

Dec. 29, 1953

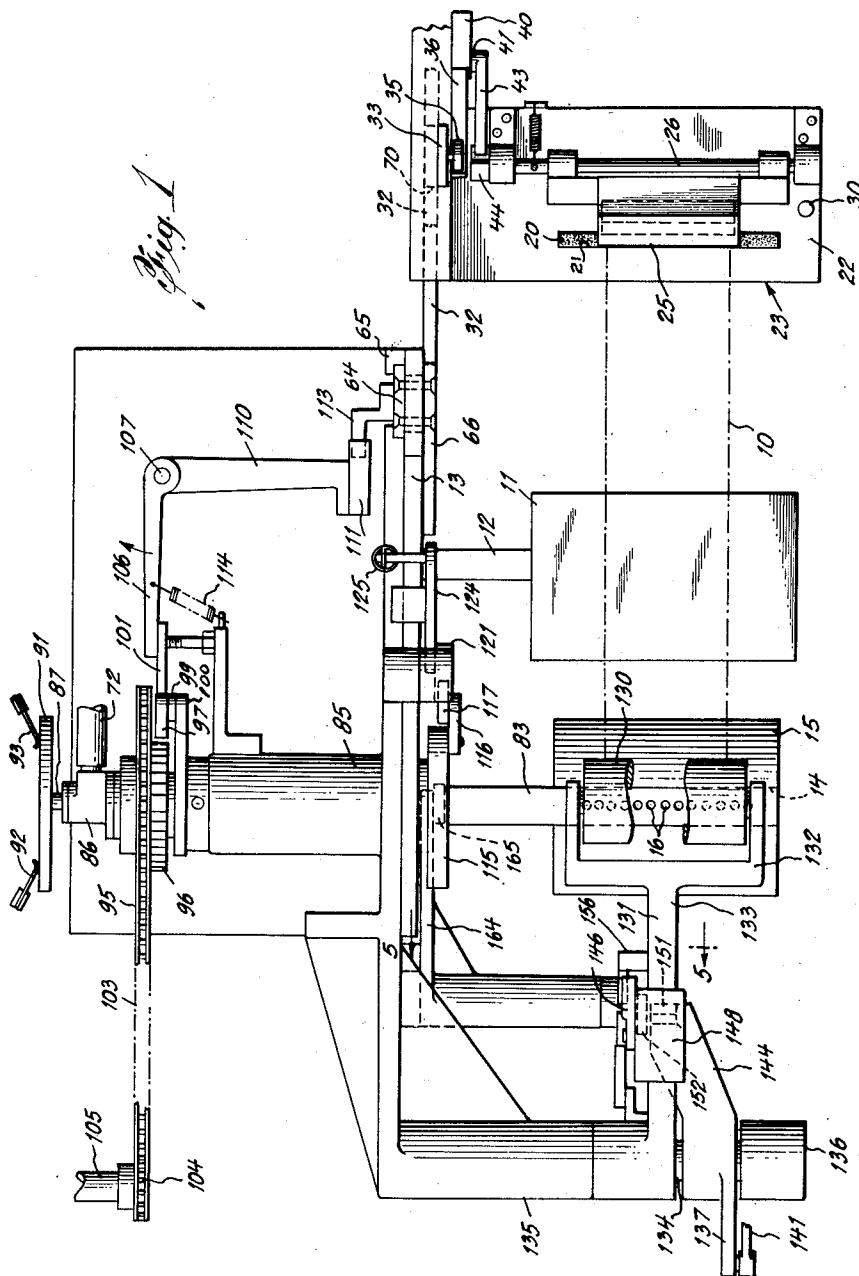
L. TRIOLO

2,664,036

CONTAINER-MAKING MACHINE

Filed Sept. 7, 1951

4 Sheets-Sheet 1



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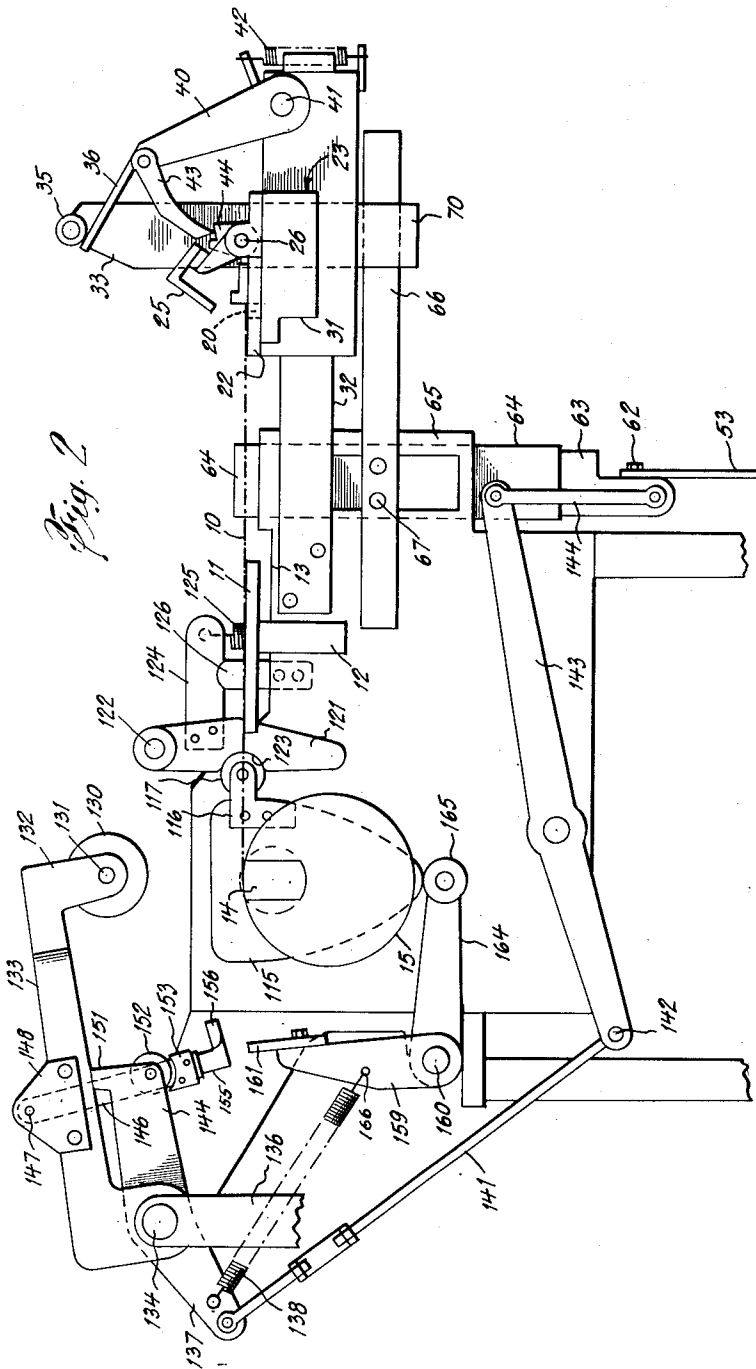
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4 Sheets-Sheet 2



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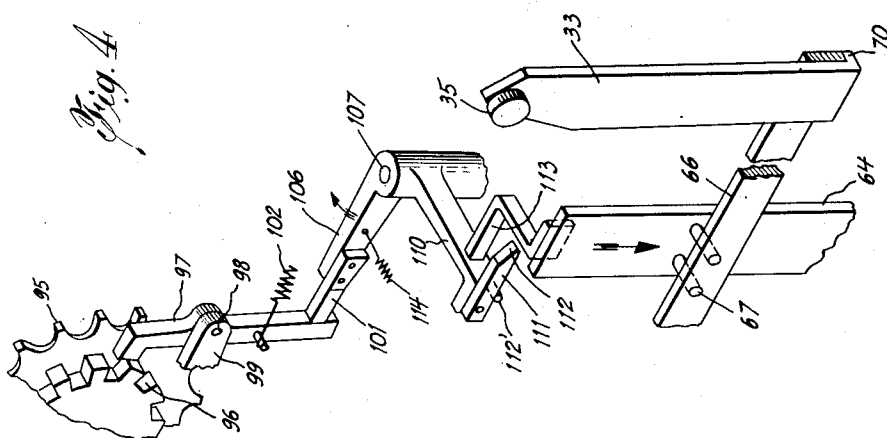
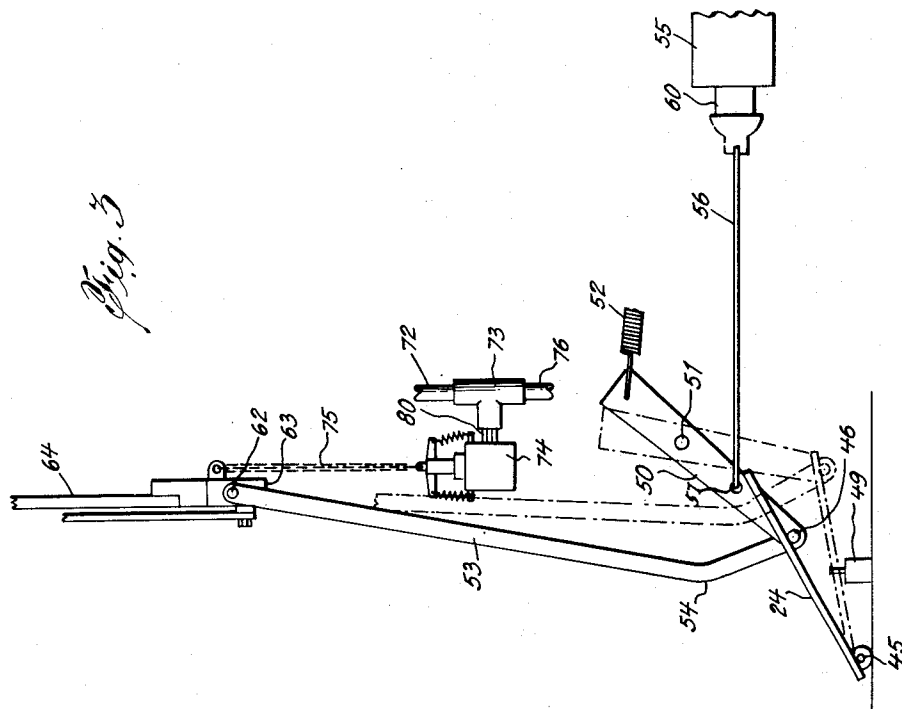
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4 Sheets-Sheet 3



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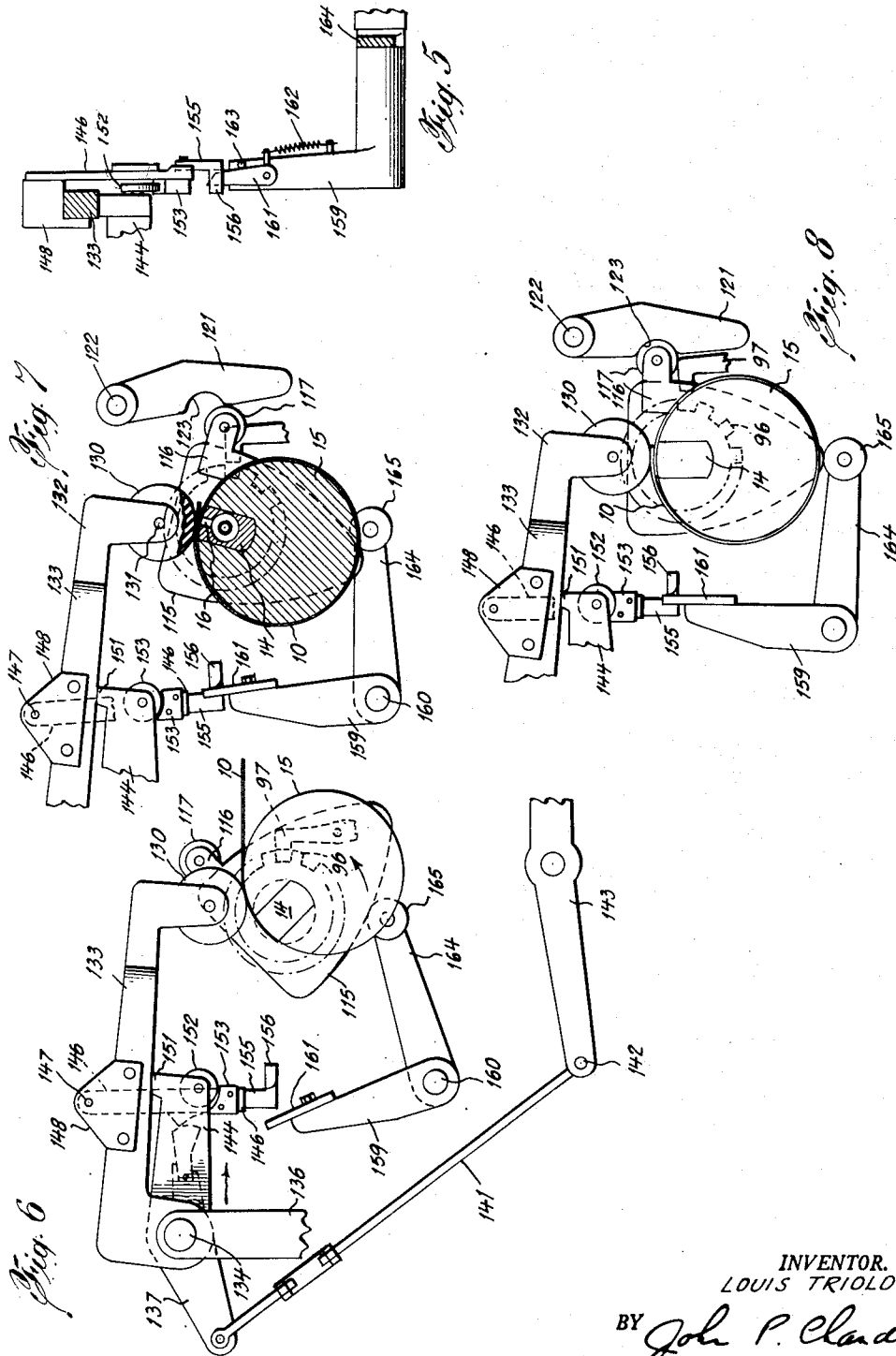
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,664,036

CONTAINER-MAKING MACHINE

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6 Claims. (Cl. 93-77)

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This invention relates to new and useful improvements in container making machines and relates more particularly to a novel machine for making cylindrical containers from plastic material.

The use of clear transparent plastic sheet material for containers has increased in recent years, primarily because it affords such an attractive display for the goods housed therein. One type of container which has proved difficult to make is a cylindrical one provided at each end thereof with removable, flanged caps or other end closures. These containers are generally made by hand around a fixed mandrel provided with means for applying the solvent or adhesive to the ends of the blank, after which pressure is applied to said overlapping ends.

Because of the human factor involved, the blank is not wrapped tightly enough around the mandrel and each finished container varies slightly in diameter, thus causing difficulty when the end closures are applied. Another marked difficulty consists in the failure of the operator to apply sufficient pressure to get effective solvent action and the containers thus open up under slight internal pressure and spill the contents.

The principal object of the present invention is to provide an automatic high speed machine for the making of cylindrical containers of this character wherein the flat blank is manually or automatically fed in flat condition to the machine, solvent for the purpose of adhesion being automatically applied to the margin at the trailing end of the blank. The opposite end of the blank overlies an eccentrically mounted, rotatable mandrel provided with suction means to hold the blank in place on the mandrel as the latter rotates, thus wrapping the blank tightly around the mandrel. Heating means are also provided in the mandrel for operating on certain types of plastic materials wherein the solvent action is aided by the heat.

For the purpose of retaining the blank tightly wrapped around the mandrel during rotation of the latter, a pressure roller freely mounted on the free end of a pivotal arm, rotates with the mandrel under a measure of pressure and near the end of the revolution, novel means are employed for exerting a high order of pressure by the roller against the mandrel so that when the trailing edge of the blank, to which the solvent or adhesive has been applied, overlies the leading edge, yet held in position by the suction means, the heavy pressure is exerted which, in the case a proper solvent has been used, need only remain for an instant, and the bond is complete.

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Another object of the invention is the provision of a novel mandrel structure wherein the mandrel, usually formed of wood, is provided with a peripheral recess which receives a spindle mounted on a hollow drive shaft, the outer surface of the spindle being curved and forming a part of the outer periphery of the mandrel structure. The hollow shaft has, at one end thereof, a source of controlled negative pressure and the bore in the shaft communicates with openings in the spindle to provide the suction for holding the blank during revolution of the mandrel.

Thus the mandrel has an eccentric movement and the roller pressing the blank tightly against the surface of the mandrel acts as a follower during this movement. Another object of the invention is to provide a machine of the character described which can be quickly re-set to form cylindrical containers of varying diameters and lengths. In this connection, the wooden mandrel may be easily replaced with one of different diameter and length and the solvent fountain assembly easily moved longitudinally of the frame to accommodate a blank of different length.

Yet another object of the invention is to provide a machine of positive operation wherein a careless operator can nevertheless make a perfect container, just so long as the foot treadle is depressed far enough to close a circuit and so long as the blank is properly positioned to overlie the spindle portion of the mandrel at its leading edge, and the solvent fountain at its trailing edge.

It was earlier pointed out that the blank might be automatically fed but such automatic feed forms no part of the present invention.

In the drawings:

Fig. 1 is a plan view of a machine embodying the present invention;

Fig. 2 is a broken front elevation of the machine;

Fig. 3 is a broken end elevation showing the treadle control of the operator and associated mechanism;

Fig. 4 is a broken perspective view showing part of the control assembly and the one-revolution clutch arrangement;

Fig. 5 is a broken vertical section showing part of the means for operating the presser assembly for the mandrel, the section being on line 5-5 of Fig. 7;

Fig. 6 is a broken front elevation of the left-hand end of the machine;

Fig. 7 is a broken section taken on line 7-7 of Fig. 1;

Fig. 8 is a broken front elevation of the rotating mandrel assembly.

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The rectangular blank 10 is placed on a work support 11 mounted on a bracket 12 which is supported on a frame member 13. The forward edge of the blank overlies an elongated spindle 14 disposed in a recess in a mandrel 15. This spindle has a plurality of openings 16 which are connected with a suitable source of negative pressure so as to hold the blank to the spindle as the mandrel rotates.

The rear or trailing edge of the blank is positioned just above an adhesive or solvent applying fountain which includes a fibrous moistening mass or wick 20 positioned in an opening 21 in the upper plate 22 of the fountain assembly 23.

When a cycle of operation commences by depressing foot treadle 24 as hereinafter described, a presser bar 25, keyed to shaft 26, descends pressing the end of the blank into engagement with the moistening mass. The upper wall of the fountain assembly has an opening 30 to admit the fluid adhesive which is contained in a housing 31 just below the upper wall, in which the lower end of the wick is positioned.

The fountain assembly is supported in an adjusted, fixed position on frame member 32 and its position can be changed to accommodate blanks of varying length.

Downward movement of the presser bar is effected by a lever 33 mounted for vertical sliding movement in a frame member 34. It has a roller 35 at its upper end which engages a cam surface 36 at the upper end of a lever 40 journaled on the fountain assembly at 41.

A spring 42 urges the lever upwardly and when it descends due to downward travel of roller 35 a pivoted finger 43 carried by it engages a notched lever 44 keyed to shaft 26.

Treadle 24 is pivoted at 45 (Fig. 3) and as it is depressed it engages a pin 46 carried at the lower end of a lever 50 which is centrally pivoted at 51. A spring 52 urges lever 50 in a clockwise direction. Elongated link 53 having offset portion 54 is connected with lever 50 by means of pin 46. Thus, as the treadle is depressed link 53 starts to descend and when the treadle is about half-way down it contacts a micro-switch 49, closing a circuit (not shown) and energizes the field 55 of a solenoid. A rod 56 connects the armature 60 of the solenoid with lever 50 at 57 which completes the downward stroke of link 53 and operates a one-revolution clutch assembly associated with the main drive shaft.

At its upper end link 53 is pivotally connected at 62 with a block 63 secured to a lever 64 slidably mounted for vertical reciprocating movement in a trackway 65. A horizontal lever 66 is connected with lever 64 at 67. The lower end of lever 33 has a flange 70 so that as levers 66 and 64 descend, the movable parts of the fountain assembly are actuated.

It was earlier pointed out that openings 16 in spindle 14 are connected with a suitable source of negative pressure. This assembly includes a conduit 72 leading to a pipe fitting 73 which is connected with a valve 74. This valve is actuated by a chain or other linkage arrangement 75 connected at its upper end with block 63. Conduit 76 is connected with a vacuum tank and pump (not shown). During operation of the device there may be constant suction on conduit 76 but suction is afforded through openings 16 only during a cycle of operation since conduits 76 and 72 are connected with valve 74 by conduits 80.

Spindle 14 is mounted on and is arranged to rotate concentrically with a hollow driven shaft

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83 journaled in bearing 85. Driven shaft 83 also passes through a housing 86 to which conduit 72 is connected and such hollow shaft has suitable openings, not shown, whereby to connect the source of negative pressure in conduit 72 to such hollow shaft. Thus when valve 74 is open there is afforded a suction through holes 16. Shaft 83 has an extension 87 on which a disc 91 is mounted and such disc during rotation is engaged by brushes 92, 93 to furnish power to an electric heating element (not shown) contained within spindle 14 to heat the same. A sprocket 95 is freely journaled on driven shaft 83. Also journaled on this shaft is a notched wheel 96 whose notches are arranged to receive a dog 97 journaled at 98 on a bracket 99 carried on a separate disc 100 keyed to the drive shaft. Dog 97 is urged in a counterclockwise direction by a spring 102 and when the dog is free to move it engages one of the teeth in notched wheel 96, thus causing such wheel to rotate with sprocket 95 which is constantly rotated during normal operation by a chain drive 103 also connected with a sprocket 104 on a drive shaft 105 suitably connected with a motor (not shown). The dog is normally held out of engagement with the teeth of the notched wheel 96 by means of a stop 101 secured to one arm 106 of a bell crank lever journaled at 107 on the frame. The other arm 110 of the bell crank lever carries a pivoted boss 111 having a diagonal surface 112. At the upper end of lever 64 is a finger 113 which engages diagonal surface 112 as lever 64 descends, thus moving stop 101 out of restraining position and freeing dog 97 for one revolution with notched wheel 96. A stop pin 112' limits downward travel of boss 111. A spring 114 returns the bell crank lever to starting position.

A cam 115 is secured to shaft 83, such cam having the shape shown in Fig. 2. A bracket 116 carrying a roller 117 is secured to the cam. A lever 121 pivoted at 122 is formed with an arcuate recess 123 which receives roller 117 to stop rotation of the shaft after it has turned its one revolution. The lever carries an arm 124 which is urged downwardly by a spring 125. A stop 126 limits this downward travel.

Pressure is applied to the mandrel which increases to its maximum near the end of the cycle by a free roller 130 carried on a shaft 131 mounted in a U-shaped frame 132. The frame is secured at the outer end of an arm 133 freely journaled on a shaft 134 carried by frame members 135 and 136.

Also freely mounted on shaft 134 is a bell crank lever 137 which is urged by a spring 138. Secured to the outer end of lever 137 is a rod 141 whose opposite end is secured at 142 to one end of a centrally pivoted lever 143. A link 144 connects the opposite end of lever 143 to vertically reciprocating block 63. Thus, during a cycle of operation leg 137 of the bell crank lever moves up and the other leg 144 thereof moves down.

A lever 146 is pivoted at 147 on a bracket 148 fast on arm 133 and depends downwardly therefrom. Arm 133 normally rests upon a forward upper projection 151 of lever 144 and when the latter falls arm 133 is also free to fall and the roller 130 carried thereby is free to follow the eccentric path described by the mandrel.

Lever 144 also carries a roller 152 journaled on a pin. Lever 145 carries a block 153 formed with an arcuate surface forming a cam which underlies the left hand lower surface of roller

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152. It will thus be seen that movement of lever 146 in the direction of the arrow in Fig. 6 will force the cam and its supporting lever downwardly, thus adding pressure to the upper roller against the mandrel.

At its lower end lever 146 has a bracket 155 having a lateral projection 156. One arm 159 of a bell crank lever freely journaled on a shaft 160 is provided with a pivoted finger 161 and is urged by a spring 162 against a stop 163. The opposite leg 164 of the bell crank lever carries a roller 165 which is driven by cam 115.

It was earlier pointed out that a spring 138 is secured at one end thereof to bell crank lever 137. The opposite end of this spring is secured at 166 to bell crank lever 159 and accordingly such spring has the double function of drawing lever 137 downwardly and also of retaining roller 165 against the cam.

The operation of the machine is as follows:

The blank 10 is first placed with its leading edge overlying a portion of spindle 14 and its trailing edge overlying wick 20. The foot treadle is now depressed and as soon as it contacts micro-switch 49 the circuit is closed and the solenoid completes the downward movement of link 53. Even though the work from there on is done by the solenoid it is nevertheless necessary for the operator to continue downward pressure on the foot treadle since if the pressure is released the circuit is opened.

The broken lines in Fig. 3 show the lowermost position of link 53 and when in this position pin 46 has passed slightly beyond a center line defined by the axes point 57 and pivot 62. This action causes lever 64 and lever 66 to descend, thus actuating the presser assembly for the fountain and applying the solvent or adhesive to the trailing edge of the blank. Simultaneously with this movement vacuum is applied to the hollow shaft through holes 16 in the spindle and the one-revolution clutch assembly causes the mandrel to rotate, carrying with it the blank. The blank of course is of a length greater than the circumference of the mandrel by the length of the overlap and when the leading edge returns to starting position the trailing edge overlies this portion of the leading edge.

During the foregoing movement lever 143 actuates link 141 causing leg 137 of this bell crank lever to raise and simultaneously causing the opposite leg 144 to be lowered to a point wherein roller 130 is free to follow the travel of the mandrel which is eccentric relative to the axis of spindle 14. Just before the end of the cycle the high point of cam 115 engages roller 165, thus causing leg 159 of the bell crank lever to move to the right. Finger 161 carried by bell crank lever 159 at this time engages the rear surface of projection 156, thus moving the lower end of arm 146 to the right (Fig. 6) wherein the cam 153 begins to move downwardly due to the engagement of its rear arcuate surface with roller 152. This brings arm 133 and the roller 130 carried thereby downwardly into exceedingly firm contact with the overlying terminals of the blank. By this time one revolution of the shaft has been completed and the shaft and the mandrel carried thereby are restrained against further rotation by roller 117 entering recess 123 in brake 121. The cam is so shaped that at the end of the cycle the pressure of finger 161 against projection 156 has been released. This permits lever 146 to rise to starting position, carrying with it roller 130. Manual pressure on the foot treadle

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is now released, thus permitting block 63 to raise and thus returning the presser assembly to the starting position.

While one form or embodiment of the invention has been shown and described herein for illustrative purposes, and the construction and arrangement incidental to one specific application thereof has been disclosed and discussed in detail, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiment shown herein, but that extensive deviations from the illustrated form or embodiment of the invention may be made without departing from the principles thereof.

I claim:

1. A machine for making cylindrical containers from rectangular blanks comprising a frame, a cylindrical mandrel having a longitudinal recess in the periphery thereof, a drive shaft journaled in the frame, a spindle carried by the drive shaft and secured within the mandrel recess, suction means associated with the spindle for securing one end of the blank thereto as the mandrel rotates, means for effecting an adhesive surface on the other end of the blank and a follower roller arranged to engage the blank on the mandrel as it rotates eccentrically of the drive shaft axis, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel.

2. A machine for making cylindrical containers from rectangular blanks comprising a frame, a cylindrical mandrel having a longitudinal recess in the periphery thereof, a drive shaft journaled in the frame, a hollow spindle carried by the drive shaft and secured within the mandrel recess, the spindle having openings therein and suction means connected with the openings for securing one end of the blank thereto as the mandrel rotates, means for applying adhesive to the other end of the blank and a follower roller arranged to engage the blank on the mandrel as it rotates eccentrically of the drive shaft axis, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel.

3. A machine for making cylindrical containers from rectangular blanks comprising a frame, a drive shaft journaled in the frame and a mandrel carried thereby upon which the blank is wound, means for affixing the leading edge of the blank to the mandrel as the latter rotates, means for applying adhesive to the other end of the blank, a motor for turning the shaft and control means for effecting a single revolution thereof, and a follower roller arranged to engage the blank on the mandrel as it rotates, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel, such means comprising a cam keyed to the drive shaft, a bell crank lever, one leg of which is provided with a roller which engages the periphery of the cam, a lever depending downwardly from the pivoted arm and provided with a camming surface, a roller against which the camming surface is movable to draw the lever downwardly, the other leg of said bell crank lever being arranged to move the lever to effect such downward camming action.

4. In a machine for making cylindrical containers from rectangular blanks and provided with a frame, a drive shaft journaled in the

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frame and a mandrel carried thereby upon which the blank is wound, a motor for turning the shaft and control means for effecting a single revolution thereof, the combination of a follower roller arranged to engage the blank on the mandrel as it rotates, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel, such means comprising a cam keyed to the drive shaft, a bell crank lever, one leg of which engages the periphery of the cam, a lever depending from the pivoted arm and provided with an inclined camming surface, a fixed member against which the surface is engageable, the other leg of the bell crank lever moving the lever to effect such camming action.

5. A machine for making cylindrical containers from rectangular blanks comprising a frame, a drive shaft journaled in the frame and a mandrel carried thereby upon which the blank is wound, a motor for turning the shaft and control means for effecting a single revolution thereof, and a follower roller arranged to engage the blank on the mandrel as it rotates, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel, such means comprising a bell crank lever, one leg of which normally supports the pivoted arm in elevated position, a lever connected with the other leg operable by said control means for lowering the support, and means for drawing the pivoted arm downwardly near the end of the revolution, said means comprising a cam keyed to the drive shaft, a second bell crank lever pivoted on the frame, one leg of which is actuated by the cam, a pivoted plate carried by the other leg of said bell crank lever and provided with a stop and a spring urging the plate against the stop, a camming roller carried on the first mentioned leg of the first bell crank lever, a lever depending from the follower roller carrying arm and provided with an arcuate camming surface normally positioned to the rear of the camming

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roller, the pivoted plate contacting the lower end of the depending arm on movement of the second bell crank lever and moving the camming surface forwardly under the camming roller.

6. A machine for making cylindrical containers from rectangular blanks comprising a frame, a drive shaft journaled in the frame and a mandrel mounted on the drive shaft eccentrically thereof and upon which the blank is wound, means for securing the leading edge of the blank to the mandrel as the latter rotates, a motor for turning of the shaft and control means for effecting a single revolution thereof, and a follower roller arranged to engage the blank on the mandrel as it rotates, a pivoted arm on which the roller is journaled, and means for exerting pressure on the roller as the ends of the blank overlap on the mandrel, such means comprising a bell crank lever, one leg of which normally supports the pivoted arm in elevated position, a lever connected with the other leg operable by said control means for lowering the support, a roller carried by the support, a cam carried by the pivoted arm to the rear of the support, a second cam keyed to the drive shaft, and a second bell crank lever, one leg of which is moved by the second cam and the second leg of which engages the cam carried by the pivoted arm and moves the same forwardly and draws the pivoted arm downwardly as the ends of the blank overlap.

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