Feb. 18, 1947. C. W. GOODWIN 2,416,001

BOTTLE CAPPING HEAD

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Fig. 1.

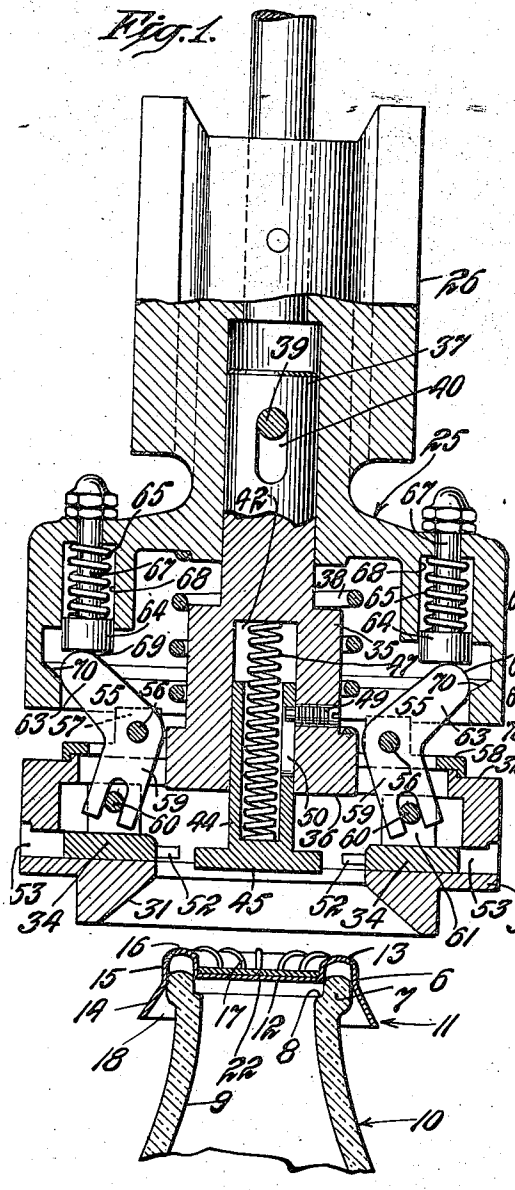
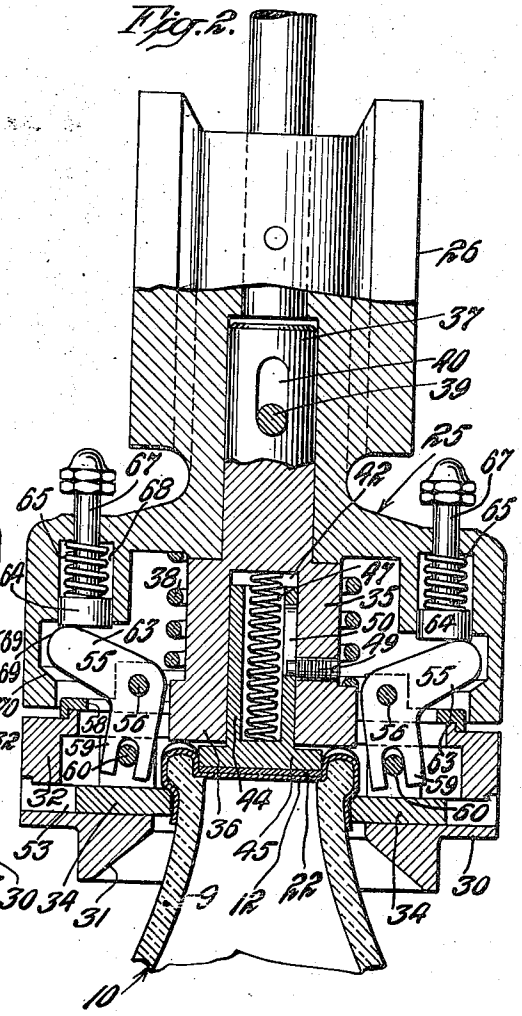


Fig. 2.



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BOTTLE CAPPING HEAD

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4 Claims. (Cl. 226—86)

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This invention relates to machines for fastening and sealing flexible skirted hood caps over the mouths of containers such as milk bottles.

An object of the invention is to provide a new and improved container capping machine of the general type referred to.

Another object is to provide a capping head having means for centering a flexible hood cap on the mouth of a bottle, contracting the skirt portion of the cap around the head of the bottle with the application of a high contracting pressure thereto, and then positively releasing the cap from engagement with the centering means at the conclusion of the capping operation.

Still another object is to provide a capping head of the foregoing type having novel and improved details of construction and features of operation.

Various other objects and advantages will appear as the nature of the invention is more fully disclosed.

In accordance with the present invention I provide means in the capping head to first seat the cap on the internal ledge of the bottle, then fold the sheet downwardly and apply sealing pressure thereto. In this way the inside cap diaphragm and the pouring lip housing are positioned before the skirt is folded and are held in position while the folding and sealing take place. The proper positioning of the cap without tearing is thus facilitated.

Although the novel features which are characteristic of this invention are set forth more in detail in the claims appended hereto, the nature and scope of the invention may be better understood by referring to the following description, taken in connection with the accompanying drawing forming a part thereof, in which a specific embodiment has been set forth for purposes of illustration.

In the drawing:

Fig. 1 is a vertical sectional view of a capping head embodying the invention, showing the parts in initial position ready to receive a bottle for cap sealing operations; and

Fig. 2 is a similar view showing the head during the final sealing operation.

In the following description certain specific terms are used for convenience in referring to the various details of the invention. These terms, however, are to be interpreted as broadly as the state of the art will permit.

The capping head of the present invention is of the general type disclosed in my Patent No. 2,325,160, issued July 27, 1943, and is designed to seal a hood cap 11 onto a milk bottle 10 or other

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similar container having a central bore 9, an internal closure receiving ledge 8, a pouring lip 7 and an outer head 6 around the bottle mouth.

The hood cap 11 may be shaped from a circular blank of flexible sheet material such as paper, having form sustaining rigidity to permit shaping, and may be preformed in a manner disclosed and claimed in Patent No. 2,353,879, dated July 18, 1944, to Clark and Vore, for Bottle cap and method of making the same. Said patent discloses a preformed cap having a depressed central bore-closing diaphragm 12, adapted to enter snugly into the mouth of the bottle 10, and to seat on the internal ledge 8 thereof, an annular pouring lip housing 13 of channel shaped cross-section adapted to extend over the pouring lip 7, and an outwardly extending, fluted skirt 14 adapted to be contracted around the head 6.

The housing 13 is shown provided with inner and outer substantially parallel walls 15 and a top wall 16 bridging said parallel walls and having raised radial ribs 17.

The skirt 14 is dished downwardly and is provided with pairs of crease or fold lines 18 diverging radially outwardly from the pouring lip housing 13. The crease lines 18 of each pair are scored for folding in opposite directions, so that when the skirt 14 is contracted downwardly and inwardly on the bottle, the surplus material of said skirt is folded along said crease lines into predetermined triangular pleats. A disc 22 may be fixedly seated on the diaphragm 12 to bear the necessary printing, to reinforce said diaphragm, and to exert seating pressure against the internal wall of the bottle. The cap may be coated in whole or in part with a suitable adhesive, such as a thermoplastic adhesive or a solvent softening adhesive, or may carry a thermoplastic binder capable of setting to form a rigid cap when cold.

The capping head embodying the present invention comprises a bell-shaped housing 25, integral with or otherwise secured to the lower end of a crosshead 26, which may be secured in a handle for manual operation or may be slidably mounted in the turret (not shown) of a standard capping machine.

A forming ring 30 having a downwardly flaring opening 31 to receive the bottle neck with attached hood cap is secured to a ring frame 32 by any suitable means, and forms therewith a housing for a plurality of clamping jaws 34. A cylindrical plunger 35, integral with or otherwise fixed to the ring frame 32, is formed with a lower cylindrical section 36 adapted to engage the top wall 16 of the cap 11 during the capping opera-

tion, as hereinafter described. The plunger 35 is carried by an arbor 37 slidably mounted in the housing 25. The lower cylindrical section 36 of plunger 35 forms an abutment for the lower end of a coil spring 38 encircling said plunger and seated against the top wall of the housing 25. A pin 39 secured diametrically to the crosshead 26 extends through a vertically elongated guide slot 40 in the arbor 37 to limit the movement of plunger 35.

Within the central vertical bore 42 of cylindrical plunger 35 is a hollow slidable plunger 44 having a lower disc-shaped head 45 which is adapted to extend snugly into the mouth of the bottle for seating the diaphragm 12 of the cap 11 on the ledge 8 of the bottle. A coil spring 47 within the plunger 44 has its lower end seated against the plunger head 45 and its upper end engaging the top of the vertical bore 42 of cylindrical plunger 35. A set screw 49 secured diametrically to the plunger 35 extends through a vertically elongated guide slot 50 in the plunger 44 to limit the movement of said plunger 44.

The clamping jaws 34 are slidably seated on the forming ring 30 and are disposed in the hollow of the ring frame 32. These clamping jaws 34 are segmental in shape and conjointly form a ring adapted to encircle the cap skirt 14, as disclosed in my above-mentioned Patent No. 2,325,160. The inner peripheral sections of these jaws 34 may be provided with teeth 52 to compress and concentrate the sealing pressure on the corresponding portions of the overlapping layers of the cap pleats during sealing. The clamping jaws 34 are relatively and independently slidable into pressing engagement with the cap skirt 14, each clamping jaw being slidable radially toward and away from the bottle neck in a radial recess 53 on the upper face of the forming ring 30.

The clamping jaws 34 are moved radially in or out by the reciprocating movement of the ring frame 32 in the housing 25. For that purpose there are provided a plurality of bell cranks 55, each pivotally supported on a pin 56 between a corresponding pair of opposed brackets 57 which are integral or otherwise rigid with a ring 58 fixedly seated in the ring frame 32. One arm 59 of each crank 55 passes downwardly through openings in the rings 32 and 58, and is bifurcated to loosely receive a pin 60 extending between a pair of upstanding parallel brackets 61 integral or otherwise rigid with the corresponding clamping jaw 34. The other arm 63 of each crank 55 extends obliquely upward, and during certain phases of the sealing operation is engaged by a plunger 64 which is slidably mounted in the housing 25 and is urged into downward position by a spring 65 encircling a spindle 67 of said plunger and seated in a recess 68 in said housing. The outer edges 69 of the crank arms 63 are curved as shown to permit free sliding movement of said edges along their respective plungers 64 as the ring frame 32 is moved upwardly. The housing 25 is provided with an annular flange 70 adapted to engage the arms 63 for retracting the same.

In the capping operation the preformed hood cap 11 is applied to the head of the bottle 10 as shown in Fig. 1, with its pouring lip housing 13 in alignment with the pouring lip 7 of the bottle and with the diaphragm section 12 in position to be seated on the internal ledge 8 of said bottle. If this cap carries a thermoplastic binder or adhesive, the cap is heated either before or after it is applied to the bottle head by suitable means (not shown) to render the adhesive tacky or to soften the binder preliminary to the sealing operation.

The bottle 10 with attached heated hood cap 11 is moved axially upward through the flaring opening 31 of the forming ring 30 by any suitable means, or else the entire capping head is depressed over the bottle. In either case, according to a feature of the present invention, the disc-shaped head 45 of the slidable plunger 44 first enters the depressed central diaphragm portion 12 of the cap and firmly seats the same on the internal ledge 8 of the bottle, before the cap skirt 14 passes through the flaring opening 31 of the ring 30 which is smaller than the flared diameter of the cap skirt 14. Then, as the bottle continues its axial upward movement with the plunger head 45 still holding the cap 11 seated on the bottle as aforesaid, the plunger 44 is forced upwardly by the bottle against the tension of spring 47, while the cap skirt 14 is contracted radially inwardly by the forming ring 30 so that when the bottle reaches the position shown in Fig. 2 the skirt will have been contracted to extend about vertically downward and the surplus material of said skirt will have been folded along the predetermined fold lines 18 to form triangular pleats.

As the bottle continues its upward movement, retracting the plunger 44 against the force of spring 47, the raised radial ribs 17 on the top wall 16 of cap 11 engage the annular section 36 of cylindrical plunger 35, whereupon the ring frame 32 and plunger 35 are moved upwardly in housing 25 against the force of spring 38, thereby causing the crank arms 63 to engage the plunger 64. The cranks 55 are thus rotated about their pivotal supports 56 by the force of the springs 65 and cause the jaws 34 to slide radially inwardly towards the cap skirt 14. This relative upward movement of plunger 35 is continued until said plunger engages the wall of housing 25, or until the jaws 34 have contracted the lower section of cap skirt 14 against the outer surface of the bottle and have exerted the necessary sealing pressure thereon to cause the overlapping layers of the pleats or folds of said skirt 14 to be adhesively secured together. The teeth 52 on the inner periphery of the sealing jaws 34 cause the pressure to be concentrated at the corresponding points of the skirt and to crease same in overlapping engagement. This concentration of pressure during sealing serves more effectively to seal the overlapping layers of said folds together.

During the sealing operation the sealing pressure is limited to that exerted by the springs 65. The sealing pressure is taken up by the plunger 35 resting on the top wall 16 of the cap 11 seated on the pouring lip 7 of the bottle, and not by the head 45 of plunger 44 since it has been found that excessive pressure on plunger head 45 may result in damage to the diaphragm 12 of cap 11 or even to the internal ledge 8 of the bottle itself. The force exerted by plunger 44 for sealing the cap in the bore of the bottle is determined by the spring 47 and is independent of the contracting forces exerted by springs 38 and 65.

When the sealing operation has been completed the bottle is lowered, or the capping head raised, thereby lowering the ring frame 32 in housing 25 and releasing the pressure of plungers 64 on the crank arms 63. The arms 63 then engage the flange 70 which retracts the cranks 55 and jaws 34 to their original position. At the same time, spring 47 causes plunger 44 to descend part way with the bottle, to the original

position shown in Fig. 1, thus assisting in resiliently expelling the plunger head 45 from engagement with the depressed central diaphragm portion 12 of the cap.

While certain specific features of the invention have been shown and described for purposes of illustration, it will be understood that various omissions, substitutions and changes in the forms and details of the machine, process and product illustrated may be made by those skilled in the art without departing from the scope and spirit of the appended claims.

What is claimed is:

1. A capping head for affixing onto a bottle a hood cap having a central diaphragm, a top wall, and a flared marginal skirt to be folded around the outer surface of the bottle neck, comprising a housing, a plunger carried in said housing and spring pressed downwardly for engagement with the top wall of said cap, said plunger being movable upwardly into said housing in response to pressure exerted by the bottle, means carried by said plunger for resiliently engaging the diaphragm of said cap to seat same on the bottle prior to engagement of said plunger with said cap, and means responsive to the upward movement of said plunger for exerting an inward pressure on said skirt to fold same upon the neck of the bottle.

2. A capping head for affixing onto a bottle a hood cap having a central diaphragm, a top wall, and a flared marginal skirt to be folded around the outer surface of the bottle neck, comprising a housing, a cylindrical plunger carried in said housing, said plunger being spring pressed downwardly and having an annular bottom surface for engagement with the top wall of said cap, said plunger being movable upwardly into said housing in response to pressure exerted by the bottle, a second plunger carried centrally in said cylindrical plunger and spring pressed downwardly beneath the latter, said second plunger having a disc bottom surface and extending downwardly a distance to engage the diaphragm of the cap to seat same on the bottle prior to engagement of said cylindrical plunger with the top wall of said cap, and means actuated in response to the upward movement of said cylindrical plunger for exerting an inward pressure on said skirt to fold same upon the neck of the bottle.

3. A capping head for affixing onto a bottle a hood cap having a central diaphragm, an annular top wall, and a flared marginal skirt to be folded around the outer surface of the bottle neck, comprising a housing, a cylindrical plunger carried in said housing, said plunger being spring pressed downwardly and having an annular bottom surface for engagement with the top wall of said cap, said plunger being movable upwardly into said housing in response to pressure exerted by the bottle, a second plunger carried centrally

in said cylindrical plunger and spring pressed downwardly with respect thereto, said second plunger having a disc bottom surface and extending downwardly a distance to engage the diaphragm of the cap to seat same on the bottle prior to engagement of said cylindrical plunger with the top of said cap, a frame rigidly secured to said cylindrical plunger and movable therewith, a skirt forming ring carried by said frame having an opening smaller than the flared diameter of said skirt and arranged to fold said flared skirt downwardly as the same is passed upwardly therethrough on the bottle neck, and means including clamping jaws mounted on said frame above said ring opening and actuated by the movement of said cylindrical plunger for folding inwardly and applying pressure to said skirt.

4. A capping head for affixing onto a bottle a hood cap having a central diaphragm, an annular top wall, and a flared marginal skirt to be folded around the outer surface of the bottle neck, comprising a housing, a cylindrical plunger carried in said housing, said plunger being spring pressed downwardly and having an annular bottom surface for engagement with the annular top wall of said cap, said plunger being movable upwardly into said housing in response to pressure exerted by the bottle, a second plunger carried centrally in said cylindrical plunger and spring pressed downwardly with respect thereto, said second plunger having a disc bottom surface engage the diaphragm of the cap to seat same on the bottle prior to engagement of said cylindrical plunger with the top of said cap, a frame rigidly secured to said cylindrical plunger and movable therewith, a skirt forming ring carried by said frame having an opening smaller than the flared diameter of said skirt and arranged to fold said flared skirt downwardly as the same is passed upwardly therethrough on the bottle neck, a plurality of clamping jaws circumferentially arranged to form an opening for receiving the marginal skirt, means mounting said jaws on said frame above said ring opening for movement toward the center of said opening for folding inwardly and applying pressure to said skirt, and means responsive to the movement of said cylindrical plunger and said frame for actuating said jaws.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,325,160	Goodwin	July 27, 1943
2,082,167	MacCordy	June 1, 1937
1,155,119	Winter	Sept. 28, 1915