

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

Patented Jan. 10, 1922.
13 SHEETS—SHEET 1.

1,402,818.

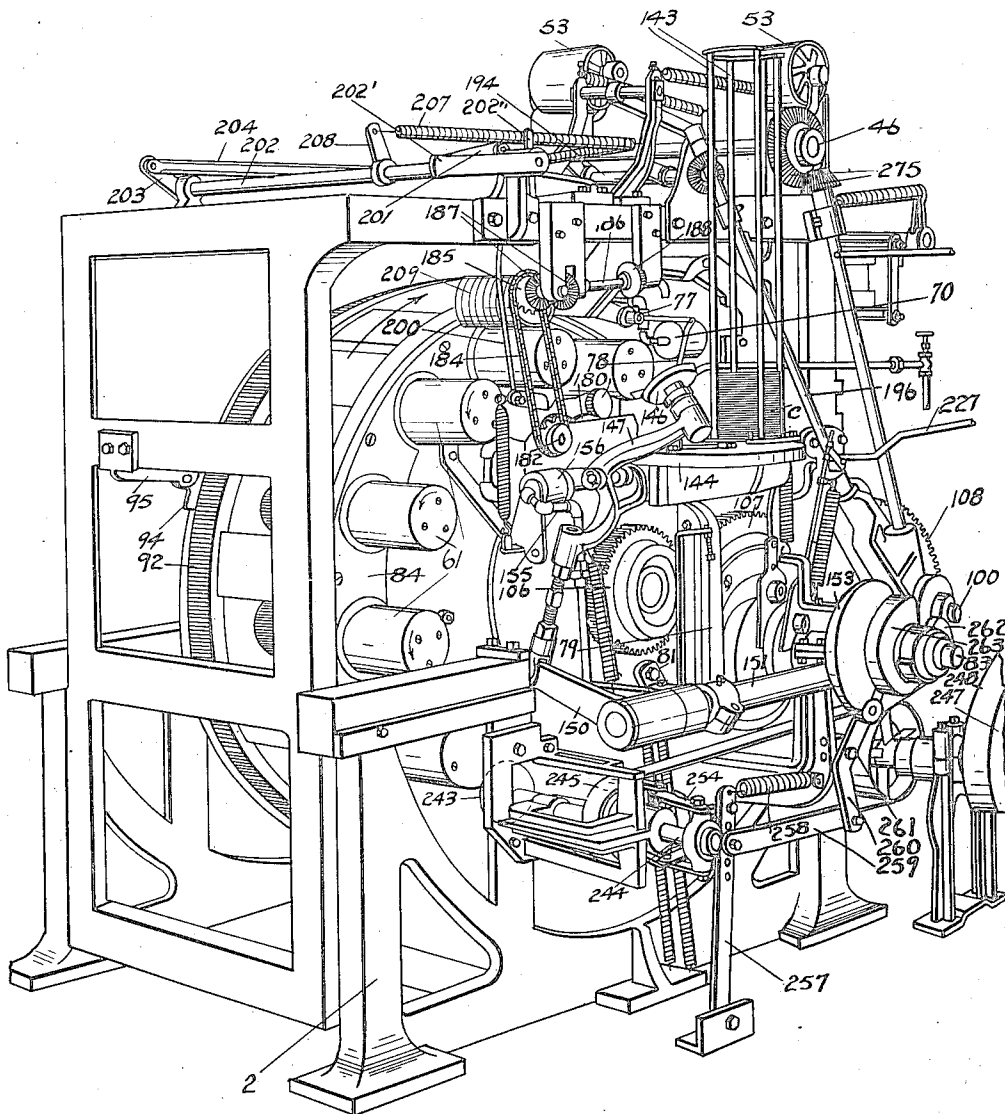


FIG. I.

Inventor
Jesse S. Wentworth

Witnesses
Lem Gilman
M. Louise Thurston

By *Chappell & Earl*
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 2.

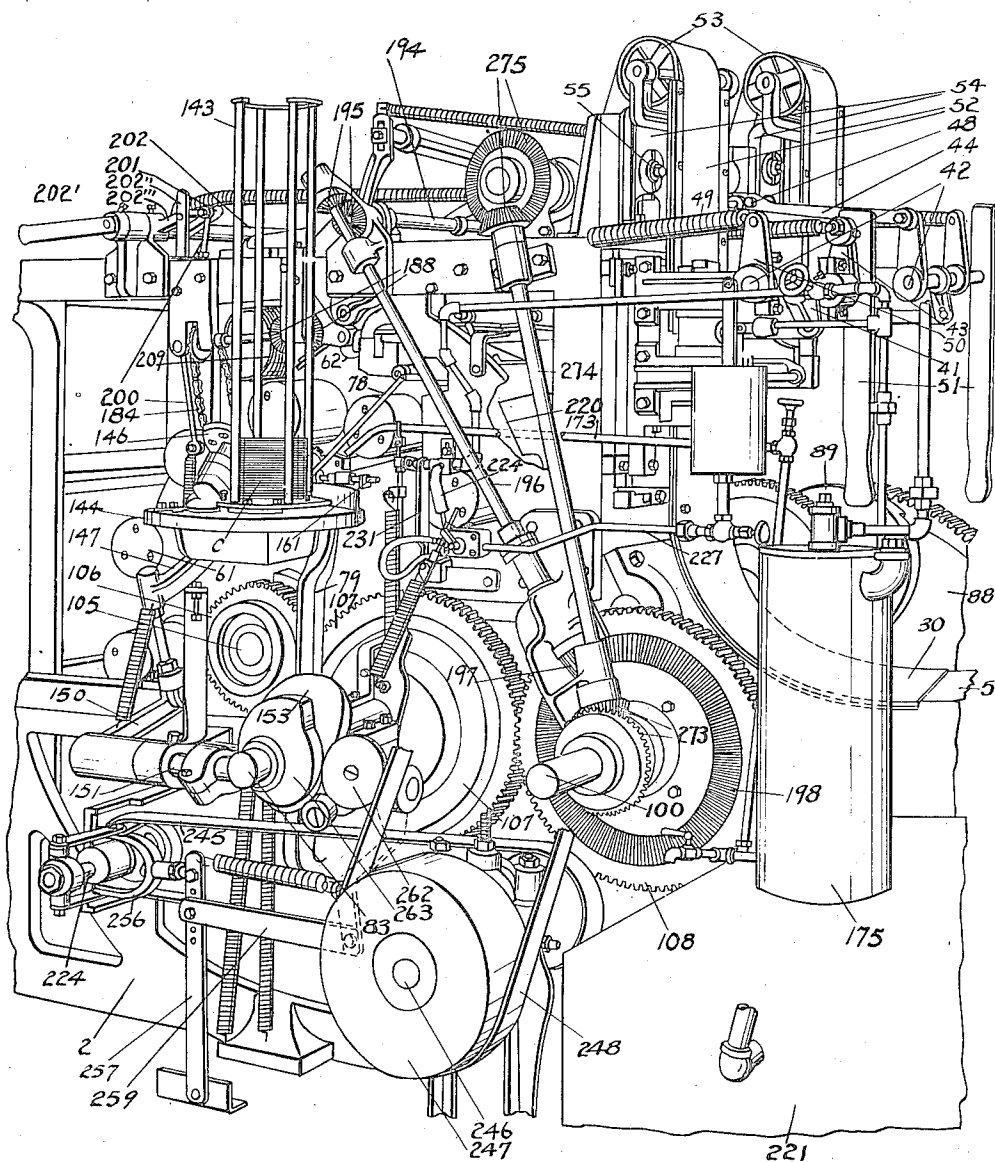


FIG. II.

Inventor
Jesse S. Wentworth

Witnesses

René Gilman

M. Louise Thureton

By

Chappell & Earl

Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 3.

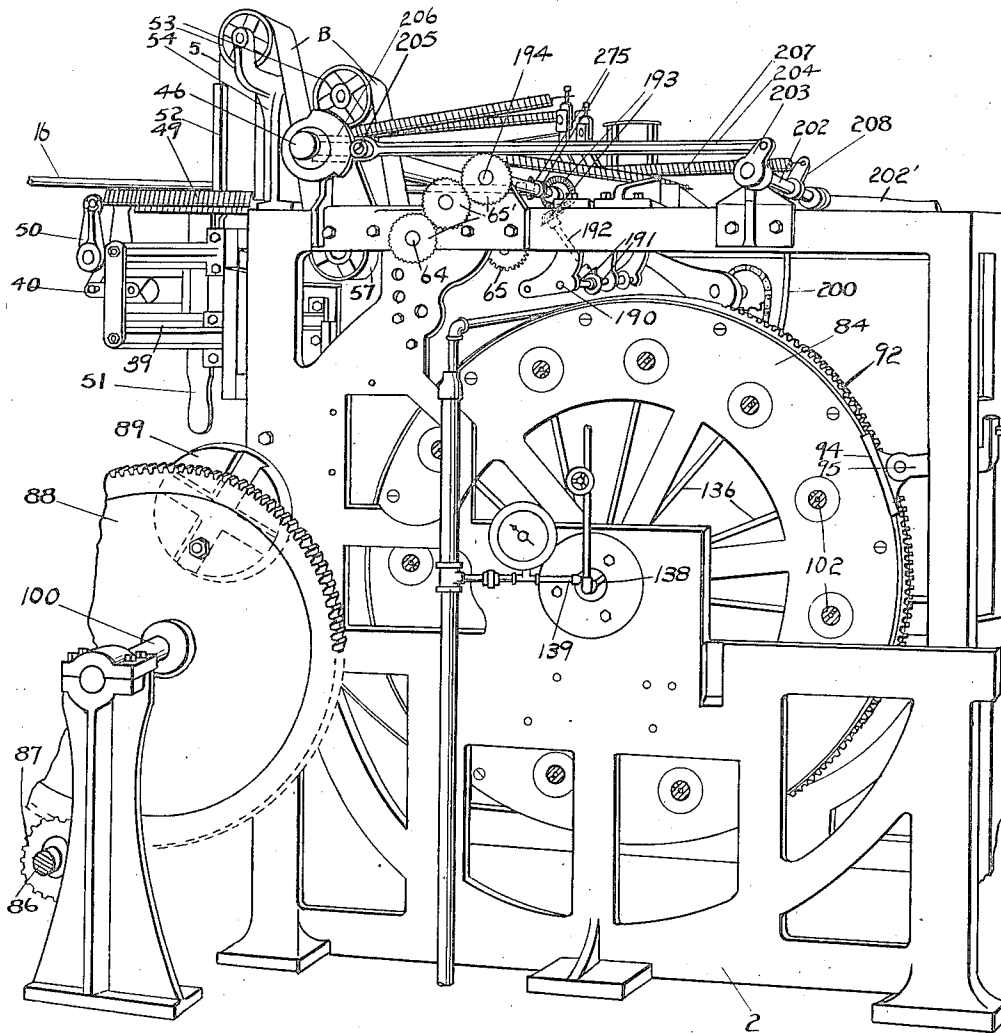


FIG. III.

Inventor
Jesse S. Wentworth

Witnesses
Kenn Gilman
M. Louis Thurston

By Chappell & Earl
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 4.

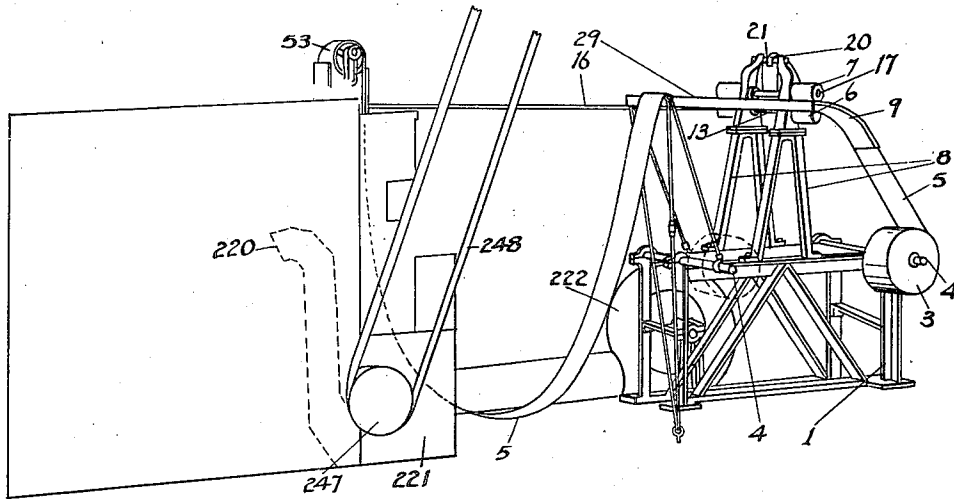


FIG. IV.

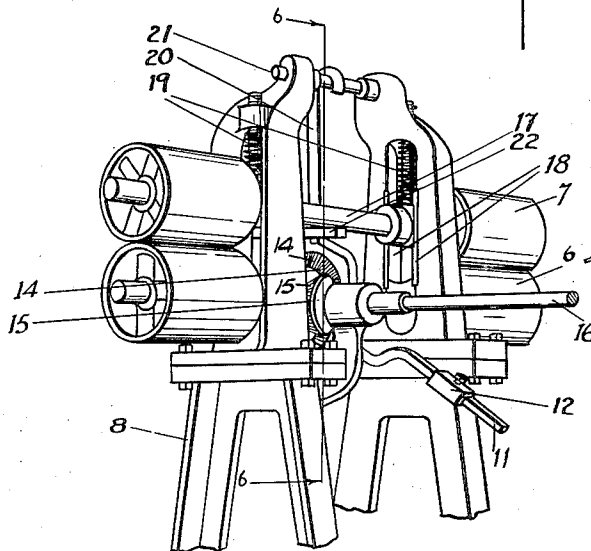


FIG. V.

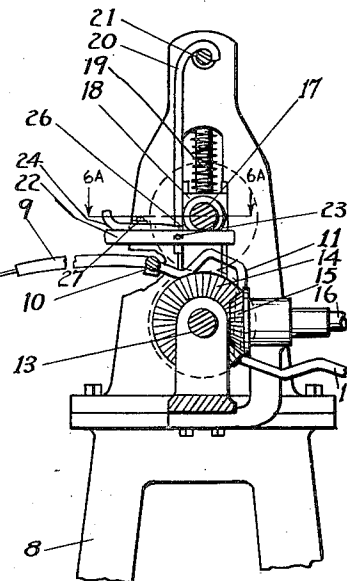


FIG. VI.

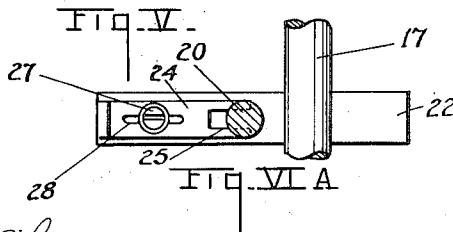


FIG. VI A

Witnesses
Henry Gilman
M. Louise Thurston

Inventor
Jesse S. Wentworth

Chappell & Earl
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 5.

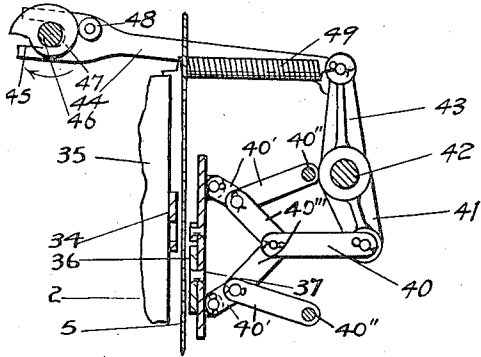


FIG. XVIII.

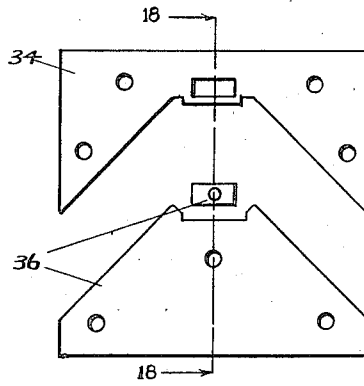


FIG. XIX.

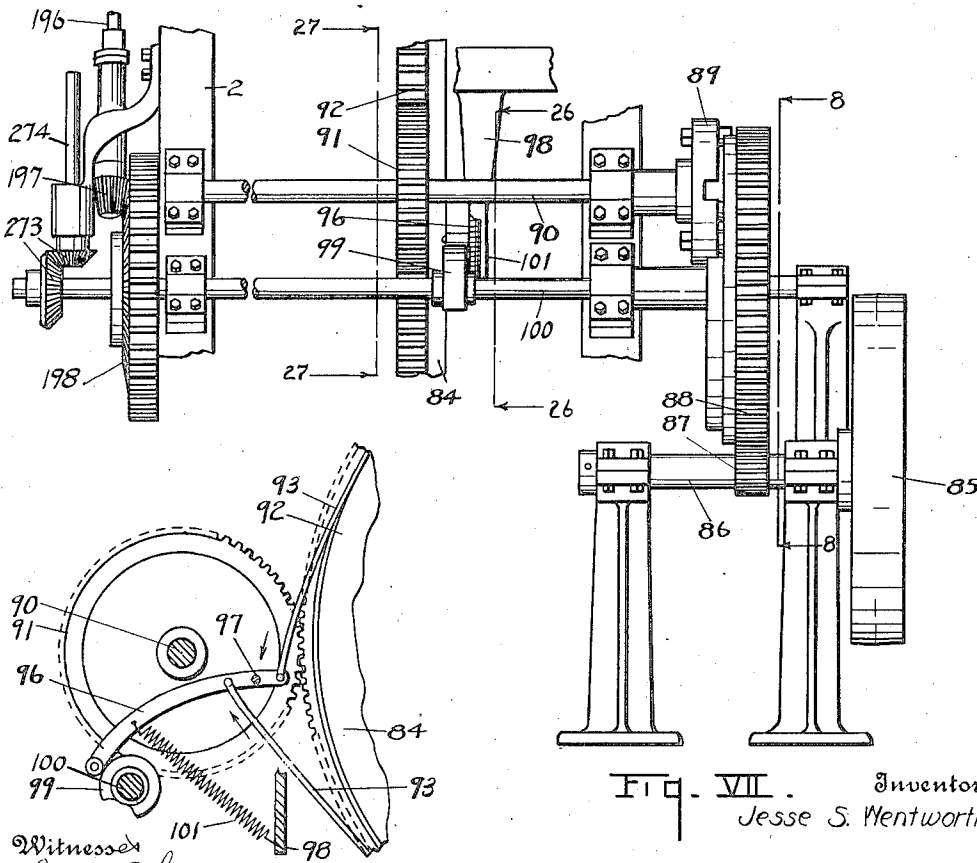


FIG. VII.

Inventor
Jesse S. Wentworth

Witnesses
Lem Gilman
M. Louise Thurston

FIG. XXVI.

Chappell Earl

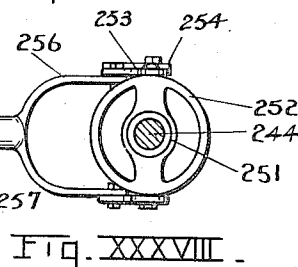
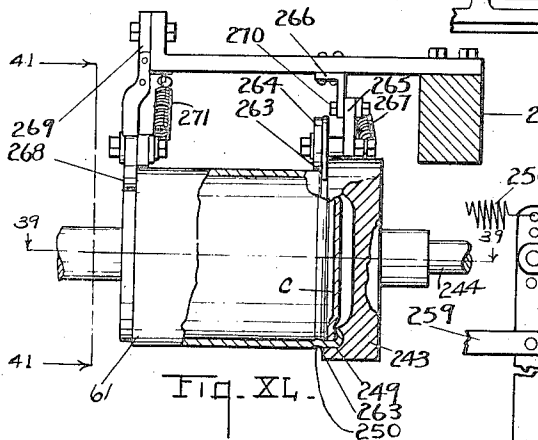
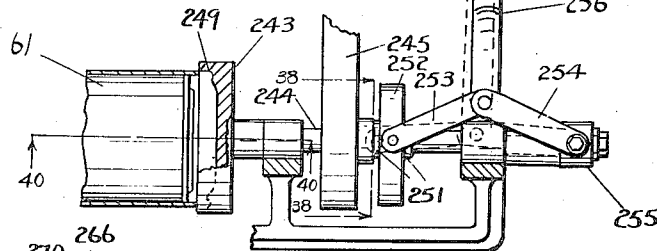
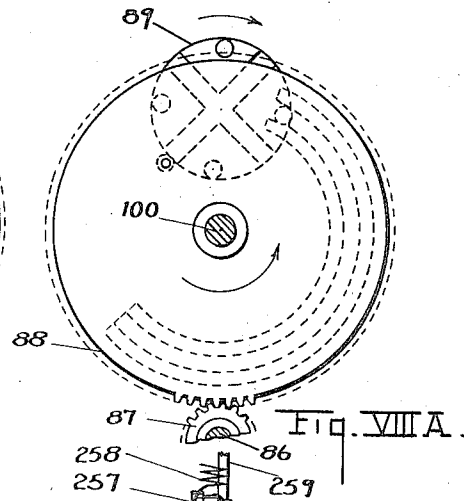
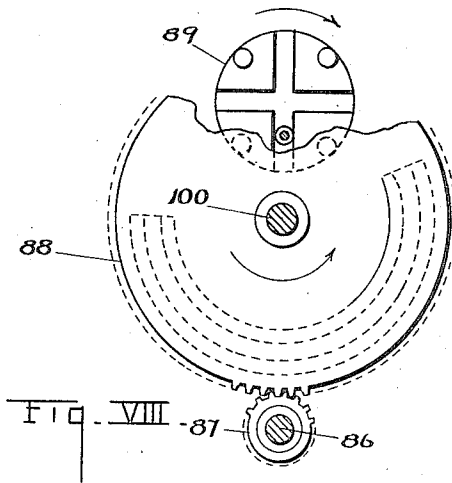
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 6.



Witnesses
Samuel Gilman
M. Louis Thurston

Inventor
Jesse S. Wentworth

By *Chappell Deal*

Attorney:

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 7.

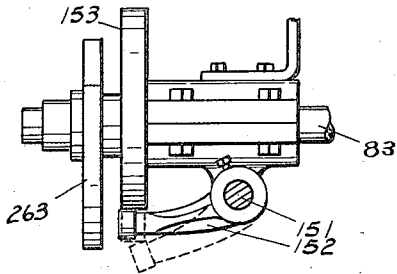


FIG. XII.

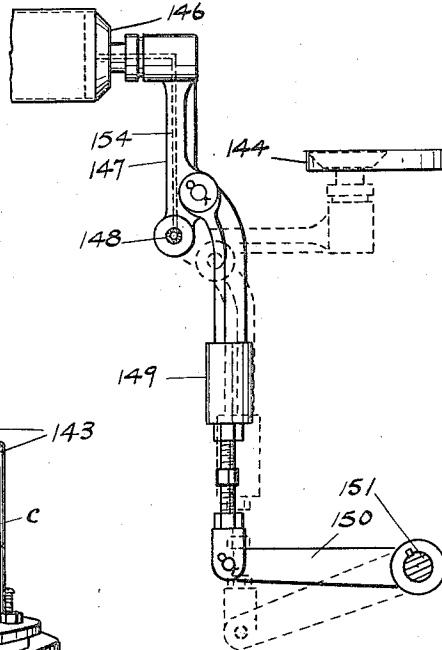


FIG. XI.

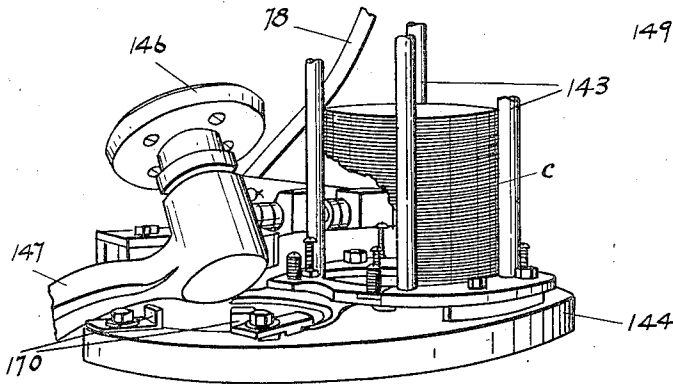


FIG. IX.

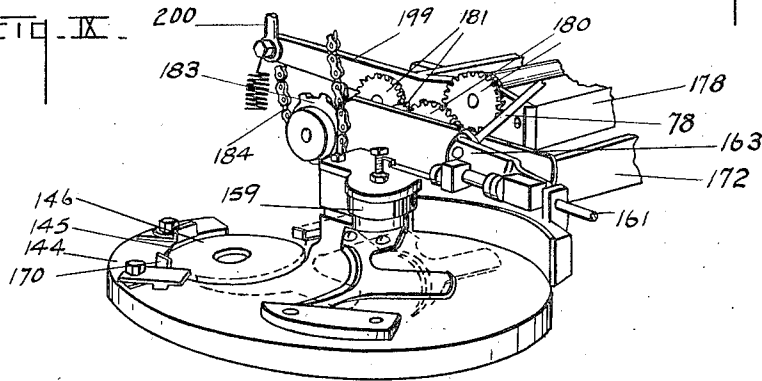


FIG. X.

Witnesses
Rem Gilman
M. Louis Thurston

Inventor
Jesse S. Wentworth

By *Chappell Earl*
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 8.

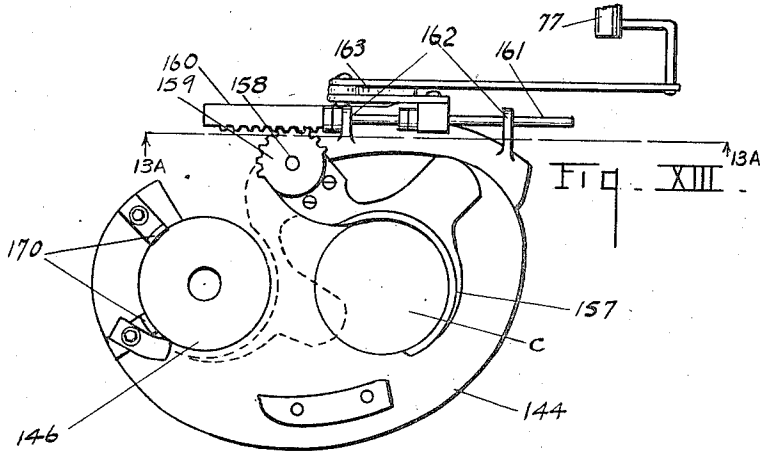


Fig. XIII.

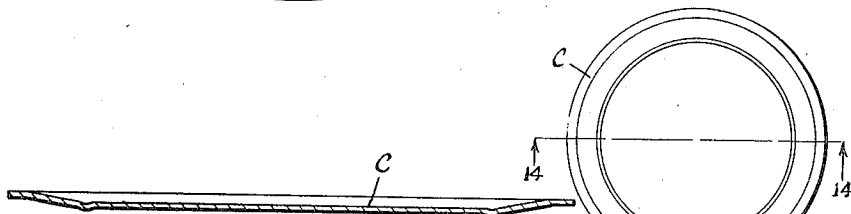


Fig. XIV.

Fig. XV.

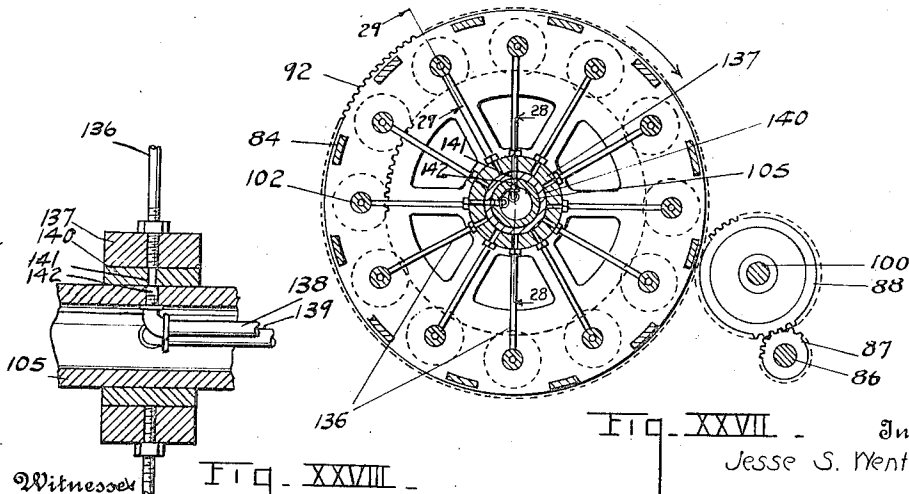


Fig. XXVII.

Inventor
Jesse S. Wentworth

Witnesses
Lenn Gilman
M. Louise Thurston

By *Chappell & Earl*
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 9.

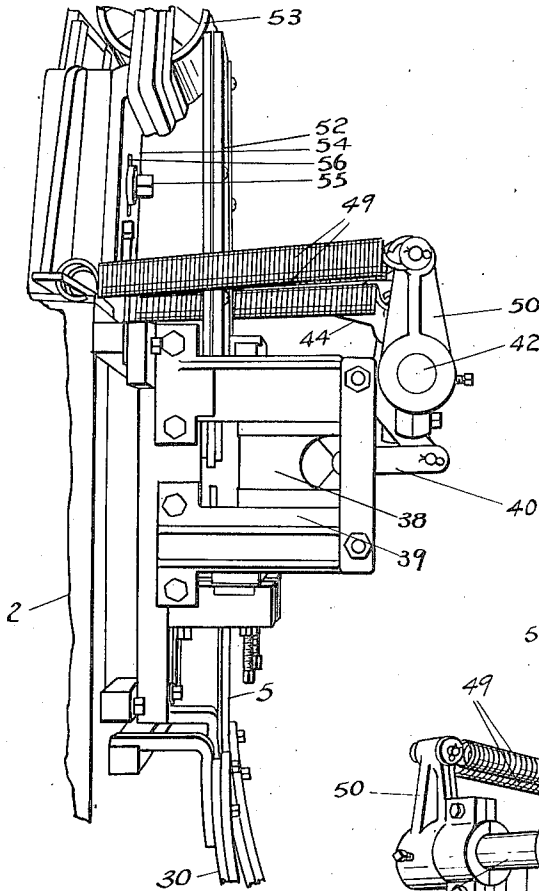


FIG. XVI.

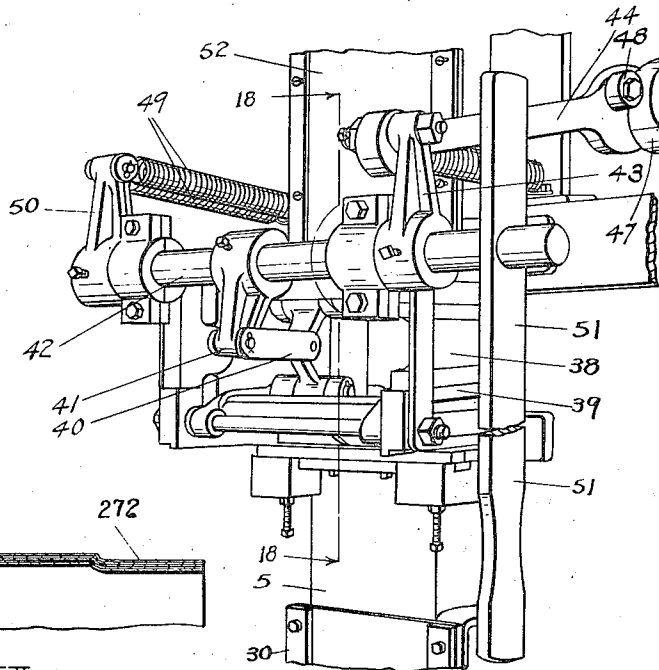
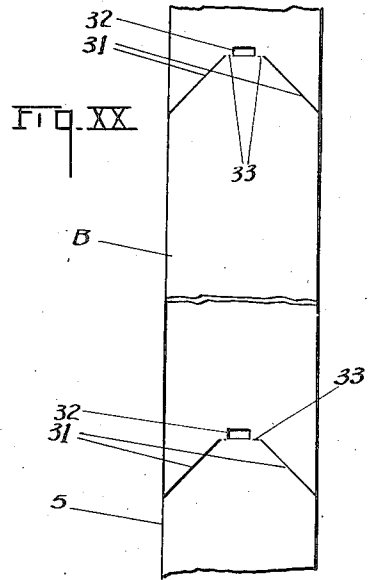


FIG. XVII

Inventor
Jesse S. Wentworth

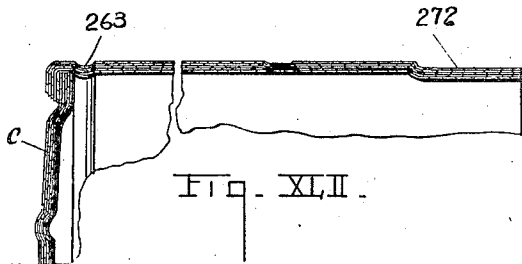


FIG. XLII.

Witnesses

Lenn Gilman

M. Louise Thuretoro

334

Chappell & Karl

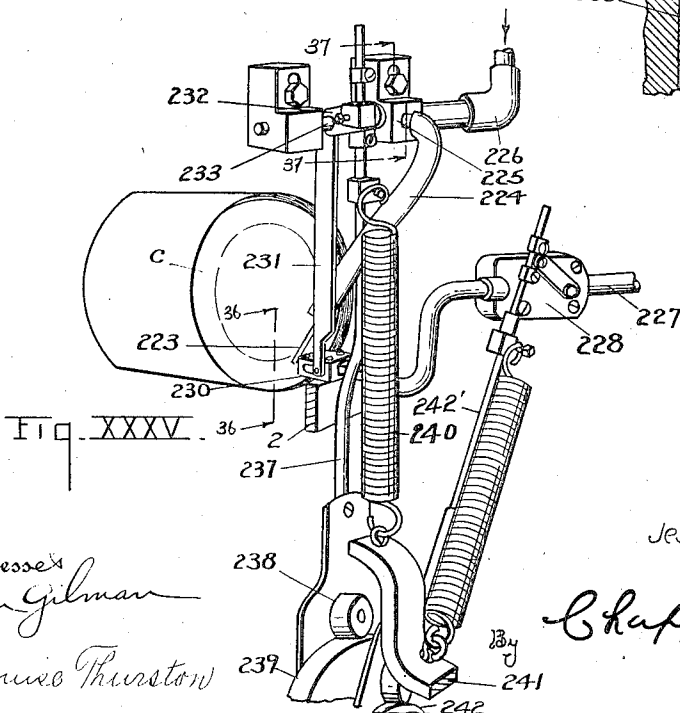
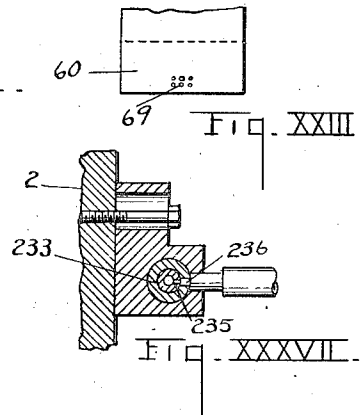
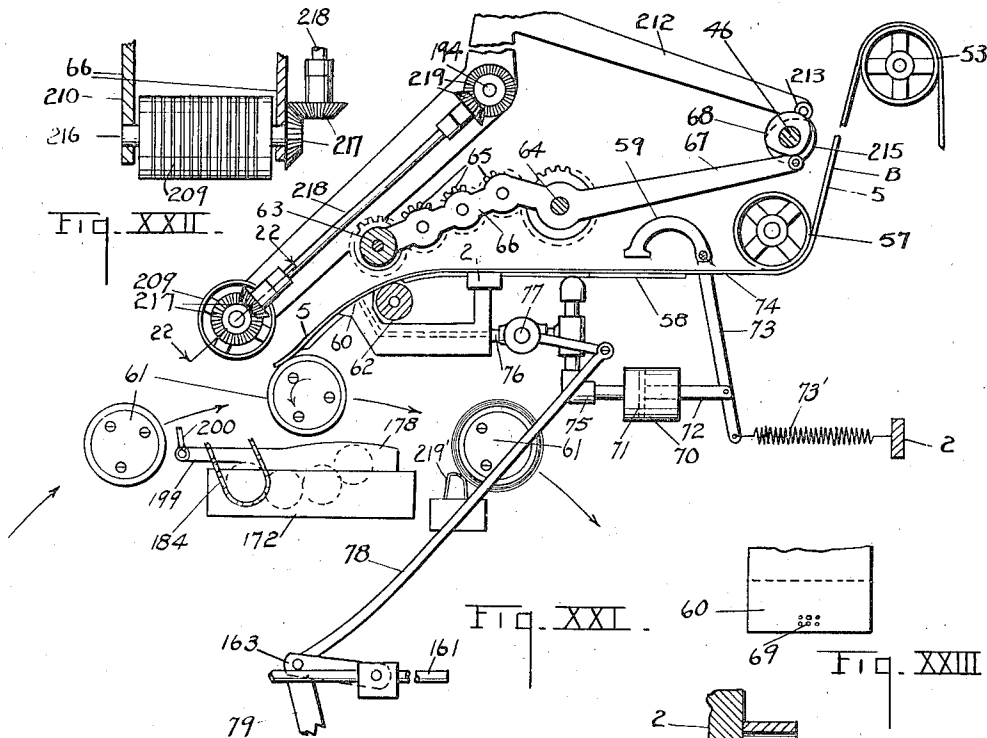
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 10.



Witnesses
Lenn Gilman
M. Louis Thurston

Inventor
Jesse S. Wentworth

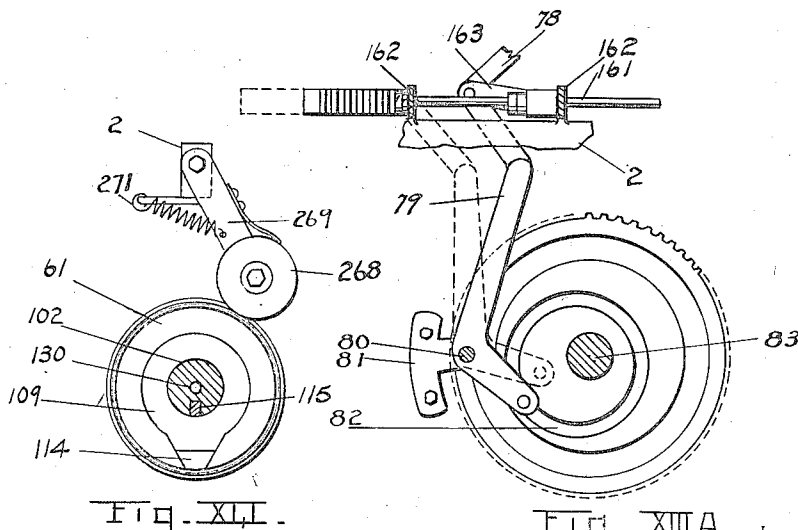
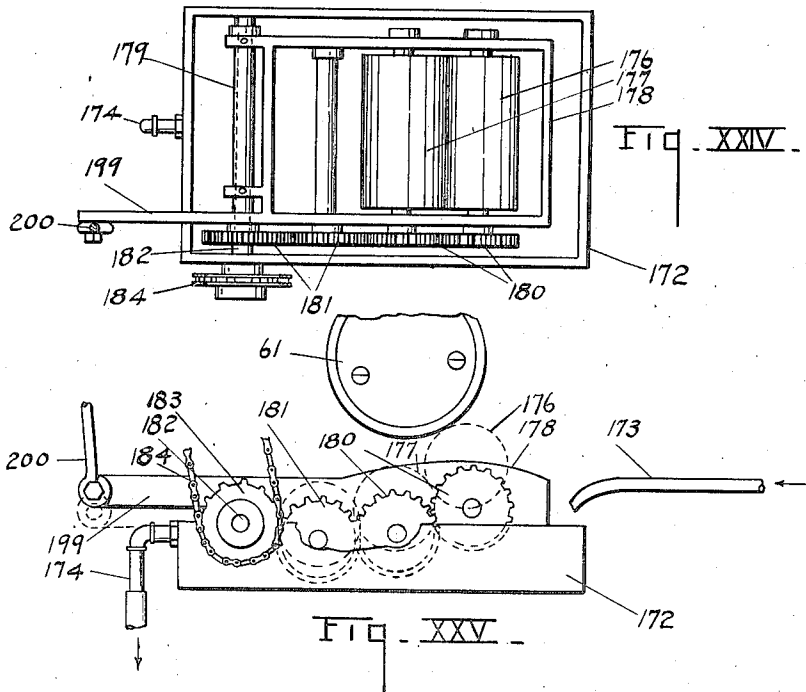
Chappell & Co.
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 11.



Witnesses
Linn Gilman
M. Louise Thurston

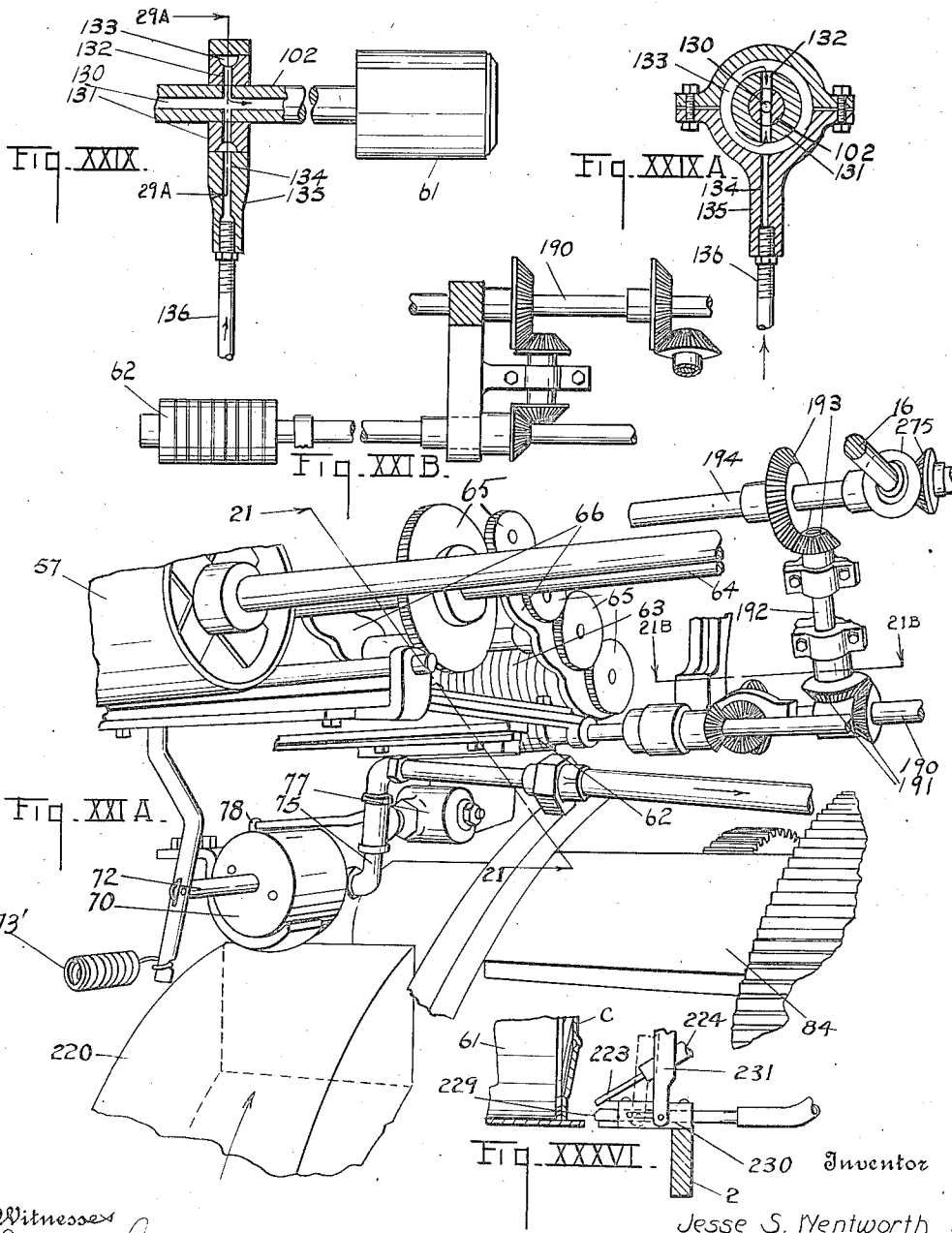
Fig. XIII A. Inventor
Jesse S. Wentworth
By *Chappell & Earl*
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 12.



Witnesses
Lem Gilman
W. Louis Thurston

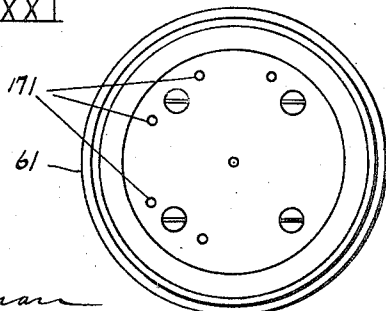
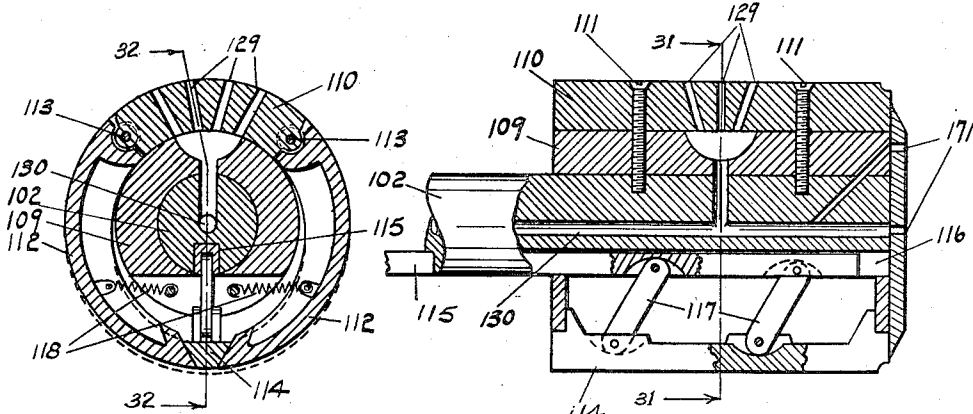
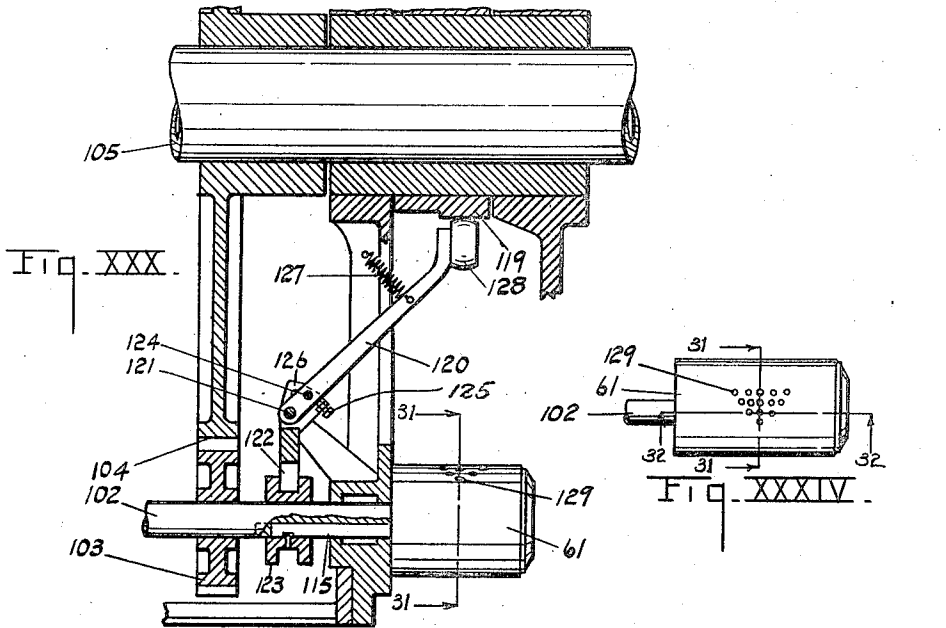
By *Chappell & Earl*
Attorneys

J. S. WENTWORTH.
CONTAINER FORMING MACHINE.
APPLICATION FILED AUG. 16, 1920.

1,402,818.

Patented Jan. 10, 1922.

13 SHEETS—SHEET 13.



Witnesses
Rem Gilman
W. Louise Thurston

Fig. XXXIII.

Inventor
Jesse S. Wentworth

Chappell & Earl

Attorneys

UNITED STATES PATENT OFFICE.

JESSE S. WENTWORTH, OF STURGIS, MICHIGAN.

CONTAINER-FORMING MACHINE.

1,402,818.

Specification of Letters Patent.

Patented Jan. 10, 1922.

Application filed August 16, 1920. Serial No. 403,887.

To all whom it may concern:

Be it known that I, JESSE S. WENTWORTH, a citizen of the United States, residing at Sturgis, county of St. Joseph, State of Michigan, have invented certain new and useful Improvements in Container-Forming Machines, of which the following is a specification.

This invention relates to improvements in container forming machines.

The main objects of this invention are:

First, to provide an improved machine for the manufacture of receptacles or containers from strips or rolls of paper or other suitable material.

Second, to provide an improved machine for the manufacture of receptacles by means of which a superior article or product may be produced.

Third, to provide an improved machine for the manufacture of receptacles which is of large capacity.

Fourth, to provide an improved machine for the manufacture of receptacles which is automatic in its operation.

Fifth, to provide an improved machine for the manufacture of receptacles having bodies formed by convolutely winding strips of paper, the bodies being wound upon the bottoms.

Sixth, to provide an improved machine for the manufacture of receptacles in which the bottoms and bodies are separately formed and very securely united.

Seventh, to provide in a machine of the class described, an improved paper feed mechanism.

Eighth, to provide in a structure of the class described, an improved bottom feed mechanism.

Further objects, and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which:

Fig. I, Sheet 1, is a rear perspective view of the left hand side of a structure embodying the features of my invention, the front portion of the machine being broken away.

Fig. II, Sheet 2, is another detail perspective

view of the left hand side of the machine.

Fig. III, Sheet 3, is a rear perspective view of the right hand side of the machine, various parts of which are duplicated on both sides of the machine and are shown in Figs. I and II, being omitted.

Fig. IV, Sheet 4, is a rear perspective view of the left hand side of the machine, the container forming mechanism proper being indicated conventionally and the paper feed means being shown in its relation thereto.

Fig. V, Sheet 4, is a rear perspective view of parts of the paper feed mechanism.

Fig. VI, Sheet 4, is a detail vertical section on a line corresponding to line 6—6 of Fig. V, showing details of the paper feed mechanism.

Fig. VI^A, Sheet 4, is a detail horizontal section on a line corresponding to line 6^A—6^A of Fig. VI, showing details of the paper feed.

Fig. VII, Sheet 5, is a detail front elevation of the container forming machine proper, showing details of the driving mechanisms.

Fig. VIII, Sheet 6, is a detail view partially in section on a line corresponding to line 8—8 of Fig. VII, showing details of the Geneva stop gearing whereby certain parts are driven with a step by step movement.

Fig. VIII^A, Sheet 6, is a detail view partially in section on a line corresponding to that of Fig. VIII, showing further details of the Geneva stop gearing.

Fig. IX, Sheet 7, is a detail perspective view of the bottom feed mechanism.

Fig. X, Sheet 7, is another perspective view of parts of the bottom feed mechanism shown in Fig. IX.

Fig. XI, Sheet 7, is a detail view of parts of the bottom feed mechanism, the supporting shafts for the parts illustrated being shown in full lines, parts being shown in one position by dotted lines and in another position by full lines.

Fig. XII, Sheet 7, is a detail view showing the actuating cam for the bottom feed mechanism of Figs. IX to XI, inclusive.

Fig. XIII, Sheet 8, is a detail plan view showing further details of the bottom feed mechanism.

Fig. XIII^A, Sheet 11, is a detail view of the bottom feed operating mechanism on a line corresponding to line 13^A—13^A, Fig. XIII.

Fig. XIV, Sheet 8, is a cross section through one of the container bottoms on a line corresponding to line 14—14 of Fig. XV.

Fig. XV, Sheet 8, is a plan view of one of the container bottoms.

Fig. XVI, Sheet 9, is a detail perspective view of the cutting and punching mechanism for forming the container body blanks or the strips from which the bodies are formed.

Fig. XVII, Sheet 9, is another detail perspective view of the body strip forming blanks.

Fig. XVIII, Sheet 5, is a detail vertical section on a line corresponding to line 18—18 of Figs. XVII and XIX, showing details of the strip cutting dies.

Fig. XIX, Sheet 5, is a plan view of the blank forming dies, not shown, however, in assembled or operative relation.

Fig. XX, Sheet 9, is a detail plan view of a strip of body material after passing the blank cutting dies.

Fig. XXI, Sheet 10, is a detail view partially in longitudinal section on a line corresponding to line 21—21 of Fig. XXI^A, showing further details of the paper feed and also details of the container forming mechanism.

Fig. XXI^A, Sheet 12, is a detail perspective view of the paper feed and container forming mechanism.

Fig. XXI^B, Sheet 12, is a detail horizontal section on a line corresponding to line 21^b—21^b of Fig. XXI^A.

Fig. XXII, Sheet 10, is a detail view partially in section on a line corresponding to line 22—22 of Fig. XXI, showing details of the forming press roll.

Fig. XXIII, Sheet 10, is a face or plan view of the valve plate with which the paper coats in controlling the feeding of the paper.

Fig. XXIV, Sheet 11, is a detail plan view of the adhesive applying means.

Fig. XXV, Sheet 11, is a detail side view of the adhesive applying means.

Fig. XXVI, Sheet 5, is a detail section on a line corresponding to line 26—26 of Fig. VII, showing the means for stopping the turret.

Fig. XXVII, Sheet 8, is a detail vertical section on a line corresponding to line 27—27 of Fig. VII, showing details of the turret and its driving means and the air connections for the mandrels.

Fig. XXVIII, Sheet 8, is a detail section on a line corresponding to line 28—28 of Fig. XXVII, showing further details of the air connections for the mandrels.

Fig. XXIX, Sheet 12, is a detail sectional view on a line corresponding to line 29—29 of Figs. XXVII, showing further details of the air connections for the mandrels.

Fig. XXIX^A, Sheet 12, is a detail section on a line corresponding to line 29^a—29^a of Fig. XXIX.

Fig. XXX, Sheet 13, is a detail view, partially in transverse section through the turret and illustrating the mandrel supporting and driving means and certain details of the mandrel expanding and collapsing means.

Fig. XXXI, Sheet 13, is a cross section through the mandrel on a line corresponding to line 31—31 of Figs. XXX, XXXII and XXXIV.

Fig. XXXII, Sheet 13, is a detail view partially in longitudinal section through the mandrel on a line corresponding to line 32—32 of Figs. 31 and 34.

Fig. XXXIII, Sheet 13, is an elevation of the outer end of one of the mandrels.

Fig. XXXIV, Sheet 13, is a side view of one of the mandrels.

Fig. XXXV, Sheet 10, is a detail perspective view, illustrating the means for crimping the edge of the body upon the bottom.

Fig. XXXVI, Sheet 12, is a detail section on a line corresponding to line 36—36 of Fig. XXXV, showing details of the mechanism for applying adhesive to the bottom.

Fig. XXXVII, Sheet 10, is a detail section on a line corresponding to line 37—37 of Fig. XXXV, showing still further details of the means for applying adhesive to the bottom.

Fig. XXXVIII, Sheet 6, is a detail view partially in section on a line corresponding to line 38—38 of Fig. XXXIX, showing further details of the bottom securing mechanism.

Fig. XXXIX, Sheet 6, is a detail view partially in section on a line corresponding to line 39—39 of Fig. XL, showing still further details of the bottom crimping or securing means.

Fig. XL, Sheet 6, is a detail view partially in section on a line corresponding to line 40—40 of Fig. XXXIX, showing details of the bottom securing mechanism.

Fig. XLI, Sheet 11, is a detail section on a line corresponding to line 41—41 of Fig. XL.

Fig. XLII, Sheet 9, is a detail vertical section through one of the completed containers.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

The machine illustrated is a double machine, that is, a double set of mechanisms are provided so that two strips of paper are fed into the machine and the containers or receptacles are formed by two sets of mechanisms, but as these are substantial dupli-

cates, only one set is illustrated. The turret, however, and certain other features are common to both sets.

The means for supporting the rolls of paper and feeding them into the receptacle blank forming and receptacle forming mechanism is shown in coacting relation thereto in Fig. IV, Sheet 4, the blank forming and receptacle forming mechanisms being indicated conventionally.

For convenience I use the term "paper" in the specification and claims but I wish to be understood as using the same in a broad sense and as including any suitable material, fibrous material or fabric, for forming the receptacles.

Stated generally my improved receptacle or container forming machine comprises means for supporting and feeding paper from a roll, means for forming body blanks or body strips from the roll of paper, means for delivering the blanks to forming mandrels, and applying adhesive to the blanks as they are wound up in the mandrels, means for feeding container bottoms so that the convolutely wound bodies are wound upon the same, means for applying adhesive to the bottom and crimping and upsetting the bodies on the bottoms, means for crimping the tops to receive the cover flanges, and means for ejecting the several operations being automatic.

I have for convenience in description designated as the front of the machine the end from which the strip of paper is fed thereto. The term is, however, more or less arbitrary. For clearness in illustration, I have, in various figures, shown parts removed from the machine and have shown the part or parts in connection with certain coacting parts in order that the details may be clearly understood. Many of these parts may, however, be greatly varied in structure, and I have shown the details thereof mainly for the purpose of clearly illustrating a structure which I have found practicable and to enable others to embody the invention in practical working structures.

Referring to the drawing, I provide a frame, designated generally by the numeral 1—see Fig. IV, Sheet 4, for the paper feed mechanism adapted to support the rolls of paper and the paper feed rolls. However, as details of this frame form no part of this invention they are not described herein.

I provide a separate frame 2 for the container blank forming and container forming mechanism, this frame being adapted to support various parts in their proper coacting relations. However, as the details of this frame form no part of my present invention, I do not describe the same herein. Referring to Fig. IV of the drawing, the rolls of paper 3 are mounted upon spindles 4, there being a spindle 4 at the front and rear

of the frame 1 and the spindles projecting to receive rolls on either end.

From the roll 3 the strip of paper 5 is passed between feed rolls 6 and 7 supported by the bearing pedestals 8. The paper passes to these feed rolls through a guide 9 mounted on the pivot 10 and provided with a counterbalance arm 11 having an adjustable weight 12 thereon—see Figs. V and VI, Sheet 4. This counterbalanced guide swings to accommodate the roll when mounted on either the front or rear spindles. The object of the pair of spindles is that a roll may be arranged on a spindle while the paper is being fed or drawn off from the roll on the other spindle, and when the roll on one spindle is exhausted its end is attached to the end of the paper on the other roll so that it is not necessary to thread up the machine.

The feed roll 6 is a driven feed roll, its shaft 13 being provided with a beveled gear 14 meshing with a gear 15 on the shaft 16 driven from the main mechanism of the machine as will be later described. The shaft 17 of the feed rolls 7 is carried by floating bearings 18 held yieldingly downward by the coiled springs 19.

It is sometimes desirable, as for instance, when adjusting the paper or feeding up the machine, to raise the pressure rolls 18. To accomplish this I provide an adjustable support for the shaft 17 consisting of the hanger 20 engaged over the cross rod 21 at the upper ends of the bearing pedestals and having an arm 22 pivoted on its lower end at 23.

A wedge-shaped slide 24 is mounted on this arm, the slide being slotted at 25 to engage a notch 26 in the hanger. The slide is secured in its adjusted position by means of the screw 27 engaging the slot 28 therein. A very slight adjustment is required of this slide to raise the rolls out of feeding engagement with the paper.

From the feed roll the paper passes through a steam chest 29. The steam connections for this chest are, however not illustrated. The paper is treated with steam to render it more flexible, certain grades, however, do not require this steam treatment. These parts are shown in detail in Figs. IV, IV^A and V, Sheet 4.

From the steam chest 29, the strip of paper passes through the guide 30—see Fig. II, Sheet 2, Fig. IV, Sheet 4, and Figs. XVI and XVII, Sheet 9—to the cutters or blank forming dies—see also Fig. XVIII, Sheet 5, in which the relation of the strip to the dies is illustrated.

The dies or cutters are adapted to cut the strip of paper 5 into blanks or strips of proper length to form the bodies of the containers, the blanks being designated as B—see Fig. XX, Sheet 9. The dies form the

converging or diagonally disposed cuts or slits 31 and the holes 32, the holes being located centrally and at the apex of the slits 31. There are uncut portions 33 at each side of the holes 32 so that the paper is still carried or fed along as a continuous strip after being operated upon by the dies or cutters.

By thus forming the slits the blanks are provided with tapered front ends and correspondingly recessed rear ends, the advantage of which will appear later.

The die 34 is mounted upon a fixed support 35 on the frame 2. The die 36 is mounted upon the movable die plate 37. The movable die plate 37 is mounted on a reciprocating carriage 38 supported in the ways 39. The carriage is operated through a pair of toggles 40 one member of each toggle being pivoted on the frame at 40' and the other being connected to the carriage or die plate. These toggles are connected by the link 40'' to the link 41 on the rock shaft 42. The shaft 42 is provided with an arm 43 to which the link 44 is pivotally connected, the link being slotted at 45 to engage the cam shaft 46 having a cam 47 thereon coacting with the roller 48 so that as the cam revolves the die plate carriage is actuated.

The springs 49 connected to an arm 50 on the rock shaft 42 and to the frame return the carriage. The rock shaft is provided with a lever 51 so that the dies may be manipulated by hand. These parts and their relation to the machine are shown in Fig. II, Sheet 2, Figs. XVI and XVII, Sheet 9, and Fig. XVIII, Sheet 5. The driving connections for the cam shaft 46 will be pointed out later.

From the dies the paper passes between the guides 52 over the rollers 53. These rollers are supported by brackets 54 for vertical adjustment. These brackets are supported by the screws 55 engaging slots 56—see Fig. II, Sheet 2 and Fig. XVI, Sheet 9. The length of the body forming strip may be varied by the adjustment of these rollers 53.

From these guide rollers 53 the paper passes under the guide roller 57 over the plate 58 which for convenience I designate as the clutch plate as it supports the paper as it is gripped by the clutch or holding member 59—see Fig. XXI, Sheet 10.

From the plate 58 the paper passes to the feed plate 60 from which it passes to a mandrel 61. The mandrels are brought successively to position to receive the paper. The blanks are completely severed from the main strip by the temporary stopping of the strip by means of the gripper 59 while the blank is being drawn forward which tears the paper at 33.

The paper is fed to the mandrels 61 by

the feed rolls 62 and 63—see Fig. XXI, Sheet 10. The feed roll 62 is an idler and is disposed so that the bite of the rolls is in the horizontal plane of the plate 60. The upper feed roll 63 is driven from the shaft 64 by a train of gears 65. The opposite end of the shaft 64 is connected to the shaft 194 by a train of gears 65'—see Fig. III. The driving connections for the shaft 194 will be described later.

The feed roll 63 and the driving gears with the exception of the gear on the shaft 64 are mounted on a rocking frame 66 pivoted on the shaft 64 and provided with an arm 67 projecting forwardly to be engaged by a cam 68 on the cam shaft 46 so that the upper feed roll is raised from and lowered into driving engagement with the paper, supported by the coacting roll 62, carrying the paper forward to the mandrels.

The openings 32 in the paper are positioned so that they are brought into register with the holes 69 in the plate 60 as the paper is advanced. The strip of paper acts as a valve closing these holes 69 until the holes 32 are brought into register therewith when air is admitted to break the vacuum by which the gripper 59 is controlled or actuated, thereby severing the blanks at 33 as stated.

The operating means for the gripper 59 comprises the cylinder 70 having a plunger 71 therein, the plunger rod 72 of which is connected by the arm 73 to the rock shaft 74 on which the gripper 59 is mounted. The cylinder 70 is connected by the pipe 75 to a suitable suction or vacuum means.

A conduit 76 provided with a valve 77 connects the ports or openings 69 with this suction or vacuum pipe. The valve 77 is connected by the link 78 to an actuating lever 79 pivoted at 80 on the bracket 81 mounted on the frame—see Fig. XXI, Sheet 10 and Fig. XIII^A, Sheet 11.

This actuating lever 79 is actuated by a cam 82 on the shaft 83 and also actuates parts of the bottom feed mechanism. The driving connections for the shaft 83 will be hereinafter described. A spring 73' is attached to the arm 73 to return the plunger 71 to its outer position.

The winding or forming mandrels 61 are mounted upon the turret 84, there being, as stated, in the structure illustrated a set of mandrels on both sides of the turret. The turret is driven with a step by step movement to advance the mandrels successively to position to receive the body blanks or strips of paper as has been described.

The turret and other parts are driven from the main driving pulleys 85—see Fig. III, Sheet 3 and Fig. VII, Sheet 5—mounted on a shaft 86 at the rear and side of the machine. The shaft 86 is provided with a pinion 87 meshing with the Geneva gear 88.

The coacting Geneva gear 89 is mounted on the shaft 90 provided with a gear 91 meshing with a gear 92 on the turret 84. The details of the Geneva gears are not described as the operation thereof will be readily understood.

To stop the turret in the exact position and prevent overthrow and oscillation thereof when stopped, I provide a brake means consisting of the brake band 93 mounted at 94 on the bracket 95—see Fig. III, Sheet 3—the free ends of the band being connected to the lever 96 pivoted at 97 on the hanger 98—see Figs. VII and XXVI, Sheet 5, the ends of the brake band being connected at opposite sides of the pivot.

This lever 96 is actuated by the cam 99 on the shaft 100 of the Geneva gear 88—see Fig. VII and Fig. XXVI, Sheet 5. A coiled spring 101 holds the lever to the cam.

The spindles 102 of the mandrels 61 are supported in suitable bearings on the turret 84 and are provided with pinions 103 meshing with the gear 104 on the shaft 105 on which the turret 84 is rotatably mounted, see Figs. XXX to XXXIV, Sheet 13. The shaft 105 is provided with a gear 106 meshing with a gear 107 on the shaft 83.

The gear 107 is driven from the gear 108 on the shaft 100 which is driven from the driving pulley as has been described—see Fig. VII, Sheet 5.

With this arrangement, the mandrels are continuously driven, the speed of the mandrels, however, being slackened during the advancing of the turret owing to the planetary relation of the spindle driving gears to the turret. This is of advantage in that the ends of the freshly wound blanks or body strips are not thrown off by the rapid rotation of the mandrels.

The mandrels are adapted to be expanded and retracted during the container forming and removing operations and to be subjected to a vacuum during part of the container forming operation and to a position pressure during the removing operation. In general the structure shown—see details of Figs. XXX to XXXIV, Sheet 13—is substantially that shown in my Letters Patent No. 1,342,575 issued June 8, 1920, and consists of the spindle 102 and a sleeve 109 mounted upon the spindle. A hinge block or fixed segment like body 110 is mounted upon the sleeve 109 by means of the screws 111.

A pair of segmental wings 112 are pivoted to the fixed segment 110 at 113. The wing segments 112 are operated to expand and retract the mandrel by means of the wedge segment 114. This wedge segment is mounted for radial movement in the sleeve portion 109 and is actuated from the slide bar 115 slidable in the way 116 cut longi-

tudinally in the spindle. The slide bar is connected to the wedge member 114 by means of the links 117.

With this arrangement as the slide is reciprocated the wedge member 114 is projected or retracted to expand or retract the wings 112. Springs 118 are provided to hold the wing members 112 normally in their collapsed position.

The mandrels are expanded and retracted when in their proper positions by means of the fixed cam 119 which acts upon the lever 120 pivoted at 121 on the turret and forked at 122 to engage the grooved collar 123 slidably mounted on the spindle and secured to the slide 115.

The fork of the lever is adjustably connected to the arm by means of the bolt 124 through the arm portion engaging a slot 125 in the fork portion. A stop screw 126 is provided for facilitating accurate adjustment. A spring 127 holds the roller 128 of the lever against the cam 119.

The fixed body portion 110 of the mandrel is provided with air openings 129 preferably disposed in a triangular relation as shown in Fig. XXXIV, Sheet 13, corresponding to the tapered front end of the body blanks or strips so that when the front end of a strip is projected over these holes by the feed means described, the suction draws and holds the end of the strip upon the mandrel.

The openings 129 communicate with the passage 130 in the mandrel spindles 102—see Fig. XXII, Sheet 13. The spindles are provided with disks 131 having radial passages 132 therein and a peripheral passage 133 registering with the passage 134 in the heads 135 of the radially disposed conduits 136—see Figs. XXIX and XXIX^A, Sheet 12.

The conduits 136 are disposed radially within the turret and are connected to a sleeve-like hub 137—see details of Figs. XXVII and XXVIII, Sheet 8, the shaft 105 being tubular—see also Fig. III, Sheet 3—to receive the pipes 138 and 139, the pipe 138 being the vacuum pipe and 139 the pressure pipe. The hub member 137 is mounted upon an annular valve member 140 having ports 141 and 142 therein registering with the pipes 138 and 139 respectively and with which the conduits 136 are brought into register as the turret revolves. The conduits being connected to the suction pipe 38 when the mandrels are in receiving position and are cut off therefrom as the mandrels are advanced to their second step and brought into communication with the pressure pipe when the mandrels are in ejecting position.

I will now describe the bottom feed mechanism. The bottoms "C"—see Figs. XIV and XV, Sheet 8, are arranged in a stack in a hopper consisting in the structure illustrated of rods or uprights 143—see Fig. I, 130

Sheet 1, Fig. II, Sheet 2, Figs. X to XII, Sheet 7, and Fig. XIII, Sheet 8.

At the bottom of the hopper is a feed table 144 having an opening 145 at one side of the hopper adapted to receive the disk-like head 146 on the swinging feed arm 147. The arm 147 is mounted on the rock shaft 148 and connected by the link 149 to an arm 150 on the rock shaft 151 which is provided with an arm 152 actuated by the cam 153 on the shaft 83—see figures last referred to.

The shaft 148 is tubular, and the arm 147 is provided with an air passage 154 indicated by the dotted lines in Fig. IX, Sheet 7, the purpose being to provide a suction or vacuum for holding the bottoms to the feed lead 146 during its stroke. This shaft 148 is connected by the pipe 155—see Fig. I, Sheet 1—to a suitable vacuum producing means. The air is controlled by a valve designated generally by the numeral 156—see Fig. I—which is actuated by the swinging of the arm. The details of this valve are not illustrated as it is deemed sufficient to state that the valve is such that the passage is connected with a vacuum producing means during the swinging movement of the shifter plate 146.

The bottoms are discharged from the bottom of the stack in the hopper one by one to the feeder 146. The hopper discharge mechanism consisting of the swinging discharge member 157 pivoted at 158—see Fig. XIII, Sheet 8. This discharge member is provided with a segment 159 coating with the rack 160. This rack is provided with a slide portion 161 mounted in supports 162 and connected by the link 163 to the lever 79—see Fig. XIII, Sheet 8, and Fig. XIII^A, Sheet 11.

Positioning stops 170 are provided to position the bottoms above the feed lead 146. The operation of these feed members is properly synchronized and the feeding of the bottoms is timed so that they are positioned against the ends of the mandrels prior to the winding of the body strip thereon so that the body is wound upon the bottoms.

The ends of the mandrels have openings 171 therein communicating with the passage 130 so that the bottoms are subject to the vacuum to hold them in position and to pressure for ejecting the cartons—see Fig. XXII, Sheet 13.

I will now describe the adhesive applying means which are arranged so that the adhesive is applied to the body blank or strip as it is wound upon the mandrel in forming the container body. The details of this adhesive applying means are shown in Figs. XIV and XV, Sheet 11. It comprises an adhesive tank 172 arranged so that the mandrels are above it when they are in their body forming position. The adhesive is

kept at the desired level in the tank 172 by means of the feed pipe 173 and the overflow pipe 174, the supply tank being shown at 175.

The adhesive applying roller 176 and its coating adhesive feed roller 177 are mounted in a rocking frame 178 supported on the shaft 179 so that by rocking the frame the applying roller 176 is brought into and out of coating relation with the mandrel or the body blank as indicated by dotted lines in Fig. XV, Sheet 11.

The rollers 176 and 177 are provided with meshing gears 180 connected by the gears 181 to the shaft 182 on which the frame 178 is mounted. This shaft is provided with a sprocket wheel 183 connected by a sprocket chain 184 to a sprocket 185. The sprocket 185 is connected by the shaft 186 and beveled gears 187 and 188 to a shaft 190. The shaft 190 is connected by the beveled gears 191 to a shaft 192 disposed centrally of the machine which shaft is connected by the beveled gears 193 to a shaft 194 extending across the machine from side to side. This shaft 194 is connected by the beveled gears 195—see Figs. I and II, Sheets 1 and 2—to a shaft 196 having a beveled pinion 197 on its lower end meshing with a gear 198 on the face of the gear 108. The details are of importance mainly in showing a driving connection whereby the several operations are properly synchronized or timed.

The adhesive roller frame 178 is actuated to bring the applying roller 176 into and out of operative position by means of the arm 199 connected by the link 200 to an arm 201 on the rock shaft 202. This rock shaft has as an arm 203—see Fig. III—to which the link or connecting rod 204 is connected, the other end of this connecting rod being slidably supported and provided with a roller 205 coating with a cam 206 on the cam shaft 46. A spring 207 connected to an arm 208 on the rock shaft 202 holds the roller 205 against the cam.

With the parts thus arranged the adhesive applying roller is brought into operative position at the proper time to apply adhesive to the strip as it is rolled upon the mandrel and is shifted to inoperative position so that no adhesive is applied to the mandrels themselves. The rock shaft 202 is provided with a lever 202' by means of which it may be actuated manually to hold the adhesive applying roller in operative position. A latch 202'' mounted on an arm 202''' on the rock shaft is provided for holding the rock shaft in operative position. This latch is adapted to rest on the frame as shown in Figs. I and II, or to be swung out of operative position when desired.

As the strip is wound upon the mandrels, it is engaged by the pressure or forming roller 209 and the several convolute windings are pressed together as they are wound upon

the mandrel. This pressure roller 209 is preferably peripherally ribbed as shown in Fig. XXII, Sheet 10, so that while the several windings are firmly pressed together and are drawn tightly one upon the other, the adhesive is not squeezed out.

The pressure roller is mounted to swing to and from operative relation to the mandrels as they are successively brought to forming position, the roller being carried by a frame 210 pivoted on the shaft 194, the frame being provided with an arm 212 carrying the roller 213 coacting with a cam 215 on the cam shaft 46—see Fig. XXI, Sheet 10. The shaft 216 of the pressure roller 209 is connected by the beveled gears 217 to a shaft 218 which in turn is connected by the beveled gears 219 to the shaft 194 on which the frame 210 is pivoted. The adhesive applying roller preferably remains in operative position so as to apply a complete coating of the adhesive to the outside of the body, an adhesive being used which will provide a glass like finish. When this is done I provide a wiper 219' positioned at the second slip of the turret—see Fig. XXI, Sheet 10. This wiper is supplied with a suitable solvent so that the adhesive is spread and smoothed to provide the finish.

As the formed containers are carried by the mandrels from this position, they are brought into the range of a drying blast of heated air from the blower nozzle 220—see Fig. II, Sheet 2, and Fig. XXI^A, Sheet 12. This is of advantage in that it hastens or speeds the setting of the adhesive thus enabling the machine being speeded up. The air heating chamber is shown conventionally at 221 and the blower at 222—see Fig. II, Sheet 2, and Fig. IV, Sheet 4.

As stated, the body is wound upon the bottom and it is wound so that the end of the body projects beyond the bottom as shown in Fig. XXXV, Sheet 10, and Fig. XXXVI, Sheet 12. During one of the periods of rest of the turret, the second period after the body is formed in the structure illustrated, the adhesive is applied to the bottom and to the portion of the body projecting beyond the bottom. This adhesive is applied by an atomizing of blast means—see Figs. XXXV, Sheet 10, and XXXVI, Sheet 12,—comprising an air nozzle 223 connected by the pipe 224 to a valve 225 connected to a source of supply of air under pressure by the pipe 226. The adhesive supply pipe 227 is provided with a valve 228 controlling its nozzle 229. The air nozzle 223 and the adhesive nozzle 229 are arranged so that as the air blows across the adhesive nozzle, the adhesive is atomized or sprayed onto the work. These nozzles are mounted on a slide 230 so that they may be adjusted to and from the work as the turret

is advanced. The slide 230 is actuated by a link 231 connected to an arm 232 on the valve stem 233 of the valve 225.

See Fig. XXXVII, Sheet 10. The valve 233 is provided with a port 235 adapted to be brought into register with the port 236 in the supply pipe 226 upon which the valve is rotatably mounted. The valve stem or rock shaft 233 is operated from a plunger rod or link 237 having the roller 238 traveling on a cam 239 on the shaft 83. A spring 240 is connected to the bracket 241 on the frame and to the link or plunger rod 237.

The valve 228 is actuated by the plunger rod 242' from the cam 242. With this arrangement the air and adhesive are controlled so that when the mandrels are in proper position, the adhesive is sprayed onto the bottom and the projecting portion of the body so that when the body is crimped or turned upon the bottom at a later stage it is retained by the adhesive. This takes place at a later step and the mechanism by which it is accomplished is detailed in Figs. XXXVIII, XXXIX and XL, Sheet 6. It comprises the spinner head 243 mounted on the shaft 244, the shaft being connected by the belt 245 and suitable pulleys to the driving shaft 246 which in turn is provided with a pulley 247 driven from a belt 248 from a line shaft or other source of power.

The spinner head 243 is conformed to embrace the body and has a curved portion 249 adapted to turn the body retaining flange 250 upon the bottom as shown in Fig. XL, Sheet 6. The shaft 244 besides being rotatably mounted is mounted for axial movement so that the spinner head is pushed upon the container as it is rotated. This is accomplished by providing the shaft with a pair of collars 251 between which is a shifter member 252.

The shifter member 252 is actuated by a toggle consisting of pairs of links 253 and 254, the links 253 being connected to the shifter member 252 while the links 254 are connected to the bearing 255 at the outer end of the shaft. The yoke 256 is connected to a lever 257 urged in one direction by the spring 258 which is connected by the link 259 to a lever 260 pivoted at 261 on the frame and provided with a roller 262 coacting with the cam 263 on the shaft 83—see Figs. XXXVII and XXXIX, Sheet 6, Fig. I, Sheet 1, and Fig. II, Sheet 2.

When the mandrel is in its bottom securing position as shown in Figs. XXXIX and XL, Sheet 6, and prior to the completion of the spinning up from the bottom, the body is internally beaded at 263 just above the bottom, preventing the bottom being shoved up into the body, the bottom being held on the inner side by this internal bead and on the outer side by the flange turned

over upon the bottom as shown in Fig. XLII, Sheet 9. The bottom is also retained by the winding of the body thereon.

This beading is accomplished by means of the roller 264 which is carried by an arm 265 pivoted on the bracket 266. A spring 267 holds the beading roller yieldingly to the work.

To adapt the container to receive the cover flange and so that the cover flange will be practically flush with the body of the container, I provide a roller 268 carried by the arm 269 pivoted at 272. The spring 271 urges the roller 268 to its work. This roller forms the annular indentation 272 at the top of the container to receive the cover flange, as stated.

The cam shaft 46 is driven from the shaft 100 by means of the beveled gears 273, the shaft 274 and the beveled gears 275—see Fig. I, Sheet 1, and Fig. II, Sheet 2.

The driven paper feed rolls 6 are driven from the shaft 16 connected to the shaft 149 by the beveled gears 275.

With this arrangement of parts, I am enabled to rapidly and economically produce containers of a superior quality. One end of the blank being tapered and the other recessed, there is no tendency for the containers to break or collapse at the lapping points of the ends of the blanks. The bottoms are very rigidly secured as the bodies are tightly wound thereon in the forming, the internal bead is provided preventing the upward movement of the bottom within the container, and the bottom edge of the body is spun upon and glued to the bottom.

The operations are entirely automatic, it only being necessary for the operator to supply the rolls of paper and connect the end of an exhausted roll with the fresh roll which has previously been arranged upon one of the roll spindles to facilitate this operation. The structure is also quite compact.

I have not in the accompanying drawings attempted to maintain the proper relative proportions of parts and various parts are shown conventionally. I have not attempted to illustrate various modifications in structural details as I believe the disclosure made will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired.

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

1. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, said mandrels being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by

suction, suction control means for said mandrel conduits, a forming roll movable to and from coacting relation with said mandrels, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, feed means delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon, a guide way for the blanks to the mandrels, a pair of coacting paper feed rolls interposed in said guide way to coact therewith in delivering the paper to said mandrels one of said feed rolls being movable to and from coacting relation with the other, a body blank cutter adapted to nearly sever the blanks with an A-shaped slit and to form a hole at the apex of the slit, a gripper coacting with said guide way in advance of said feed rolls, means for operating said gripper comprising a cylinder and plunger, there being a conduit operatively associated with said cylinder and opening in the face of said guide way between said feed rolls and mandrels, the blanks constituting closures for said conduit until the holes in the blanks are brought into register therewith and a valve for said cylinder conduit.

2. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, a forming roll movable to and from coacting relation with said mandrels, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, a guide way for the blanks to the mandrels, a pair of coacting paper feed rolls interposed in said guide way to coact therewith in delivering the paper to said mandrels one of said feed rolls being movable to and from coacting relation with the other, a body blank cutter adapted to nearly sever the blanks with an A-shaped slit and to form a hole at the apex of the slit, a gripper coacting with said guide way in advance of said feed rolls, means for operating said gripper comprising a cylinder and plunger, there being a conduit operatively associated with said cylinder and opening in the face of said guide way between said feed rolls and mandrels, the blanks constituting closures for said conduit until the holes in the blanks are brought into register therewith, and a valve for said cylinder conduit.

3. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, said mandrels being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by

suction, suction control means for said mandrel conduits, feed means delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon, a guide

5 way for the blanks to the mandrels a pair of coating paper feed rolls interposed in said guide way to coat therewith in delivering the paper to said mandrels one of said feed rolls being movable to and from co-
10 acting relation with the other, a body blank cutter adapted to nearly sever the blanks and to form a hole therein, a gripper coacting with said guide way in advance of said feed rolls, means for operating said gripper
15 comprising a cylinder and plunger, there being a conduit operatively associated with said cylinder and opening in the face of said guide way between said feed rolls and mandrels, the blanks constituting closures for
20 said conduit until the holes in the blanks are brought into register therewith, and a valve for said cylinder conduit.

4. In a container forming machine, the combination with a turret driven with a step
25 by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, a guide way for the blanks to the mandrels, a pair of coating paper feed rolls
30 interposed in said guide way to coat therewith in delivering the paper to said mandrels one of said feed rolls being movable to and from coacting relation with the other, a body blank cutter adapted to nearly sever
35 the blanks and to form a hole therein, a gripper coacting with said guide way in advance of said feed rolls, means for operating said gripper comprising a cylinder and plunger, there being a conduit operatively
40 associated with said cylinder and opening in the face of said guide way between said feed rolls and mandrels, the blanks constituting closures for said conduit until the holes in the blanks are brought into register
45 therewith, and a valve for said cylinder conduit.

5. In a container forming machine, the combination of a driven forming mandrel provided with an air conduit opening at the
50 sides and ends thereof so that the blanks may be held thereto by suction, suction control means for said mandrel conduit, feed means delivering the bottoms against the end of the mandrel so that the bodies are
55 wound thereon, a way for guiding a strip of connected body blanks each having a hole at one end thereof to the mandrel, a pair of coating paper feed rolls, one of said feed rolls being movable to and from coacting relation
60 with the strip, means for separating said blanks comprising a gripper disposed in advance of said feed rolls, and means for operating said gripper comprising a cylinder and plunger, there being a conduit opera-
65 tively associated with said cylinder and

opening in the face of said guide way between said feed rolls and mandrel, the blanks closing said conduit until the holes therein are brought into register therewith, and a valve for said conduit. 70

6. In a container forming machine, the combination of a driven forming mandrel, a way for guiding a strip of connected body blanks each having a hole at one end thereof
75 to the mandrel, a pair of coating paper feed rolls, one of said feed rolls being movable to and from coacting relation with the strip, means for separating said blanks comprising a gripper disposed in advance of said feed roll, and means for operating said gripper
80 comprising a cylinder and plunger, there being a conduit operatively associated with said cylinder and opening in the face of said guide way between said feed rolls and mandrel, the blanks closing said conduit until
85 the holes therein are brought into register therewith, and a valve for said conduit.

7. In a container forming machine, the combination of a forming mandrel provided with an air conduit opening at the side and
90 end thereof so that the blanks may be held thereto by suction, a suction control means for said mandrel conduit, a feed means delivering the bottoms against the end of the mandrel so that the bodies are wound there-
95 on, a body blank cutter adapted to nearly sever the blanks with an A-shaped slit and to form a hole at the apex of the slits, a body blank feed means comprising a pair of coating feed rolls one of which is movable to and
100 from coacting relation with the strip, a stop means comprising a strip engaging member, and pneumatic operating means therefor controlled by the strip, the actuation of the stop means being effected by the registering
105 of the holes in the strip with a conduit operatively associated with said pneumatic control means.

8. In a container forming machine, the combination of a forming mandrel, a body
110 blank cutter adapted to nearly sever the blanks with an A-shaped slit and to form a hole at the apex of the slits, a body blank feed means comprising a pair of coating feed rolls one of which is movable to and
115 from coacting relation with the strip, a stop means comprising a strip engaging member, and pneumatic operating means therefor controlled by the strip, the actuation of the stop means being effected by the registering
120 of the holes in the strip with a conduit operatively associated with said pneumatic control means.

9. In a container forming machine, the combination of a forming mandrel, a body
125 blank cutter adapted to nearly sever the blanks with an A-shaped slit and to form a hole at the apex of the slits, a body blank feed means comprising a pair of coating feed rolls one of which is movable to and
130

from coating relation with the strip, a stop means comprising a strip engaging member, pneumatic operating means therefor controlled by the strip the actuation of the stop means being effected by the registering of the holes in the strip with a conduit operatively associated with said pneumatic control means, and means for varying the length of the blanks comprising an adjustable guide roll disposed between said cutter and feed rolls.

10. In a container forming machine, the combination of a forming mandrel, a pair of coating paper feed rolls one of said feed rolls being movable to and from coating relation with the other, a body blank cutter adapted to nearly sever the blanks from a strip of paper and to form holes therein, a stop member for the strip, and a pneumatic operating means for said stop member including a conduit disposed so that the blanks constitute closures therefor until the holes therein are brought into register therewith.

11. In a container forming machine, the combination of a forming mandrel, means for feeding separable blanks thereto in a connected strip, and means for separating the succeeding blank from the blank that is being wound upon the mandrel comprising a gripper adapted to engage such succeeding blank, a pneumatic operating means for said gripper including a conduit disposed so that the blanks constitute a closure therefor, the blanks having holes therein adapted to be brought into register with said conduit as the blank is carried forward, and a pair of feed rolls disposed between the gripper and the conduit.

12. In a container forming machine, the combination of a forming mandrel, a body blank cutter adapted to nearly sever the blanks from a strip of paper and to form holes therein, a feed means, a blank gripper for the strip, and pneumatic operating means therefor including a conduit disposed so that the blanks constitute closures therefor until the holes therein are brought into register therewith.

13. In a container forming machine, the combination of a forming mandrel, means for feeding separable body blanks thereto in a connected strip and separating the blanks from the strip comprising a pair of coating feed rolls, one of said feed rolls being movable to and from strip engaging position, a stop member for the strip disposed in advance of said feed rolls, and a pneumatic means for operating said stop member controlled by the strip.

14. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, said mandrels being provided with air

conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction, suction control means for said mandrel conduits, a forming roll movable to and from coating relation with said mandrels, an adhesive applying means comprising a roller movable to and from coating relation with the body blanks as they are wound upon the mandrels, feed means delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon, a pair of coating paper feed rolls, a body blank cutter adapted to nearly sever the blanks, and a stop means engaging the strip in advance of said feed rolls.

15. In a container forming machine, the combination with a turret driven with a step by step movement of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, a forming roll movable to and from coating relation with said mandrels, an adhesive applying means comprising a roller movable to and from coating relation with the body blanks as they are wound upon the mandrels, a pair of coating paper feed rolls, a body blank cutter adapted to nearly sever the blanks, and a stop means engaging the strip in advance of said feed rolls.

16. In a container forming machine, the combination of a driven forming mandrel provided with an air conduit opening at the sides and ends thereof so that the blanks may be held thereto by suction, suction control means for said mandrel conduit, feed means delivering the bottoms against the end of the mandrel so that the bodies are wound thereon, a way for guiding a strip of connected body blanks, a pair of coating paper feed rolls, one of said feed rolls being movable to and from coating relation with the other, means for separating said blanks comprising a gripper disposed in advance of said feed rolls, and operating means for said gripper.

17. In a container forming machine, the combination of a driven forming mandrel, a way for guiding a strip of connected body blanks, a pair of coating paper feed rolls, one of said feed rolls being movable to and from coating relation with the other, means for separating said blanks comprising a gripper disposed in advance of said feed rolls, and operating means for said gripper.

18. In a container forming machine, the combination of a forming mandrel, a body blank cutter adapted to partially sever the blanks so that they may be separated by a pull thereon, a body blank feed means comprising a pair of coating feed rolls, a stop means comprising a strip engaging member disposed in advance of the feed rolls, and means for varying the length of the blanks comprising an adjustable guide roll disposed between said cutter and feed rolls.

19. In a container forming machine, the combination of a forming mandrel, means for feeding separable blanks thereto in a connected strip, and means for separating the succeeding blank from the blank that is being wound upon the mandrel comprising a gripper adapted to engage such succeeding blank, and coacting feed rolls disposed between the gripper and the mandrel.

20. In a container forming machine, the combination of a forming mandrel, means for feeding separable body blanks thereto in a connected strip, means for separating the blanks from the strip comprising a pair of coacting feed rolls, a stop member for the strip disposed in advance of said feed rolls, and a means for operating said stop member controlled by the strip.

21. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, a contained wiper, means for applying adhesive in the angle formed by the bottom and the projecting portion of the body, means for crimping the projecting edge of the body upon the bottom, and a beading roller adapted to form an internal bead above the bottom, said wiping, crimping and beading means being arranged so that they act successively while the turret is at rest.

22. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, means for applying adhesive in the angle formed by the bottom and the projecting portion of the body, means for crimping the projecting edge of the body upon the bottom, and a beading roller adapted to form an internal bead above the bottom, said crimping and beading means being arranged so that they act successively while the turret is at rest.

23. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, a container wiper, means for applying adhesive in the angle formed by the bottom and the projecting portion of the body, and means for crimping the projecting edge of the body upon the bottom.

24. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, a container wiper, means for applying adhesive in the angle formed by the bottom and the projecting portion of the body, and means for crimping the projecting edge of the body upon the bottom.

25. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, said mandrels being adapted to be expanded and contracted and being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction and the containers ejected therefrom by pressure, a suction and pressure control means controlled by the rotation of the turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, a container wiper, means for applying adhesive in the angle formed by the bottom and the projecting portion of the body, and means for crimping the projecting edge of the body upon the bottom.

26. In a container forming machine, the

combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, said mandrels being adapted to be expanded and contracted and being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction and the containers ejected therefrom by pressure, a suction and pressure control means controlled by the rotation of the turret, means for expanding and contracting said mandrels controlled by the rotation of the turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, and means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon.

27. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels, and means for delivering the bottom against the ends of the mandrels so that the bodies are wound thereon.

28. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, said mandrels being adapted to be expanded and contracted and being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction and the containers ejected therefrom by pressure, a suction and pressure control means controlled by the rotation of the turret, means for expanding and contracting said mandrels controlled by the rotation of the turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, and an adhesive applying means comprising a roller movable to and from coacting relation with the body blanks as they are wound upon the mandrels.

29. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, a forming roll movable to and from coacting relation with said mandrels when they are in forming position, and an adhesive applying means comprising a roller movable to and from coacting relation with

the body blanks as they are wound upon the mandrels.

30. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of continuously driven forming mandrels mounted on said turret, said mandrels being adapted to be expanded and contracted and being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction and the containers ejected therefrom by pressure, a suction and pressure control means controlled by the rotation of the turret, and means for expanding and contracting said mandrels controlled by the rotation of the turret.

31. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret, means for applying adhesive to the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, adhesive applying means for the bottom, means for crimping the projecting edge of the body upon the bottom, and a beading roller adapted to form an internal bead above the bottom.

32. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret, means for applying adhesive to the body blanks as they are wound upon the mandrels, means for delivering the bottoms against the ends of the mandrels so that the bodies are wound thereon with their edges projecting beyond the bottoms, adhesive applying means for the bottom, and means for crimping the projecting edge of the body upon the bottom.

33. In a container forming machine, the combination of a driven forming mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for delivering the bottoms against the end of the mandrel so that the bodies are wound thereon with their edges projecting beyond the bottoms, adhesive applying means for the bottom, means for crimping the projecting edge of the body upon the bottom, and a beading roller adapted to form an internal bead above the bottom.

34. In a container forming machine, the combination of a driven forming mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for delivering the bottoms against the end of the mandrel so that the bodies are wound thereon with their edges projecting beyond the bottoms, adhesive applying means for the bottom, and means for crimp-

ing the projecting edge of the body upon the bottom.

35. In a container forming machine, the combination of a mandrel, a forming roll coacting with said mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for feeding the blanks to the mandrel, means for delivering bottoms against the end of the mandrel so that the bodies are wound thereon with their edges projecting beyond the bottoms, means for applying adhesive in the angle formed by the bottom and projecting portion of the body, means for crimping the projecting edge of the body upon the bottom, and means for forming an internal bead in the body above the bottom.

36. In a container forming machine, the combination of a mandrel, a forming roll coacting with said mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for feeding the blanks to the mandrel, means for delivering bottoms against the end of the mandrel so that the bodies are wound thereon with their edges projecting beyond the bottoms, means for applying adhesive in the angle formed by the bottom and a projecting portion of the body, and means for crimping the projecting edge of the body upon the bottom.

37. In a container forming machine, the combination of a mandrel, a forming roll coacting with said mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for feeding the blanks to the mandrel, and means for delivering bottoms against the end of the mandrel so that the bodies are wound thereon.

38. In a container forming machine, the combination of a mandrel adapted to be expanded and contracted and provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereby by suction, a forming roll coacting with said mandrel, means for applying adhesive to the body blanks as they are wound upon the mandrel, means for feeding the blanks to the mandrel, and means for delivering bottoms against the end of the mandrel so that the bodies are wound thereon.

39. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, means for feeding body blanks to said mandrels, means for feeding bottoms against the ends of the mandrels so that the bodies are wound thereon, and means for crimping the bodies upon the bottoms disposed to act thereon at succeeding stops of the turret.

40. In a container forming machine, the combination of a forming mandrel, means

for feeding blanks thereto, means for feeding bottoms to the mandrel so that the bodies are wound thereon with the edges of the bodies projecting, means for applying adhesive to the angle of the bottom and the projecting edge, means for upsetting the projecting edge upon the bottom, and means for forming an internal bead above the bottom.

41. In a container forming machine, the combination of a forming mandrel, means for feeding blanks thereto, means for feeding bottoms to the mandrel so that the bodies are wound thereon with the edges of the bodies projecting, means for applying adhesive to the angle of the bottom and the projecting edge, and means for upsetting the projecting edge upon the bottom.

42. In a container forming machine, the combination of a forming mandrel, means for feeding separable blanks thereto in a connected strip, means for separating the succeeding blank from the blank that is being wound upon the mandrel, and means for feeding the bottoms to the ends of the mandrels so that the bodies are wound thereon.

43. In a container forming machine, the combination with a mandrel provided with an air conduit opening at its end so that a bottom may be held thereto by suction, a bottom feeding means comprising a hopper, a feed arm provided with a head adapted to deliver the bottoms against the end of the mandrel, a feed table at the bottom of the hopper having a recess therein adapted to receive said head, a shifter for transferring the bottoms from the hopper onto said head, said arm being provided with an air conduit opening in the face of the head whereby the bottoms may be held thereto by suction, means for oscillating said arm, a suction control means for said feed member timed to break the suction when the bottom is in position, and a suction control means for said mandrel whereby the bottom is held thereto when released by said feed head.

44. In a container forming machine, the combination with a mandrel, a bottom feeding means comprising a hopper, a feed arm provided with a head adapted to deliver the bottoms against the end of the mandrel, a feed table at the bottom of the hopper having a recess therein adapted to receive said head, a shifter for transferring the bottoms from the hopper onto said head, and means for oscillating said arm.

45. In a container forming machine, the combination with a mandrel provided with an air conduit opening at its end so that a bottom may be held thereto by suction, a bottom feeding means comprising a feed member adapted to deliver the bottoms against the end of the mandrel, means for delivering the bottoms to said feed member, said feed member being provided with an air conduit opening in its face whereby the

bottoms may be held thereto by suction, means for oscillating said arm, a suction control means for said feed member timed to break the suction when the bottom is in position, a suction control means for said mandrel whereby the bottom is held thereto when released by said feed member, and means for feeding body blanks to said mandrel, said mandrel being also provided with a conduit opening in its side whereby the body blanks are held thereto by suction.

46. In a container forming machine, the combination with a mandrel provided with an air conduit opening at its end so that a bottom may be held thereto by suction, a bottom feeding means comprising a feed member adapted to deliver the bottoms against the end of the mandrel, means for delivering the bottoms to said feed member, said feed member being provided with an air conduit opening in its face whereby the bottoms may be held thereto by suction, means for oscillating said arm, a suction control means for said feed member timed to break the suction when the bottom is in position, and a suction control means for said mandrel whereby the bottom is held thereto when released by said feed member.

47. In a container forming machine, the combination of a turret driven with a step by step movement, continuously driven mandrels mounted thereon, means for feeding body blanks to said mandrels, an adhesive applying means comprising a roller movable to and from coacting relation with said mandrels whereby the adhesive is applied to the body blanks as they are wound upon the mandrels, said roller remaining in operative position to apply adhesive to the outer surface of the completely wound container, a wiper positioned to wipe the surface of the container as it is rotated in a position succeeding its forming position, and means for delivering a current of air against the container as it is rotated in a position succeeding that of the wiping position.

48. In a container forming machine, the combination of a turret driven with a step by step movement, continuously driven mandrels mounted thereon, means for feeding body blanks to said mandrels, an adhesive applying means comprising a roller movable to and from coacting relation with said mandrels whereby the adhesive is applied to the body blank as they are wound upon the mandrels, said roller remaining in operative position to apply adhesive to the outer surface of the completely wound container, and a wiper positioned to wipe the surface of the container as it is rotated in a position succeeding its forming position.

49. In a container forming machine, the combination of a turret driven with a step by step movement, continuously driven man-

drels mounted thereon, means for feeding body blanks to said mandrels, and adhesive applying means comprising a roller movable to and from coacting relation with said mandrels whereby the adhesive is applied to the body blanks as they are wound upon the mandrels, said roller remaining in operative position to apply adhesive to the outer surface of the completely wound container.

50. In a container forming machine, the combination with a driven mandrel, means for feeding body blanks thereto, an adhesive applying means comprising a roller movable to and from said mandrel so that the adhesive is applied to the body blank as it is wound upon the mandrel, and a forming roller coacting with said mandrel having peripheral spaced ribs.

51. In a container forming machine, the combination with a driven mandrel, means for applying adhesive to the body blank as it is wound upon the mandrel, and a forming roller coacting with said mandrel having peripherally disposed spaced ribs.

52. In a container forming machine, the combination of a turret driven with a step by step movement, continuously driven mandrels mounted thereon, means for feeding bottoms to the ends of said mandrels, means for winding body blanks upon said mandrels and upon the bottoms with the edge of the body projecting beyond the bottom, an adhesive applying nozzle, a coacting air nozzle whereby the adhesive is sprayed into the angle formed by the projecting edge of the body and bottom as the mandrel is rotated, a reciprocating support for said nozzles, a valve for said air nozzle, a valve for said adhesive nozzle, and means for reciprocating said support and controlling said valves acting in synchronism with said turret for the purpose specified.

53. In a container forming machine, the combination of a turret driven with a step by step movement, continuously driven mandrels mounted thereon, means for feeding bottoms to the ends of said mandrels, means for winding body blanks upon said mandrels and upon the bottoms with the edge of the body projecting beyond the bottom, an adhesive applying nozzle, a coacting air nozzle whereby the adhesive is sprayed into the angle formed by the projecting edge of the body and bottom as the mandrel is rotated, a valve for said air nozzle, a valve for said adhesive nozzle, and means for controlling said valves acting in synchronism with said turret, for the purpose specified.

54. In a container forming machine, the combination of a mandrel, means for winding a body blank upon said mandrel and upon a bottom with the edge of the body projecting beyond the bottom, an adhesive applying nozzle, a coacting air nozzle, a reciprocating support for said nozzles, a

valve for said air nozzle, a valve for said adhesive nozzle, and means for reciprocating said support and controlling said valves for the purpose specified.

5 55. In a container forming machine, the combination of a mandrel, means for winding a body blank upon said mandrel and upon a bottom with the edge of the body projecting beyond the bottom, an adhesive
10 applying nozzle, a coating air nozzle, a valve for said air nozzle, a valve for said adhesive nozzle, and means for controlling said valves for the purpose specified.

56. In a container forming machine, the
15 combination of a driven mandrel, means for feeding body blanks to said mandrel, and an adhesive applying means comprising an adhesive receptacle, a swinging frame, an adhesive applying roller mounted on said frame
20 so that as the frame is oscillated it is brought into and out of coating relation with the body blank as it is wound upon the mandrel, a feed roll coating with said adhesive applying roller, said feed roll being positioned
25 so that it continuously dips into the adhesive, and driving means for said rollers.

57. In a container forming machine, the combination of a mandrel, means for positioning bottoms against the end of said mandrel so that the bodies are wound thereon
30 with their edges projecting beyond the bottom, an axially movable spinner head having a chambered face adapted to receive the end of a container and having an annular
35 curved portion adapted to engage the projecting edge of the body and crimp it inwardly upon the bottom, means for driving said spinner head, and a beading roller adapted to form an internal bead above the
40 bottom while the crimping head is in position to support the bottom.

58. In a container forming machine, the combination of a mandrel, means for positioning bottoms against the end of said mandrel so that the bodies are wound thereon
45 with their edges projecting beyond the bottom, an axially movable spinner head having a chambered face adapted to receive the end of a container and having an annular
50 curved portion adapted to engage the projecting edge of the body and crimp it inwardly upon the bottom, and means for driving said spinner head.

59. In a container forming machine, the
55 combination of a driven turret, a hollow shaft on which said turret is rotatably mounted, a plurality of mandrels, spindles therefor mounted on said turret, said spindles being provided with air conduits having
60 an opening in the faces of said mandrels, a plurality of radially disposed conduits, a sleeve-like valve member disposed on said shaft, pressure and suction pipes disposed within said shaft and operatively associated
65 with said valve member so that as the turret

revolves, the conduits are alternately connected with the suction and pressure pipes, a sleeve-like hub to which the inner ends of said radial conduits are connected rotatably
70 on said valve member, collars on said spindles having peripheral passages therein communicating with said conduits of said spindles, and heads for said radial conduits rotatable on said collars and having passages
75 therein communicating with the annular passages of said collars.

60. In a container forming machine, the combination of a driven turret, a hollow shaft on which said turret is rotatably
80 mounted, a plurality of mandrels, spindles therefor mounted on said turret, said spindles being provided with air conduits having an opening in the faces of said mandrels, a plurality of radially disposed conduits, a sleeve-like valve member disposed on said
85 shaft, a pipe disposed within said shaft and operatively associated with said valve member so that as the turret revolves, the conduits are connected therewith, a sleeve-like hub to which the inner ends of said radial
90 conduits are connected rotatable on said valve member, collars on said spindles having peripheral passages therein communicating with said conduits of said spindles, and heads for said radial conduits rotatable on
95 said collars and having passages therein communicating with the annular passages of said collars.

61. In a container forming machine, the combination of a driven turret, a hollow
100 shaft on which said turret is rotatably mounted, a plurality of mandrels, spindles therefor mounted on said turret and provided with air conduits for said mandrels, a plurality of radially disposed conduits connected to said spindle conduits, a sleeve-like
105 hub to which the inner ends of said radial conduits are connected rotatable on said turret shaft, and pressure and suction pipes disposed within said shaft and operatively associated with said hub member so that as the
110 turret revolves, the conduits are alternately connected with the suction and pressure pipes.

62. In a container forming machine, the
115 combination of a driven turret, a hollow shaft on which said turret is rotatably mounted, a plurality of mandrels, spindles therefor mounted on said turret and provided with air conduits for said mandrels, a
120 plurality of radially disposed conduits connected to said spindle conduits, a sleeve-like hub to which the inner ends of said radial conduits are connected rotatable on said turret shaft, and a pipe disposed within said
125 shaft and operatively associated with said hub member so that as the turret revolves, the conduits are connected therewith.

63. In a container forming machine, the combination with a turret, of a plurality of 130

mandrels, spindles therefor mounted on said turret, said mandrels being capable of being expanded and contracted, means for expanding and contracting said mandrels comprising slides disposed longitudinally of the spindles, grooved collars on said slides, actuating levers coacting with said grooved collars, said actuating levers being mounted on said turret, and a cam adapted to coact with said levers as the turret revolves whereby the mandrels are expanded and contracted.

64. In a container forming machine, the combination with a turret driven with a step by step movement, of a plurality of driven forming mandrels mounted on said turret to be successively brought to forming position, said mandrels being provided with air conduits opening at the sides and ends thereof so that the blanks may be held thereto by suction, suction control means for said mandrel conduits, means for feeding body blanks

to said mandrels, means for feeding bottoms against the ends of the mandrels so that the bodies are wound thereon, and means for crimping the bodies on the bottoms.

65. In a container forming machine, the combination of a forming mandrel, means for feeding separable body blanks thereto in a connected strip and separating the blanks from the strip comprising a pair of coacting feed rolls, a stop member for the strip disposed in advance of said feed rolls, means for operating said stop member controlled by the strip, and means for holding the body blank to the forming mandrel by suction.

In witness whereof, I have hereunto set my hand and seal in the presence of a witness.

JESSE S. WENTWORTH. [L. s.]

Witness:

GRACE B. THOMPSON.