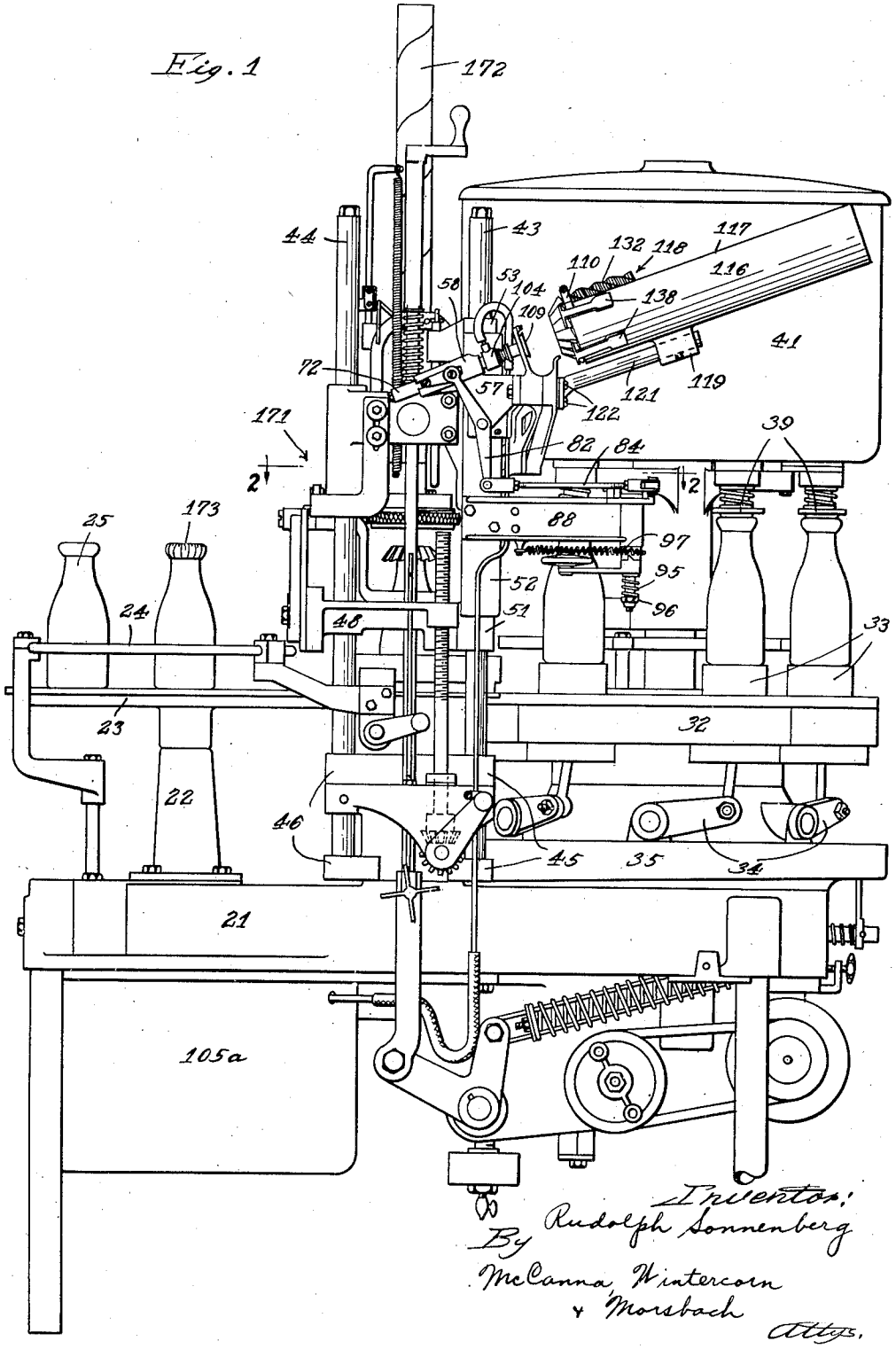
May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 1

Fig. 1



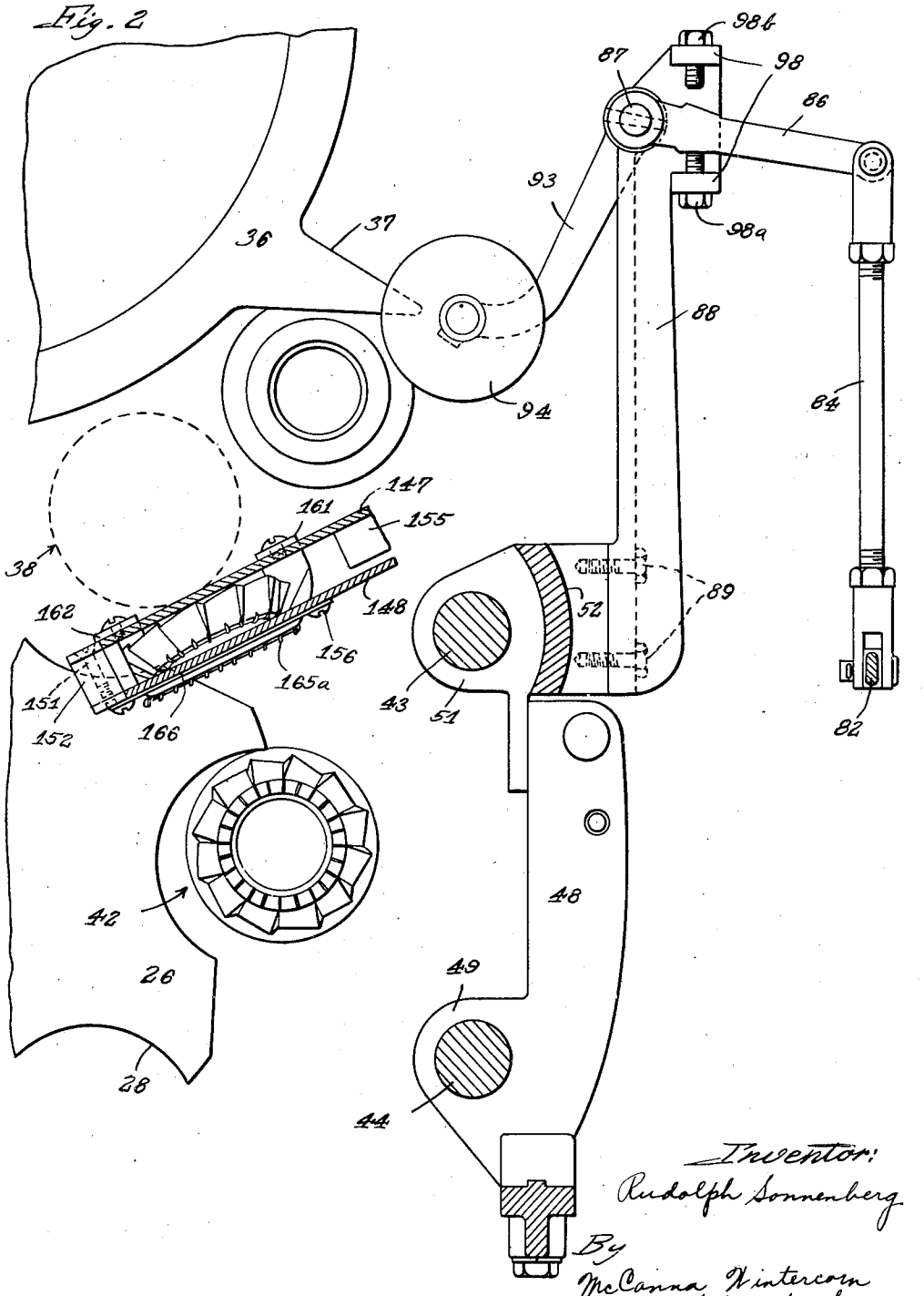
Inventor:
Rudolph Sonnenberg
By McCanna, Wintercorn & Morsbach
Attys.

May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 2

Fig. 2



Inventor:
Rudolph Sonnenberg

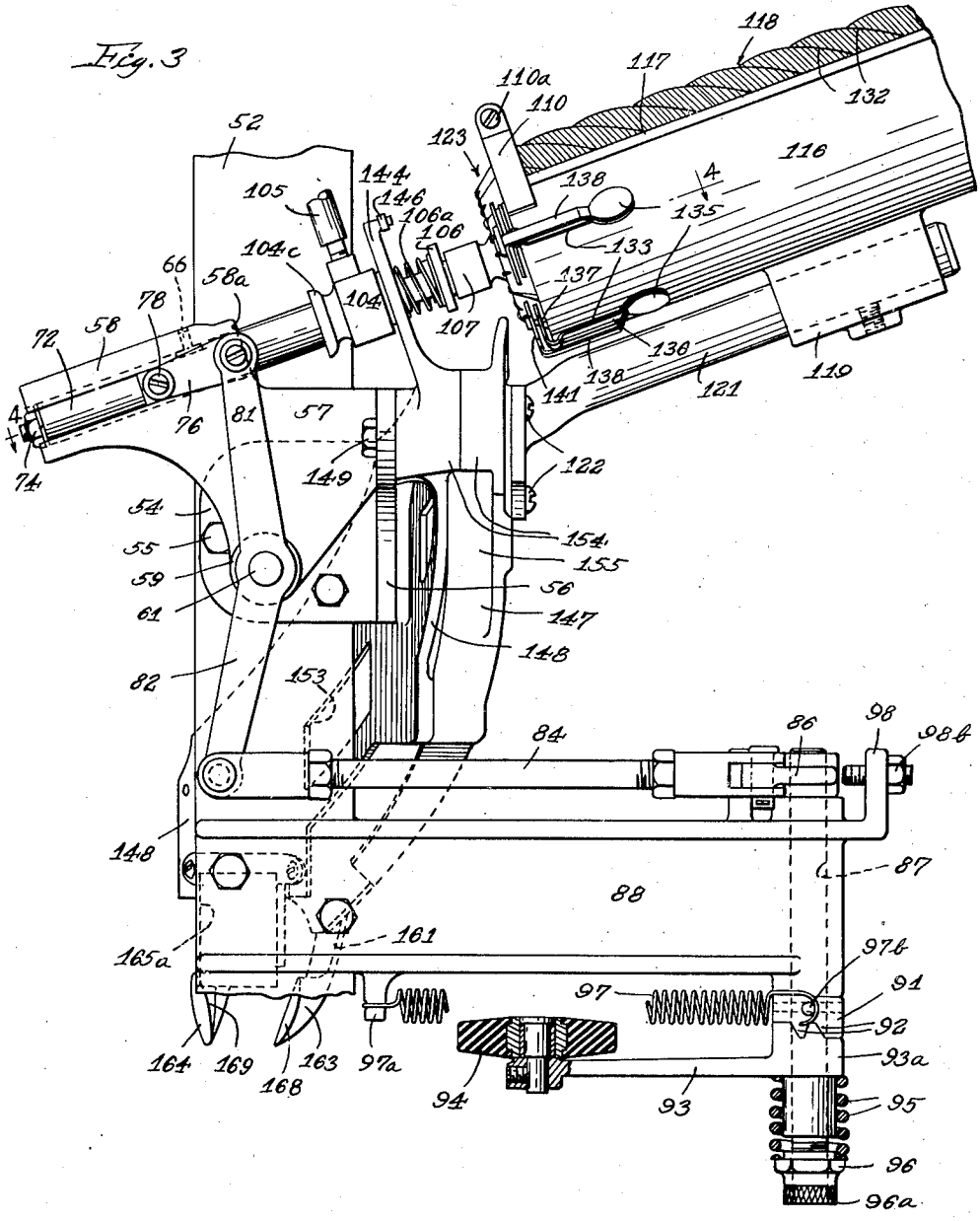
By
McCanna, Wintercorn & Morsbach
Attys.

May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 3

Fig. 3



Inventor:
Rudolph Sonnenberg
By McCanna, Wintercorn & Morsbach
Attys.

May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 4

Fig. 4

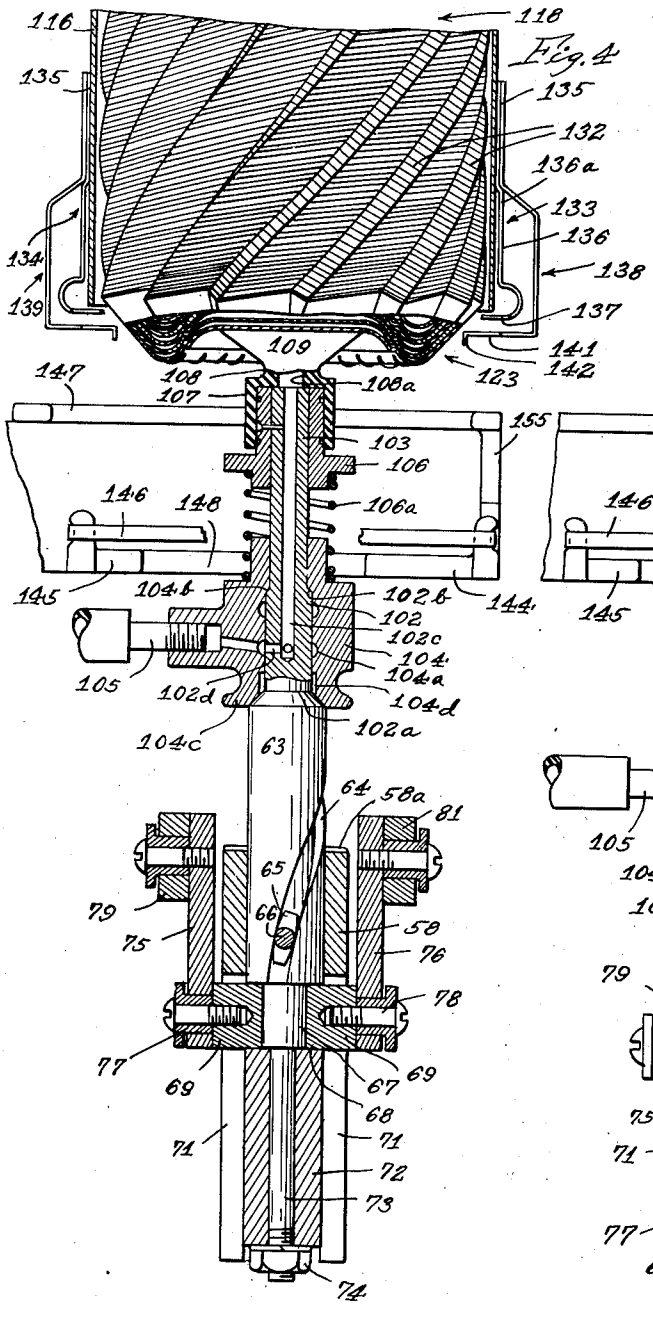
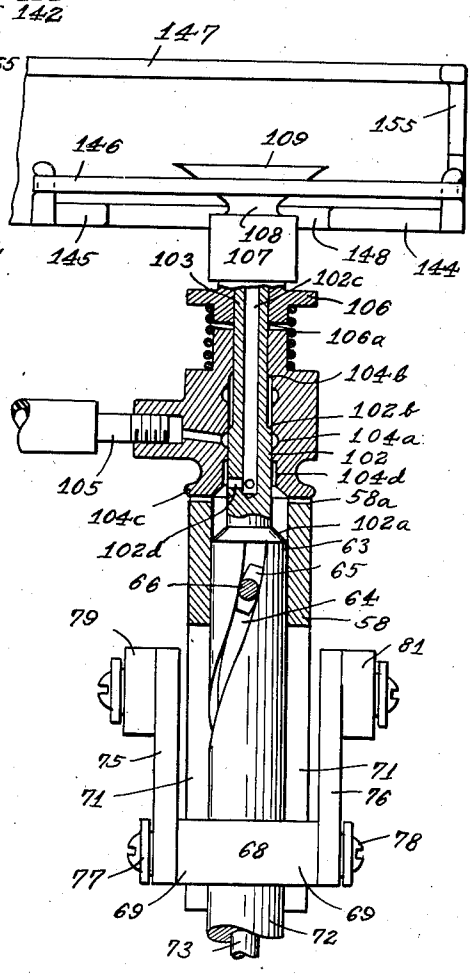


Fig. 5



Inventor:
Rudolph Sonnenberg
By
McCanna, Wintercorn & Morsbach
Attys.

May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 5

Fig. 8

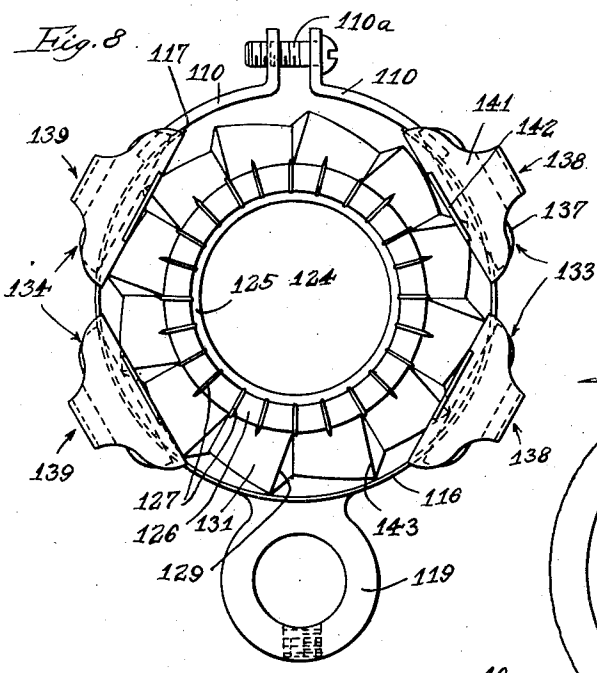


Fig. 7

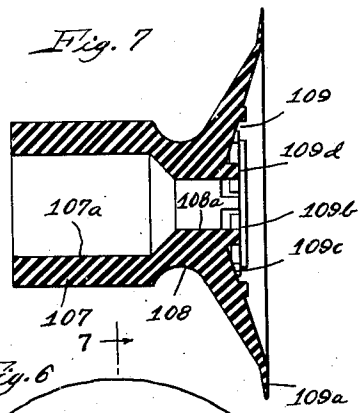


Fig. 6

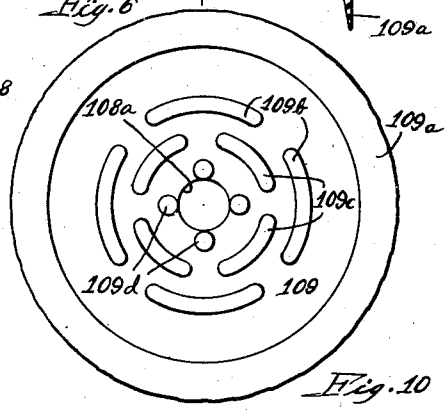


Fig. 9

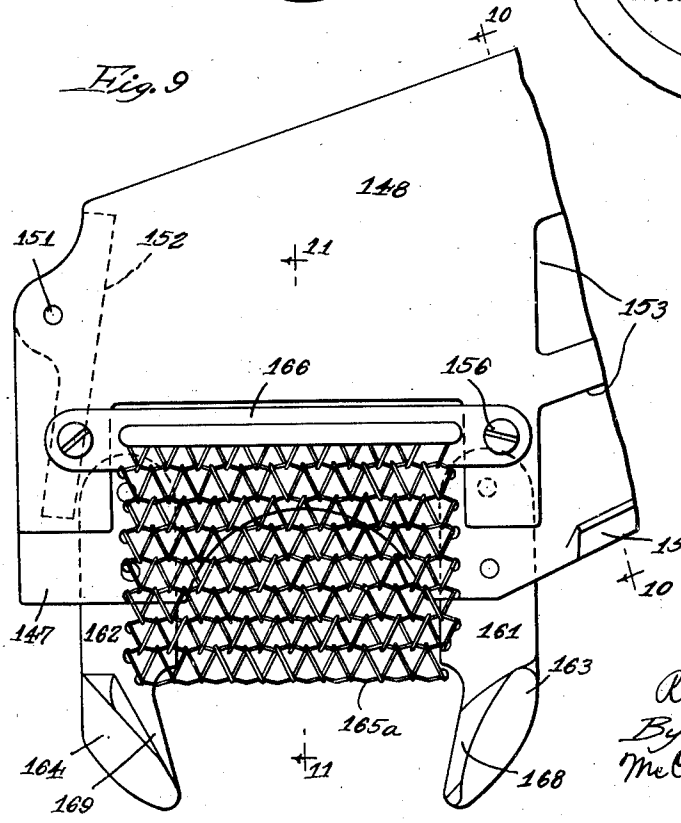
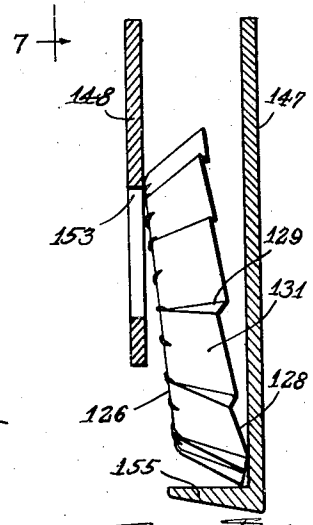


Fig. 10



Inventor:
Rudolph Sonnenberg
By
McCanna Wintercorn
& Morsbach
Attys.

May 23, 1944. R. SONNENBERG 2,349,523

BOTTLE CAP APPLYING DEVICE

Filed July 15, 1941 6 Sheets-Sheet 6

Fig. 11

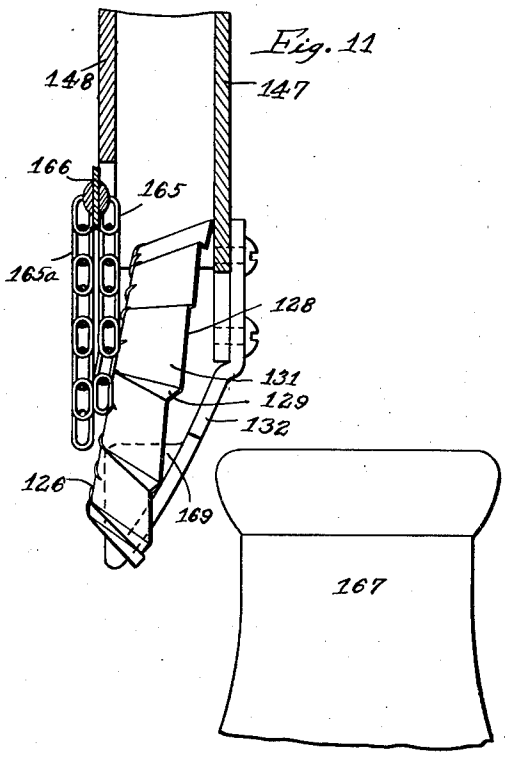


Fig. 12

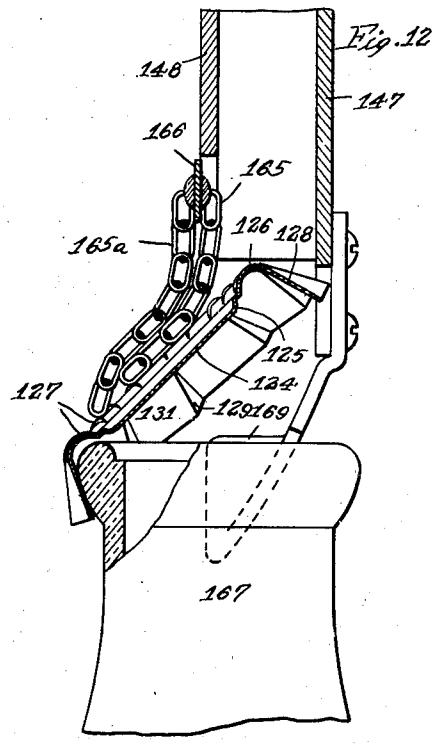
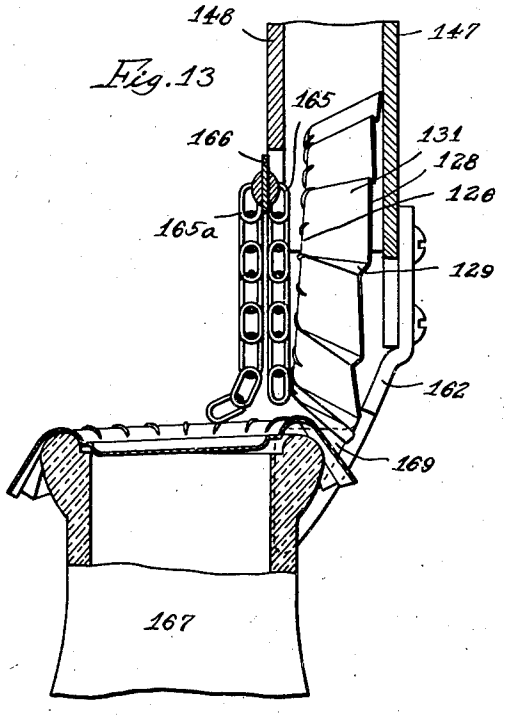


Fig. 13



Inventor:
Rudolph Sonnenberg

By
McCanna, Wintercorn
+ Morsbach
Attys.

Patented May 23, 1944 2,349,523

UNITED STATES PATENT OFFICE

2,349,523

BOTTLE CAP APPLYING DEVICE

Rudolph Sonnenberg, Belvidere, Ill., assignor to Mid-West Bottle Cap Co., Belvidere, Ill., a corporation of Illinois

Application July 15, 1941, Serial No. 402,517

25 Claims. (Cl. 226—88.1)

This invention relates to capping machines for milk bottles and more particularly to a machine for applying hoods or hood caps to milk bottles during the capping operation.

The present invention is directed primarily to cap feeding and positioning mechanism for a capping machine for applying composite paper and metal hood caps to milk bottles, though it will be seen that the invention is not limited to this particular form of cap but is suitable for handling many different types of caps or hood portions of caps. Much difficulty has been experienced in the past in an effort to provide metal hood caps for milk bottles which would meet the necessary trade requirements. In the past, the successful machines have been those in which the cap manufacturing and applying operations are simultaneously conducted in a single machine, the metal being of relatively heavy cross-section. One of the serious obstacles to using metal of lighter cross-section and consequently lesser cost has been in the handling of the thin section metal. I have found that by partially pre-forming the cap in a specified manner and by providing improved handling means for handling the hoods, this thin section metal may be used successfully for milk bottle caps. In this way I have been able to very materially reduce the cost of metal required in the hood, and to eliminate the necessity for forming the hood member as a part of the capping operation.

An important object of the invention is the provision of a cap applying device capable of handling very thin section hoods without distorting the hood during the handling operations and which is more efficient in operation, more positive in its action, more compact and easy to operate, and is capable of applying hoods or caps of different design.

Another object of the invention is the provision of a hood applying device having generally improved means for feeding the hood or cap and for locating the same on the bottle.

I have also aimed to provide a cap applying device having improved cap selecting means for withdrawing pre-formed hood members successively from a hood magazine, improved means for delivering the hoods to a hood applying station, and improved cap applying means.

A still further object of the invention is the provision in a cap applying device of improved means for selecting individual caps or hoods from a stack thereof, and for separating caps which may cling together during the selecting operation.

Another object of the invention is the provision of a cap applying device having improved means for selecting the cap or hood from a magazine in response to bringing a bottle into cap receiving position.

I have also aimed to provide a device of the character described having a novel form of chute for moving the caps from a cap selector to a cap applying position.

A still further object of the invention is the provision in a device of the character described of improved means for supporting a cap in the path of a bottle and for sliding the cap into position on the hood of the bottle in response to movement of the bottle.

Other objects and advantages will appear from the following description and the accompanying drawings, in which—

Figure 1 is a side elevation of a filling and capping machine embodying my invention;

Fig. 2 is a fragmentary view taken substantially on the line 2—2 of Figure 1;

Fig. 3 is a fragmentary front view of the hood feeding mechanism separate from the remainder of the machine;

Fig. 4 is a section on the line 4—4 of Fig. 3 showing the hood selector in projected position;

Fig. 5 is a section on the line 4—4 of Fig. 3 showing the hood selector in retracted position;

Fig. 6 is a face view of the suction cup;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is an elevational view of the end of the cap magazine;

Fig. 9 is a fragmentary side elevation of the cap applying end of the hood chute;

Fig. 10 is a section on the line 10—10 of Fig. 9, and

Figs. 11 through 13 are fragmentary sections along the line 11—11 of Fig. 9 showing selected positions of the bottle in its progress through the cap applying means.

The invention is herein shown as embodied in a filling and capping machine of the so-called rotary type in which the empty bottles are fed into a filling machine, the bottles being filled as they are carried around through a circle on this machine, the filled bottles being discharged at a discharge station adjacent the loading station. Caps are then applied to the bottles and the bottles are discharged to a suitable point for crating. Directing attention first to Figs. 1 and 2, the machine has a main frame 21 which carries a pedestal 22 upon which is mounted a rotary table 23 enclosed by a peripheral guard rail 24 which serves to retain the bottles on the table. The table

rotates from right to left facing Fig. 1 and thus carries empty bottles exemplified by a bottle 25 (Fig. 2) against a star wheel designated generally by the numeral 26. The star wheel 26 is mounted on a vertical shaft and overhangs the table 23 having on its periphery a plurality of notches 28 into which the bottles 25 are carried by the rotation of the table. The star wheel rotates intermittently in a clockwise direction and thus carries the empty bottles 25 in a step fashion to a bottle-receiving station, in this particular instance the star wheel moving through 60° in each operation. This bottle-receiving station is located over a moving platform 32 of a filler which carries a plurality of bottle stools 33 (Figure 1) carried on arms 34, which arms are rotated by mechanism within a housing 35 on the frame 21 to move the stools from a position flush with the platform 32 and an elevated position as shown in Figure 1. The rotation of the star wheel 26 and the platform 32 are so coordinated that a bottle is moved onto successive stools as these stools pass the bottle-receiving station, movement of the bottles being stopped by a ring 36 having fingers 37 against which the bottle abuts in its movement. The ring 36 is arranged for adjustment in its position so as to accommodate the machine for different sizes of bottles. The platform 32 moves continuously in a clockwise direction facing Fig. 2, bringing successive bottles around to a discharge station as indicated in dotted lines at 38 (Fig. 2). During this rotation the stools 33 are raised, causing the mouth of the bottles to engage with filler valves 39 (Figure 1) which act to fill the bottle with milk from a tank 41. As will be seen from Figure 1, the stools 33 are dropped to a position flush with the platform 32 as they approach the discharge station 38. As the stools move into the bottle-receiving station they pass under the star wheel 26 moving the bottle thereon into the discharge station 38 and into one of the recesses 28 of the star wheel, whereby upon rotation of the star wheel to bring an empty bottle into the bottle-receiving station a filled bottle is removed from the bottle discharge station to a bottle-capping station as indicated at 42 (Fig. 2), the bottle remaining stationary in the capping station 42 until the next movement of the star wheel, during which period the cap is seated on the bottle. The next succeeding movement of the star wheel brings the capped bottle back onto the table 23, whereby rotation of the table withdraws the bottle from the recess 28 in the star wheel, thus completing the filling and capping operation.

The capping mechanism is so positioned as to conduct the various operations incident to the capping subsequent to the time the bottle leaves the discharge station 38 and prior to the time it is delivered onto the table 23. This mechanism includes in this instance a pair of spaced upright rods 43 and 44 attached to the frame 21 through sleeves 45 and 46 (Figure 1). The hood feeding and applying mechanism includes a frame comprising a horizontally disposed bar 48 slidably carried on the rods 43 and 44 provided with bosses 49 and 51 (Fig. 2) having openings for the reception of the rods. Integral with the bar 48 is an upright frame portion 52 (Figure 1) having a sleeve portion 53 enclosing the rod 43 to provide additional support for the frame. Attached to the upright 52 adjacent the upper end thereof is a bracket comprising a foot portion 54 attached to the upright by means of cap screws 55 and including a side member 56. At the side member is a plate 57 carrying on its upper edge an inclined cylinder member 58 forming part of the hood selecting mechanism. The plate 57 has a depending bearing sleeve 59 forming a bearing for a shaft 61. Positioned within the cylinder member 58 is a piston 63 having a helical slot 64 therein within which is positioned a follower 65 carried on a pin 66 positioned in the wall of the cylinder (Fig. 3). The piston 63 is of slightly lesser length than the cylinder and has a portion 67 of reduced diameter for the reception of a collar 68, the collar having laterally disposed arms 69 which project through slots 71 on opposite sides of the cylinder 58, the arms 69 thus serving as guides for the piston. The collar 68 is secured in place by a sleeve 72 enclosing a portion 73 of the piston of still smaller diameter by means of a nut 74 threaded onto the threaded end of the portion 73. The sleeve 72 has the same outer diameter as the piston 63 and serves to guide the piston in the cylinder when the arms occupy a position toward the inner ends of the slots 71.

The arms 69 also serve to move the piston longitudinally and are pivotally secured to links 75 and 76 by means of thimbles and screws 77 and 78, the links in turn being pivotally secured to crank arms 79 and 81 fixed to opposite ends of the shaft 61, the crank arm 81 having a depending portion 82 through which the shaft 61 and the crank arms are reciprocated to move the piston 63 between the extreme positions shown in Figs. 4 and 5.

The crank arms are reciprocated by an arm 84, one end of which is pivotally connected to the portion 82 by a clevis 85 and the other end of which is pivotally secured to a lever arm 86 pinned to a vertically disposed shaft 87, which shaft is rotatable in the end of a bracket 88, the opposite end of the bracket being fixedly secured to the upright frame portion 52 as indicated at 89, Figs. 2 and 3. Pinned to the shaft 87 below the arm 88 is a collar 91 having cam faces 92 on its lower side adapted to engage complemental cam faces on the hub portion 93*a* of a wheel arm 93 which projects laterally outward to pivotally support a driving wheel 94 in the path of the bottles on the stools 33, as shown in Fig. 2. The hub portion 93*a* is rotatable on the shaft, and the cam faces thereof are urged into engagement with the cam faces 92 by means of a spring 95, one end of which bears against the lower side of the hub portion 93*a* and the opposite end of which bears against a nut 96 positioned on the lower end of the shaft 87 and secured in place by a knurled lock nut 96*a*. A spring 97 acts between a projecting nib 97*a* on the bracket 88 and a pin 97*b* on the collar 91, tending to urge the shaft 87 in a clockwise direction facing Figure 1, that is, into the path of the bottles. Stops are provided for limiting the rotation of the shaft 87 and of the arm 86 comprising ears 98 projecting upwardly from the bracket 88 within which ears, screws 98*a* and 98*b* are disposed for engagement with the lever arm 86 to limit its travel in one direction under the influence of the spring 97 and in the opposite direction in response to rotation of the wheel arm 93 by action of the bottles. It will be seen that as the bottles move forward on the stools 33 they engage the wheel 94 which rides outwardly therealong, causing rotation of the arm 93 and through the cams 92, causing rotation of the lever arm 86 bringing the same against the stop 98*b*. Further travel of the wheel 94 in a counterclockwise direction

causes the hub portion 93 to rotate with respect to the shaft, the cam portions 92 causing the lever to be moved downward against the compression of the spring 95, and in this manner permitting a certain amount of over-travel to accommodate for variations in the sizes of the bottles.

It will thus be seen that as the bottles pass the wheel 94, movement of the wheel brings about reciprocation of the arm 84 and consequently reciprocation of the piston 63 between the positions shown in Figs. 4 and 5. This reciprocation of the piston acts to remove successive hoods from a hood magazine and deposit the same in a chute, as will presently be described. It will be seen that the power for operating the piston is provided solely by the movement of a bottle past the wheel 94 and into position to receive the hood, and that in the absence of a bottle thereon, no hood will be deposited in response to the passage of a stool past the wheel.

Referring now to the hood selecting mechanism of Figs. 4 and 5, the piston 63 has a valve portion 102 joined to the piston portion by a shoulder 102a and to a portion 103 of reduced diameter providing a shoulder 102b, the shoulders 102a and 102b providing valve seats as will presently be described. Seated on the valve portion 102 is a valve body 104 having a central bore for the reception of the valve portion 102, the bore being provided with a peripheral groove 104a communicating with a tube 105, which tube communicates with a source of reduced pressure comprising a vacuum pump supported in the base of the machine as indicated at 105a (Figure 1). The portions 102 and 103 are provided with a central bore 102c having a hole 102d through the walls thereof, so positioned that in the projected position of the piston 63, the hole 102d will communicate with the annular groove 104a to permit air to be drawn through the bore 102c and into the tube 105. In this position of the piston the shoulder 102b engages a shoulder 104b of the valve body to seal the forward end thereof, and likewise the shoulder 102a engages a flange 104c of the valve body to seal the rear end thereof. Seated on the front end of the reduced portion 103 is a flanged sleeve 106 against which a spring 106a bears, the opposite end thereof bearing against the valve body 104 to normally urge the same downward facing Figs. 4 and 5. Seated on the end of the sleeve 106 is a suction cup best shown in Figs. 6 and 7. The valve body 104 is provided adjacent the flanged end 104c with a counterbore 104d so arranged that when the piston 63 occupies its retracted position as shown in Fig. 5, the holes 102d will communicate with this counterbore. The end of the cylinder 58 is provided with a plurality of slots 58a extending transversely thereto to provide communication into the cylinder 58 when the piston 63 occupies its retracted position.

It will be seen that the movement of the piston 63 is such that prior to the end of its return movement the flange 104c engages the end of the cylinder 58, stopping the movement of the valve, continued movement compressing the spring 106a and allowing relative movement between the valve portion 102 and the body 104, causing the holes 102d to move out of registration with the groove 104a and into registration with the counterbore 104d. This operation cuts off communication between the tube 105 and the suction cup, and also causes the air pressure within the bore 102c to return to normal, air entering through the slots 58a and the counterbore 104d and the holes 102d.

Referring now more particularly to Figs. 6 and 7, the suction cup includes a base portion 107 having a bore 107a for the reception of the sleeve 106, a portion of reduced diameter 108 having a bore 108a for the passage of air and a bell designated generally by the numeral 109 into which the bore 108a opens. For the purpose at hand, the shape of the bell is material, and it will be seen that the walls thereof taper outwardly at an angle approaching 45° and terminate in a coplanar edge 109a, this being a feather edge. Within the bell and slightly behind the plane of the feather edge 109a are a plurality of upstanding projections in the form of interrupted concentric rings as shown at 109b and 109c. Directly adjacent the end of the bore 108a is a plurality of buttons 109d. The purpose of these projections within the bell of the cup is to provide an abutment against which the mouth-spanning portion of the cap may seat to prevent the cap from being drawn into the cup to an excessive degree under the reduced pressure transmitted from the tube 105. The feather edge acts to permit the edge of the cup to flow over creases and small indentations in the metal of the hood so as to closely conform thereto and prevent the entry of air along the side of such creases or ribs. The cup is formed of soft flexible rubber, and the neck portion 108 of reduced diameter permits the bell of the cup to adjust itself to different angularities so that the mouth-spanning portion of the hood need not be at a plane directly parallel to the plane of the feather edge in order to cause the same to be gripped by the cup.

Directing attention now more particularly to the hood magazine best shown in Figs. 1, 3, 4 and 6, the magazine includes a tubular container designated generally by the numeral 116, having a slot 117 along its upper side for observation of the contents and shaped to fit a stack of hoods 118. The diameter of the magazine can be adjusted by means of straps 110 attached thereto at opposite sides of the slot and having a screw 110a acting therebetween. The magazine is located at an angle with respect to the horizontal to cause the stack of hoods to feed forward but the angle should be close to the minimum required for this purpose in order to maintain at a minimum the weight which the retaining fingers must sustain. The magazine has a sleeve 119 receiving a rod 121 supported from the side member 56 by means of screws 122, as will presently be more fully described. The sleeve 119 has a set screw or other means by which its location on the rod 121 can be varied for adjustment purposes. The magazine is supported in an inclined position, the longitudinal center line thereof approximately coinciding with the center line of the cylinder 58 and piston 63, and being spaced therefrom a distance such that the lowermost hood 123 of the stack projecting from the end of the magazine will rest in spaced relation to the suction cup when the latter occupies its retracted position as shown in Fig. 3, and such that the distance therebetween will be slightly less than the stroke of the piston 63.

Positioned in the magazine is a stack of hoods such as shown and described in detail in my copending application Serial No. 343,407, filed July 1, 1940, entitled "Bottle cap and method for making the same," each of which hoods has a depressed mouth-spanning portion 124 provided with an annular shoulder 125, a rim 126 having

spaced transversely disposed ribs 127 and a marginal skirt 128 provided with circumferentially arranged pleats, each having a narrow side 129 and a wide side 131 in a formation somewhat analogous to an oblique echelon. When these hoods are stacked in nesting relationship, each hood is turned a distance equal to the thickness of the metal so that the pleats progress helically around the stack as shown at 132. Positioned on the outer surface of the magazine are inner hood fingers, (Figs. 3, 4 and 8), two of which are positioned on each side of the tube as shown at 133 and 134, each of these fingers being attached to the side of the tube adjacent the lower end thereof and being formed of spring material provided with a pad 135 for attachment to the tube, a portion 136 (Fig. 4) in spaced relation to the tube, a portion 136a of smaller cross-section located adjacent the pad to provide resilience in the fingers, and an inturned end portion 137 adapted to bear against the skirt of the foremost hood adjacent its periphery for the purpose of retaining the stack in the magazine. Superimposed upon the fingers 133 and 134 are outer fingers 138 and 139 of similar shape, each having an inturned end 141 provided with an upturned edge 142 adapted to bear against the skirt of the foremost hood in spaced relation to the fingers 133 and 134. The function of the fingers 133, 134, 138 and 139 is to insure the feeding of a single hood from the stack at each operation of the piston 63. It will be understood that the hoods are formed of light weight metal, such, for example, as aluminum of a thickness in the region of about .001 or .002 of an inch. While this metal is very flexible to the production of bends of fairly long curvature, it has considerably more resistance to bending through short curvatures, the result being that if the edges of the skirt become slightly bent through a portion of the stack, they offer a substantial resistance to the separation of the individual hoods therefrom. Under normal conditions the fingers 133 and 134 are adequate to hold the stack and permit withdrawal of but a single hood, but by utilizing the succession of fingers as herein shown, exceedingly positive operation is obtained and even hoods having badly interlocked skirts are automatically separated in the feeding operation.

The space relation between the suction cup and the forward end of the cap stack is such that a short distance before the end of its projective movement the suction cup engages against the central mouth-spanning portion 124 of the lower hood. Continued movement of the cup causes the entire stack of hoods to be lifted in the magazine until the foremost hood is free of the fingers, this lifting being accompanied by a rotary motion of the suction cup caused by the groove 64 and follower 65. This rotation tends to bring the skirt portions 129 of successive hoods of the stack into contact to cause a slight rotation of the stack. Upon reaching the end of its projected movement the suction cup starts its return movement, reversing the direction of rotation and simultaneously tending to pull the foremost hood away from the stack. This causes the sloping or cammed portions 131 of the skirt of the first cap to have a cam movement against the similar part of the second hood, tending to separate the hoods. This cam movement not only forces the foremost hood outward away from the stack, but offsets the ridges 143 (Fig. 8) of the foremost hood from the helically disposed ridge of the stack, thereby releasing the fingers from the foremost hood. If the edges of the hoods are badly interlocked, two or more hoods may pass by the inner fingers 133 and 134, but will be retained by the outer fingers 138 and 139 so as to cause but a single hood to be withdrawn from the magazine. As the piston 63 and suction cup reach their retracted position, the pressure within the suction cup becomes normal and the hood is allowed to fall away. This is facilitated by spaced upright arms 144 and 145 extending upwardly on opposite sides of the suction cup, as best shown in Figs. 3 and 4. The upper ends of the arms may be connected by a rubber band 146 or other means, the arms and band being positioned to be engaged by the rim of the hood when the suction cup moves to its retracted position as shown in Fig. 5 to positively move the hood away from the cup and allow it to drop freely into a hood chute.

The hood chute best shown in Figs. 2, 3, 8 and 9 is, in this instance, formed of two castings, though obviously it can be fabricated in other ways, designated generally by the numerals 147 and 148 secured together and to the side member 56 by means of cap screws 149 and secured together by means of screws 151 and spacers 152. Openings such as that shown at 153 are provided for viewing the contents of the chute. The receiving end of the chute is in part closed by end ribs 154 which act to space the two portions of the chute and to guide the hood downward. The chute portion 147 has a lower inwardly directed flange 155 against which the edge of the hood skirt rests and over which the cap rolls from the upper to the lower end thereof. The chute is curved from end to end as best shown in Fig. 3 in order to bring about a compact space relationship between the parts of the filler and capper and in order to permit the hood magazine to be conveniently positioned at the front side of the machine and yet deliver the hood to the relatively limited area in which it is applied to the bottle. Furthermore, the chute has a very decided slope, the slope being sufficient to cause the hoods to roll down the flange 155.

When the hoods are released from the suction cup, they drop down onto the flange 155 at the upper end of the chute and roll down to the hood-applying end of the chute shown in Figs. 9 and 11 to 13 to be held in the path of the bottle as it moves from the bottle discharge position 38 to the cap seating station 42 (Fig. 2). Positioned on the chute member 147 and depending therefrom are arms 161 and 162 carrying projections 163 and 164 extending inward into the path of the hood and converging downwardly, the space therebetween being slightly less than the diameter of the hood, whereby when the hood rolls off the end of the flange 155, it is received and cradled between the projections 163 and 154 as shown in Figs. 2 and 11. A pair of chain fabric applicators or similar flexible elements 165 and 165a are fastened at their upper edges against the chute member 148 by means of a bar 166 and depends downwardly across the hood positioned on the projections 163 and 164, as shown in Fig. 11, the applicators being soldered to the bar 166 which in turn is attached to the chute member by screws 156. It will be seen that the applicator 165a is slightly longer than applicator 165

to facilitate the hood-applying operation, as will presently appear.

In this manner successive hoods are suspended in the path of the head of a milk bottle moving from the discharge station as indicated at 38 toward the capping station as indicated at 42 (Fig. 2), the elevation of the chute being such as to bring the bottle and the hood through the successive positions shown in Figs. 11 to 13 as the bottle is moved forward by the star wheel 26. Thus, when the bottle to which the hood is to be applied, herein designated by the numeral 167, moves toward the left facing Figs. 11 to 13, the forward edge of the bottle bead engages against the skirt of the hood as shown in Fig. 12, causing the hood to be tilted as shown in this figure from the position of Fig. 11 to that of Fig. 12 against the weight of the applicators 165 and 165a. Simultaneously with this movement of the bottle, the edge of the hood is caused to move with the bottle and to slide off supporting surfaces 168 and 169 on the projections 163 and 164, the trailing edge of the hood dropping down against the upper ends of the arms 161 and 162 as shown in Fig. 12. Continued movement of the bottle causes the trailing edge to slide down along the arms, the weight of the applicators facilitating this movement and preventing lateral tilting movement of the hood, the parts eventually reaching the position shown in Fig. 13 in which the applicator 165 falls free of the hood being seated on the bottle 167 and thus falls back to retain a succeeding hood from disturbing the position of the hood under process of being seated. The lower end of the applicator 165a remains in contact with the hood until completely seated and aligned on the hood of the bottle as shown in Fig. 13. It will be seen that the applicators and the depressed mouth-spanning portion 124 of the hood, together with the shoulder 125, function during this wiping operation to center the hood onto the bottle by seating into the mouth of the bottle in concentric relation therewith.

Operation

In operation, the empty bottles are placed on the disk 23 from which they are carried into the star wheel 26 which serves to move them in a step by step fashion onto successive stools 33. As the stools pass around on the platform 32 the bottles are raised and wedged against the filling valves 39. During the filling operation the bottles are carried around and into contact with the actuating wheel 89. At this point the bottle is tightly held between the stool and the valve and by engagement with the wheel 89 causes the wheel to move outward carrying the lever 88 and associated parts, thus rotating the arm 84 to move the piston 63 into the position shown in Fig. 4. As the wheel returns to the position shown in Fig. 2, the piston 63 returns to its retracted position shown in Fig. 5, drawing the foremost hood of the stack through the fingers at the end of the magazine. As the suction cup carrying the hood reaches the position shown in Fig. 5 the pressure in the suction cup returns to normal and simultaneously the rim of the hood engages the fingers 144 and 145 or the band 146, allowing the hood to drop into the upper end of the chute from which it rolls down into the position shown in Figs. 3 and 8. During this operation the bottle 167 has been carried forward on the stool to the bottle discharge position 38 and is then received in the star wheel 26 and carried through the hood-applying position shown in Figs. 10 and 11. In this position the forward edge of the bottle engages beneath the rim 127 of the hood and, by contact with the skirt of the cap, draws the cap forward and downward as shown in Fig. 11, the chain 165 providing a uniform and flexible pressure on the top of the hood to cause it to move into seated position on the head of the bottle under the guidance of the under surface of the annular shoulder 125. The bottle continues its movement uninterrupted until it reaches the cap seating station 42, which represents one of the dwell positions in the intermittent movement of the star wheel.

When the bottle carrying the hood comes to rest at the cap seating station, a cap seating mechanism indicated generally by the numeral 171 functions to supply a cap disk to the top of the hood from a cap disk magazine 172 and to force the cap disk into the mouth of the bottle on top of the mouth-spanning portion 124 of the hood and to compress the skirt of the hood around the bead of the bottle in the manner described in my aforesaid application, so as to produce a hood cap as shown at 173 (Figure 1) to seal the bottle.

While I have thus described and illustrated a specific embodiment of the invention this has been by way of illustration and not limitation, and I do not wish to be limited except as required by the scope of the appended claims, in which—

I claim:

1. The combination in a bottle capper of means for moving a bottle through a succession of positions into a bottle capping station, a hood magazine for holding a stack of hoods, driving means disposed in the path of said bottle during movement thereof to be moved thereby through an operating stroke, means for securing the bottle against lateral displacement while engaged by said driving means, and a suction cup movable by the last mentioned means toward and away from said magazine to remove the end cap of said stack from said magazine for application to said bottle.

2. The combination recited in claim 1 wherein said driving means comprises a wheel of a diameter in the region of that of the bottle neck positioned to be moved laterally outward by contact with the bottle.

3. The combination recited in claim 1 wherein said driving means comprises a wheel positioned to contact the neck portion of the bottle and be moved laterally outward thereby, lever means disposed between the wheel and the suction cup for driving the latter, and overtravel means for operating said suction cup through a uniform stroke with different sizes of bottles.

4. The combination in a bottle capper of means for moving bottles in succession into a cap seating station, and hood applying means for applying hoods to said bottles during said movement comprising depending fingers having projections disposed in the direction of travel of said bottles for holding a hood in edgewise position with the bottom of the hood facing the bottle and the lower edge of said hood in the path of travel of the head of said bottles, said fingers being spaced for the passage of the head of a bottle therebetween, whereby the head of the bottle in its forward progress slides the hood off said projections, and a flexible curtain applicator dis-

posed to engage the top side of said hood to drag thereover with forward progress of the bottle to wipe the hood onto the head of the bottle.

5. The combination recited in claim 4 wherein said curtain applicator comprises a flexible chain fabric.

6. The combination in a bottle capper of means for moving bottles forward in succession to a cap seating station and hood applying means for applying hoods to said bottles during said movement comprising a stationary cap chute having spaced upright walls for guiding a hood in its passage therebetween under gravity and a bottom opening, said bottom opening being disposed across the path of travel of bottles, depending fingers on the leading wall having projections disposed across said opening and in spaced relation thereto in the direction of travel of said bottles for holding a hood in said opening in edgewise position with the bottom of the hood facing the bottle and the lower edge of said hood in the path of travel of the head of said bottles, said fingers being spaced for the passage of the head of a bottle therebetween, whereby the head of the bottle in its forward progress slides the hood off said projections, and a flexible curtain of chain fabric attached to and depending from the trailing wall of said chute disposed to engage the top side of said hood to wipe the hood onto the head of the bottle with forward progress thereof.

7. The combination in a hood feeding mechanism of a hood magazine having an open end shaped to snugly receive a stack of nested hoods in inverted position with the top thereof disposed at said open end, and cap selector means reciprocable toward and away from said open end to remove the endmost hood, said magazine including means for retaining the stack in said magazine for the withdrawal of a single cap comprising a plurality of pairs of primary and secondary fingers spaced circumferentially of said magazine and on the outside thereof, each including a portion attached to said magazine at a point spaced from the open end thereof, a resilient portion adjacent said attached portion, a portion extending beyond said open end, and an inturned end portion adapted to engage said stack adjacent the periphery thereof, the inturned ends of the secondary fingers projecting inwardly toward the center of the cap to a greater extent than the primary fingers and being spaced from said opening a distance greater than said primary fingers.

8. The combination recited in claim 7 wherein said secondary fingers are superimposed on said primary fingers with the attaching portions thereof in face contact and the remaining portions thereof in spaced relation.

9. The combination in a hood feeding mechanism of a hood magazine having an open end for holding a stack of skirted hoods in nested relationship, a hood selector movable axially toward said stack in approach movement to engage the foremost hood and to lift said stack with respect to said magazine and in return movement to remove the foremost hood from the stack through said open end, means to rotate said selector in one direction during said approach movement and to rotate the same in the opposite direction upon return movement to separate the foremost hood from the stack.

10. The combination recited in claim 9 wherein said magazine has primary and secondary resilient fingers projecting inwardly across the open end of the magazine to support the stack of hoods, the secondary fingers being spaced from the end of the magazine a distance greater than the primary fingers to prevent withdrawal of more than a single hood upon each return movement of the hood selector.

11. The combination recited in claim 9 wherein the skirts of said hoods are provided with pleats each having an arcuate side and a sharply inclined side in nested relation and said rotating means turns said hoods to bring said sharply inclined sides together during approach movement and said arcuate sides together during return movement to cam the foremost cap away from the stack and separate the same for removal from the magazine.

12. The combination recited in claim 9 wherein said hood selector includes a suction cup positioned to engage said cap, a source of reduced air pressure, and valve means for connecting said source of reduced pressure to said cup during approach movement of said hood selector to hold the hood against the cup and for disconnecting said source and admitting air during return movement to release said cap.

13. The combination in a hood feeding mechanism of a hood magazine containing a stack of hoods and a hood selector mechanism comprising a cylinder, a piston in said cylinder, means for projecting said piston longitudinally in said cylinder from a retracted to an advanced hood engaging position and return, and means acting between said cylinder and said piston for rotating said piston in opposite directions during said projecting and return strokes.

14. The combination recited in claim 13 wherein said piston has a stem on the end thereof adjacent said magazine, a suction cup positioned on the end of said stem for engaging said stack, and a valve body connected with a source of reduced air pressure movable with said stem and slidable thereon to establish communication between said cup and said source of reduced pressure in response to movement of the piston to the projected position and to establish communication with the atmosphere in response to return movement of said piston.

15. The combination in a hood feeding mechanism of a hood magazine for holding a stack of nested hoods of thin flexible and smooth metal, and a hood selector movable into and out of engagement with the foremost hood of said stack to remove successive hoods from said magazine, said hood selector comprising a suction cup of soft rubber having a bell positioned to seat against said hood said bell having a laterally disposed flange of thin cross-section and substantial width at the periphery thereof providing a substantially flat hood-engaging face, and means for partially evacuating the air from within said bell, said bell having an edge extending transversely to the axis of the bell to provide a flat face to contact the hood, said edge terminating in a thin, very flexible edge to closely conform to the surface of said hood in response to said partial evacuation to tightly hold the hood to said cup.

16. The combination recited in claim 15 wherein said bell has a plurality of annular ribs on its inner surface extending to a plane parallel and closely adjacent that of said edge to support the hood in the space within the periphery of said bell and prevent permanent distortion thereof under action of the reduced pressure in said bell.

17. A suction cup for hood feeding mechanism

to feed hoods of thin easily distortable sheet material comprising a body of soft pliable rubber having an attaching sleeve, and a bell having an air inlet opening, said bell having a wide coplanar feather edge to closely fit the surface contour of stock against which the bell may be seated, and a plurality of annular ribs and projections interiorly thereof of lesser height than the depth of the bell and extending to a plane closely spaced to that of said feather edge to support said stock between the edges of the bell and prevent permanent distortion thereof under reduced pressure in said bell.

18. The combination with a filler and capper having a bottle transport and bottle filling means for gripping a bottle therebetween during filling, of a hood feeding mechanism comprising a hood magazine for holding a stack of hoods, driving means disposed in the path of a bottle on said transport to be moved by the bottle through an operating stroke, and a cap selector movable by the last mentioned means toward and away from said magazine to remove the end cap of said stack from said magazine for application to said bottle.

19. The combination in a cap feeding mechanism of a magazine for holding a stack of cap elements, a cap selector for removing individual elements from said magazine in succession, and means for actuating said cap selector comprising a wheel normally located in the path of a bottle moving to receive said cap, means for supporting said wheel for displacement thereof in response to passage of the bottle, and mechanical linkage for driving said cap selector in response to said displacement, said linkage including overtravel means for use of a selected portion of said displacement to drive said cap selector.

20. The combination recited in claim 19 wherein said mechanical linkage includes a rotatable shaft connected to said cap selector, a lever on said shaft for supporting said wheel, a stop for limiting the rotation of said shaft and a spring clutch disposed between said arm and said shaft.

21. The combination recited in claim 4 wherein said applicator comprises a plurality of parallelly disposed flexible curtains suspended in a position approaching parallel relation to said hood, one of said curtains being shorter than the other to swing free of the hood prior to the other and return to a vertical position to retain the next succeeding hood on said fingers.

22. The combination recited in claim 9 including means for removing said hood from the cap selector at the end of said return movement.

23. The combination recited in claim 9 including a flexible element positined to engage said hood near the end of said return movement to cause said hood to be released from said cap selector.

24. The combination recited in claim 13 wherein said piston has a stem on the end thereof adjacent said magazine, a suction cup positioned on said stem for engaging said stack, said stem having spaced valve seats and channels for the passage of air to and from said cup, a valve body having air passages connected with a source of reduced air pressure, said body being movable with said stem and slidable thereon, spring means for urging said body on said stem against said valve seats upon movement of the piston to projected position to establish communication between said cup and said source of reduced air pressure, and means for moving said body on said stem away from said valve seats in response to return movement of said piston to establish communication with the atmosphere.

25. The combination recited in claim 7 wherein means is provided for varying the size of the open end of said hood magazine to shift said fingers and thereby control the delivery characteristics thereof.

RUDOLPH SONNENBERG.