers of the type stated which are simple and economical, which make it possible to produce such containers at relatively low cost high speed and with great uniformity of size and quality, and which substantially eliminates the accidental production of defective containers which must be rejected upon inspection.

My invention has for a further object the provision of means for the production of containers of the type stated which is inexpensive in installation and maintenance cost, and which is durable and rugged, which is simple in operation, and which is otherwise highly efficient in the performance of its desired functions.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of the several parts presently described and pointed out in the claims.

In the accompanying drawings (3 sheets) —

Figure 1 is a front elevational view of a container-forming machine constructed in accordance with and embodying my present invention;

Figures 2 and 3 are side elevational and top plan views, respectively, of the container-forming machine;

Figure 4 is a schematic view, illustrating the initial step in forming the container side wall;

Figures 5 and 6 are fragmentary vertical sectional views of the container-forming machine, illustrating in detail the several progressive steps in the formation of the container side wall;

Figure 7 is a perspective view, partially broken away and in section, of the completed container side wall;

Figure 8 is a perspective view of the container bottom wall;

Figure 9 is a vertical sectional view of the side and bottom walls in assembled relation, forming a container shell;

Figure 10 is a perspective view of the cover member;

Figure 11 is a vertical sectional view of the completed container; and

Figures 12 and 13 are transverse sectional views of containers of modified shape constructed in accordance with my present invention.

Referring now in more detail and by reference characters to the drawings, which illustrate a preferred embodiment of the present invention, A designates a work-table including a preferably oblong rectangular top 1 conventionally supported at its corners from the floor by vertical legs 2.

Mounted in and extending vertically through the table top 1, is a pair of spaced bearing sleeves 3 provided at their upper ends with diametrically enlarged flanges 4 for overlying engagement with the upper face of the table top 1. Rotatively extending through the sleeves 3 and operatively held by conventional set collars 5 are preferably tubular shafts 6 provided on their lower ends with pulleys 7 for receiving belts 8 trained over line-pulleys 9, in turn, operatively mounted on a line-shaft 10, the latter being journaled at its ends in hangers 11 and provided, intermediate the line-pulleys 9 with a drive-pulley 12, all as best seen in Figures 1 and 2.

Securely bolted on the floor or otherwise suitably mounted beneath the table A, is an electric motor 13 or other conventional prime mover, and laterally aligned spaced brackets 14, 15. Journaled in, and extending horizontally between, the brackets 14, 15, is a drive-shaft 16 projecting at its one end through the bracket 14 and provided with a pulley 17 for receiving a drive-belt 18, in turn, trained over the drive-pulley 19 of the motor 13.

Shiftably keyed upon the shaft 16, intermediate the brackets 14, 15, is a tooth-clutch driving member 20 adapted for engagement with a driven member 21 rotatively mounted on the shaft 16 and having a pulley portion 22 for operative connection with the pulley 12 by means of a drive belt 23. The driving member 20 is conventionally provided with a circumferential groove for operative engagement in the yoked end of a disengagement arm 24 pivotally mounted at its lower end in a conventional hinge block 25 suitably mounted on the floor. Intermediate its ends, the arm 24 is connected to one end of a tension spring 26, which is, in turn, connected at its other end to the bracket 14 for normally shifting the arm 24 and the associated driving member 20 into disengaged position, as shown in Figure 1.

Also suitably bolted or otherwise secured upon the floor between the brackets 14, 15, is a hinge block 27 for swingably supporting a foot pedal 28 operatively connected by means of the link 29 to the arm 24, all as best seen in Figures 1 and 2 and for purposes more fully appearing.

Removably secured by a set screw or other conventional means upon the upper end of one of the shafts 6, is a primary mandrel 30 having an outer cylindrical face 31 and being provided at its upper and lower ends, respectively, with an annular recess 32 and a diametrically enlarged stop-flange 33, all as best seen in Figure 5.

Similarly secured upon the upper end of the other shaft 6, is a companion-shaped secondary mandrel 34 likewise provided, respectively, at its upper and lower ends with an annular recess 35 and a stop-flange 36. For a short dis-

tance downwardly from the recess 35, the secondary mandrel 34 is of substantially the same diametral size as the primary mandrel 30 and is then cut away or relieved inwardly in the provision of a circumferential clearance groove 37 terminating along its lower margin in a cylindrical section 38 extending down to the flange 36 and being of substantially the same diametral size as the smallest diametral size of the recess 35. It should further be noted in this connection that the upper end of each shaft 6 preferably projects upwardly a short distance above the plane of the upper faces of the mandrels 30, 34, as best seen in Figure 5 and for purposes more fully appearing.

Mounted upon the upper face of the table top 1 in rearwardly spaced alignment with the shafts 6, are upstanding posts 39 each provided adjacent its upper end with a vertically adjustable sleeve 40, which is, in turn, provided with a rotatable collar 41. Pivotaly mounted at its inner end upon each of the collars 41, is an arm 42 provided at its outer end with a hand-grip 43. Swingably suspended from each of the arms 42, is a top plate 44 provided with an electric heating element 45, which is controlled by a thermostatic element 46. The top plates 44 are substantially larger in diametral size than either of the mandrels 30, 34, and are recessed in their under faces in the provision of a flat face 47, a groove 48, and a rim 49 for complementarily fitting over and around the upper end of the mandrels 30, 34. The top plates 44 are further centrally provided with recesses 50 adapted to receive the upwardly extending ends of the shafts 6 in the provision of a positive bearing and guide for preventing wobbling of the top plates 44 as they move down upon the mandrels 30, 34, as shown in Figure 6.

Also adjustably mounted on each of the posts 39, are outwardly projecting horizontal brackets 51 for supporting the top plates 44 when not in use, as best seen in Figure 1.

In actual use, the operator bends around the primary mandrel 30 an oblong rectangular sheet *a* of transparent material, such as "Vue-Pack" manufactured by Monsanto Chemical Company, or any other thermo-plastic sheet-like material, and brushes a suitable acetone-base adhesive along the overlap *b*, substantially as shown in Figure 4, for securing the sheet *a* in the form of an open-ended tube which fits snugly around the outer face 31 of the primary mandrel 30 and upon the stop-flange 33. The sheet *a* is furthermore substantially wider than the height of the primary mandrel 30, so that a marginal strip *c* projects upwardly above the annular recess 32. Thereupon the operator steps on the pedal 28, engaging the clutch elements 20, 21, it being assumed, of course, that the motor 13 has been energized, so that the rotatory motion will be transmitted through the belt 23 to the mandrels 30, 34, which then begin spinning.

The top plate 44, associated with the mandrel 30, is then swung over into axial alignment above the mandrel 30. Previously the current to the heating element 45 has been turned on and the top plate 44 brought up to, and maintained at, the desired temperature under control of the thermostat 46. In this connection, it should be pointed out that the particular temperature employed should be such that the sheet *a* will become soft and pliable and may be readily shaped or formed.

The top plate 44 is then permitted to move

down upon the projecting margin *c* of the sheet *a*, causing the margin *c* to curl inwardly upon itself, being shaped by the annular recess 32 into a circumferential bead *d*. Depending upon the size, weight, and character of material being used, the operator may, by applying manual effort, either accelerate or decelerate the downward movement of the top plate 44 or may even permit the top plate 44 to move freely of its own weight. A short amount of experience with a particular type and weight of material will give the operator the "feel" of the operation and will enable him to achieve maximum speed.

When the bead *d* is fully formed, the pedal 28 is permitted to return to initial position, stopping the mandrels 30, 34. The top plate 44 is then swung away and the partially finished sheet *a*, which is now in tubular form, is removed. It is turned end for end, that is to say with the bead *d* in downward position, and slipped over the secondary mandrel 34 by tilting at an angle, as shown in dotted lines in Figure 5, so that the relatively inflexible beaded margin will slip into the clearance groove 37 and come to rest finally upon the stop-flange 36 against the mandrel face 38. Meanwhile a second sheet *a* is mounted on the primary mandrel 30, as above described.

Thereupon the mandrels 30, 34, are again set in motion and the top plates 44 lowered. On the secondary mandrel 34, a second bead *d'* is being formed in the recess 35, while on the primary mandrel 30 the next successive sheet *a* is being primarily shaped for transference to the secondary mandrel 34. Upon completion of this operation, the finished container side wall *a'* is removed from the secondary mandrel 34 and is in the form of an open-ended tube having strengthening beads *d, d'*, as best seen in Figure 8.

As a separate operation, a circular disk-like bottom member *e* is die-cut or otherwise formed from a sheet of suitable material. This bottom member may be formed of heavy cardboard, fiber, or even a transparent plastic substance, as desired, and should have a diametral size substantially equal to the inside diametral size of the tubular side wall *a'* for snug-fitting disposition therein. The bottom wall *e* is pushed into the side wall *a'* into overlying disposition upon the bead *d* and adhesively secured, as best seen in Figure 9.

As a further separate operation, the cover member *f* is stamped from a suitable material preferably, although not necessarily, the same as that employed in the formation of the side wall member *a'*. The cover *f*, when conventionally placed over the side wall member *a'*, completes the container, as best seen in Figure 11.

While the tubular wall *a'* normally assumes a circular shape and is relatively strong, it is nevertheless sufficiently flexible to accommodate itself to the shape of the bottom member inserted therein. Consequently it is possible, by employing oval and somewhat rectangular bottoms, to form containers having corresponding shapes, as shown in Figures 12 and 13. It will, of course, be obvious that the covers for such modified forms of containers will necessarily be of suitably complementary shape.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the machine may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a container-making machine, a vertically disposed mandrel provided around its upper peripheral margin with an annular bead-forming channel, means for rotating the mandrel, means for supporting a tubular section of container-forming material in upright position around and upon the mandrel with a free margin surrounding the channel, and relatively non-rotative bead-forming means positioned above said mandrel, said bead-forming means being free to move downwardly toward the mandrel by its own weight whereby it may rest upon the free margin of the container-forming material during rotation of the mandrel.

2. In a container-making machine, a vertically disposed bead-forming mandrel having an annular channel opening upon the upper end face thereof and shaped to conform to a segment of the desired bead shape, means for rotating the mandrel about a vertical axis, means for supporting a tubular section of container-forming material upon the mandrel with a free margin surrounding the channel and bead-forming means positioned above said mandrel, said bead-forming means being free to move downwardly toward the mandrel by its own weight whereby it may rest upon the upper peripheral margin of the material during rotation of the mandrel.

3. In a container-making machine, a vertically disposed mandrel provided around the peripheral portion of its upper end face with an annular bead-forming surface, means for rotating the mandrel about its vertical axis, a stop-flange at the lower end of said mandrel for supporting a tubular section of thermoplastic container-forming material upon the mandrel in such a manner that a portion of the material projects above the upper end of the mandrel, and heated means positioned above the mandrel and being free to move downwardly toward the mandrel by its own weight thereby engaging the projecting portion of the thermoplastic material and causing said portion to curl into bead formation under substantially constant pressure.

4. In a container-making machine, a vertically disposed mandrel provided around the peripheral portion of its upper end face with a bead-forming surface, means for rotating the mandrel about a vertical axis, means for supporting a tubular section of thermoplastic container-forming material upon the mandrel, forming means swingably supported above said mandrel and adapted to rest of its own weight upon the thermoplastic material when the mandrel is rotating, and constant temperature heating means associated with the forming means for forming a bead upon said tubular section under substantially constant temperature and pressure.

5. In a container-making machine, a rotary mandrel having an end face provided with an annular bead-forming groove said mandrel also having a circumferential clearance groove intermediate its ends for permitting a bead-ended tubular section to be slipped onto the mandrel.

6. In a machine for making open-ended cylindrical tubes provided at both ends with peripheral beads, a mandrel having an end face provided with an annular bead-forming channel, said mandrel further being provided intermediate its ends with a clearance groove for per-

mitting a bead-ended tubular section to be slipped onto the mandrel, said mandrel further being of reduced diametral size on the side of the clearance groove remote from the end face for accommodating the preformed bead of the bead-ended tubular section.

7. In a machine for making open-ended cylindrical tubes provided at both ends with peripheral beads, a mandrel having an end face provided with an annular bead-forming channel, said mandrel further being provided intermediate its ends with a clearance groove for permitting a bead-ended tubular section to be slipped onto the mandrel, said mandrel further being of reduced diametral size on the side of the clearance groove remote from the end face for accommodating the preformed bead of the bead-ended tubular section, and a diametrically enlarged flange for engaging the beaded end of the tubular section and supporting said tubular section upon the mandrel in such a manner that its unbeaded end will be positioned over the bead-forming channel.

8. In a machine for making open-ended cylindrical tubes provided at both ends with peripheral beads, a mandrel having an end face provided with an annular bead-forming channel, said mandrel further being provided intermediate its ends with a clearance groove for permitting a bead-ended tubular section to be slipped onto the mandrel, said mandrel further being of reduced diametral size on the side of the clearance groove remote from the end face for accommodating the preformed bead of the bead-ended tubular section, and bead-forming means shiftable toward and away from the mandrel end face and having an annular groove complementary in shape to and adapted for cooperative registration with the bead-forming channel of the mandrel to form a closed tubular bead.

9. A container-making machine comprising a table, rotary driving means associated with said table, a driven shaft journaled on said table, clutch means optionally connecting the driving means and the driven shaft, vertical shafts journaled in the table and connected to the driven shaft for rotation thereby, and container-forming mandrels mounted upon the upper ends of said shafts, said container mandrels being complementary in shape for respectively performing initial and final container-forming operations upon each container in the course of its manufacture.

10. A container-making machine comprising a table, rotary driving means associated with said table, a driven shaft journaled on said table, clutch means optionally connecting the driving means and the driven shaft, vertical shafts journaled in the table and connected to the driven shafts for rotation thereby, container-forming mandrels mounted upon the upper ends of said shafts, said container mandrels being complementary in shape for respectively performing initial and final container-forming operations upon each container in the course of its manufacture, and means swingably supported over each of the mandrels for cooperation therewith in forming a bead around the peripheral end of a tubular section of container-forming material placed upon the mandrel.

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