Jan. 3, 1939. L. BURRELL ET AL 2,142,302

CAPPING MECHANISM FOR BOTTLES AND THE LIKE

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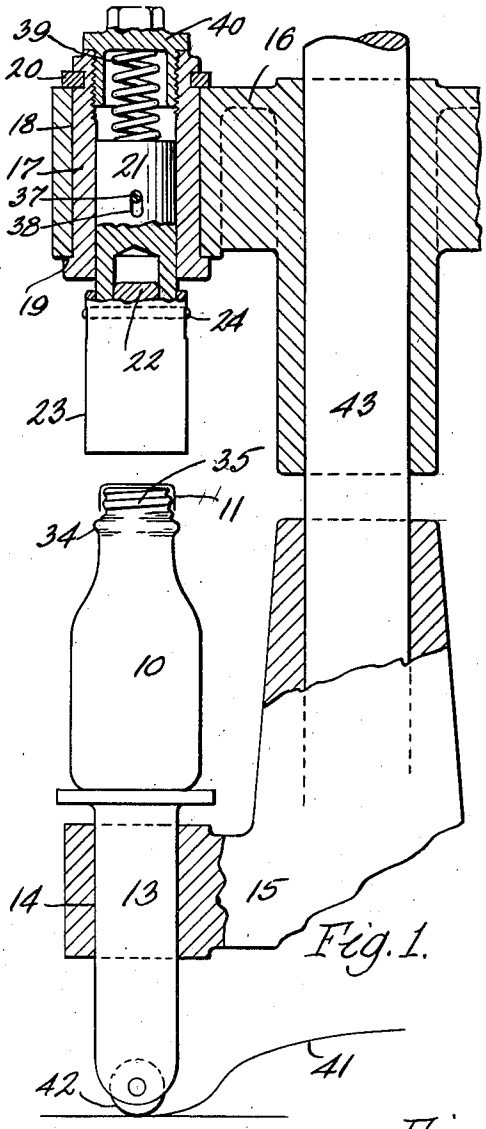


Fig. 1.

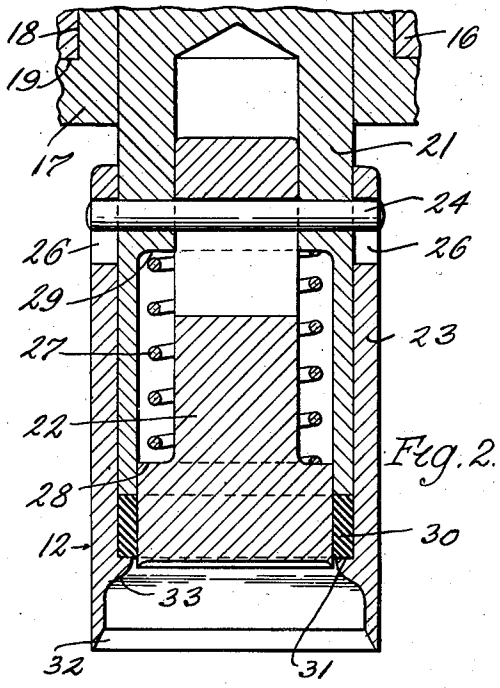


Fig. 2.

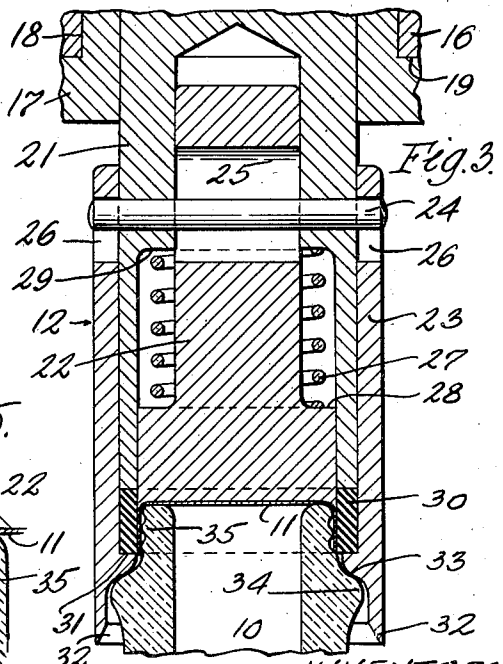


Fig. 3.

Fig. 4.

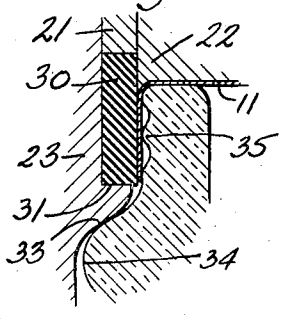
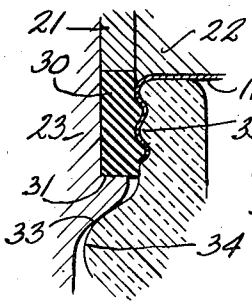


Fig. 5.



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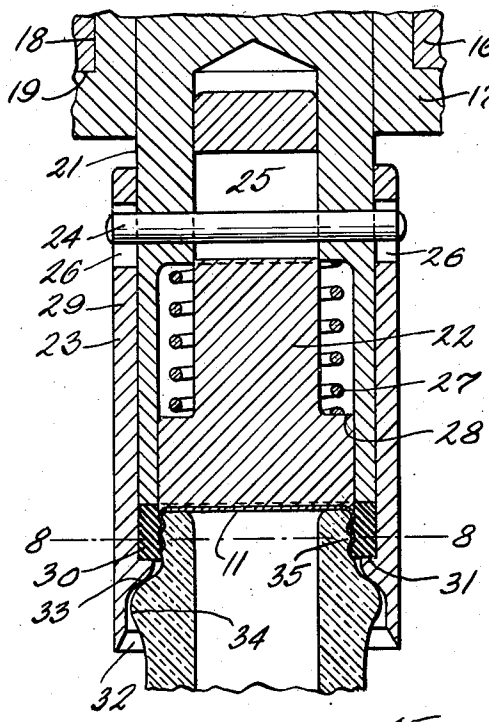
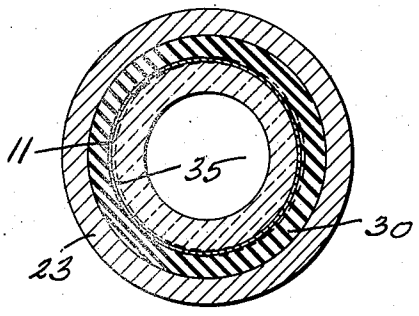


Fig. 7.

Fig. 8.



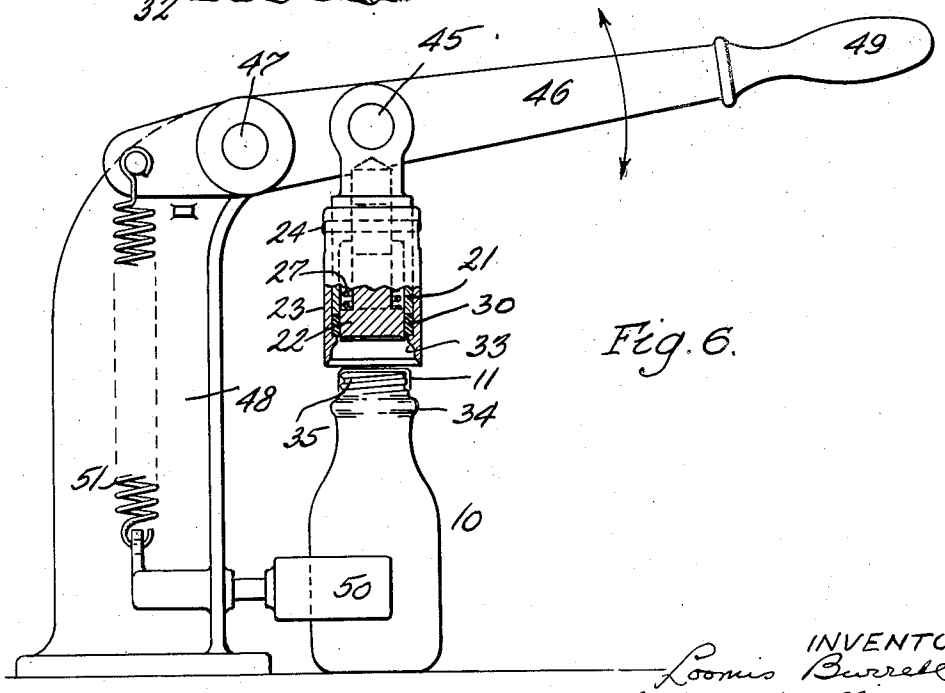


Fig. 6.

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CAPPING MECHANISM FOR BOTTLES AND THE LIKE

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Application May 7, 1937, Serial No. 141,318

6 Claims. (Cl. 226—85)

This invention relates to capping or cap sealing mechanisms for bottles or analogous receptacles by which a cap of metal foil of thin pliable material has a portion thereof, such as its skirt, molded or pressed into sealing or holding engagement with a threaded or other cap-securing portion of the bottle, whereby the cap is tightly secured or sealed on the bottle.

As herein used, the term "bottle" is intended to designate a bottle proper or analogous receptacle.

A desirable form of milk bottle adapted to be sealed by a cap of this nature is made with a circumferential enlargement or so-called "wash ring" around its neck below its cap-securing portion. Such wash ring provides a convenient grip for carrying the bottle, and it protects the threads or cap-securing parts and the sealing edge or rim of the bottle by preventing contact of the same with objects. The wash ring is also utilized in conveying or manipulating the bottle in a bottle washing machine.

One object of our invention is to provide capping or cap-sealing mechanism for bottles having such wash rings.

Other objects of the invention are to provide an improved cap sealing mechanism which is of simple, strong and durable construction; in which the wash ring is made use of as a pressure abutment for applying the pressure that compresses or seals the cap on the bottle; and which has the other features of improvement and advantage hereinafter described and set forth in the claims.

The accompanying drawings show alternative embodiments of the invention, one in which the bottle is moved toward the capping or sealing head for sealing the cap on the bottle, and another in which the sealing head is moved toward the relatively stationary bottle for sealing the cap thereon.

In said drawings:

Fig. 1 is a sectional elevation illustrating the first mentioned embodiment of the invention and showing the bottle with the cap placed loosely thereon in position below the sealing head ready for sealing.

Fig. 2 is an enlarged, sectional elevation of the sealing head showing the normal position of its parts.

Fig. 3 is a similar sectional elevation showing the position of the parts when the bottle and cap have been moved up into the sealing head, but before application of the pressure for molding the cap on the bottle.

Fig. 4 is a fragmentary, vertical section on a still larger scale, showing the sealing ring and adjacent parts in the same positions as shown in Fig. 3.

Fig. 5 is a view similar to Fig. 4, but showing the position of the parts when the sealing ring has been compressed and the cap sealed on the bottle.

Fig. 6 is an elevation, partly in section, illustrating the second mentioned embodiment of the invention, and showing the sealing head above the bottle, ready to be depressed, for sealing the cap on the bottle.

Fig. 7 is an enlarged, sectional elevation of the sealing head, showing the position of the parts when the cap is sealed on the bottle.

Fig. 8 is a transverse section through the sealing head on line 8—8, Fig. 7.

Describing first the embodiment shown in Figs. 1–5 of the drawings, 10 represents the bottle, 11 the bottle cap and 12 the capping or sealing head as a whole. As shown, the bottle stands on a holder 13 adapted to move vertically in a guide bore 14 in a support or carrier 15 for moving the bottle to and from the sealing head. The sealing head is mounted on a support or carrier 16 above the carrier 15, preferably being mounted on the support 16 by means of a supporting sleeve 17 which is shown as being secured against vertical movement in a hole 18 in the support 16 by a shoulder 19 at the lower end of the sleeve engaging the bottom of the support 16, and a securing ring 20 seated in a circumferential groove in the sleeve and engaging the top of the support 16.

In its preferred construction, the sealing head comprises an intermediate hollow cylindrical member 21 which is secured in the supporting sleeve 17, a central cap-clamping member or plunger 22 movable axially within the intermediate member 12, and an outer cylindrical sleeve member 23 which surrounds and is slidable on the intermediate member 21. The central plunger and outer sleeve may be retained on the intermediate member 21 so as to move axially thereon by any suitable means, such for instance as a diametrical pin 24 extending through and secured in holes in the intermediate member 21 and passing through vertically elongated slots 25 and 26 respectively in the plunger and in the outer sleeve. The central plunger is yieldingly pressed downwardly in the intermediate member 21 as by a coil spring 27 surrounding the plunger between shoulders 28 and 29 on the plunger and intermediate member. A compressible or de-

formable sealing element or ring 30 surrounds the central plunger in the outer sleeve 23 between the lower end of the intermediate member 21 and an internal circumferential shoulder 31 on the outer sleeve or pressure member 23 so that this sealing element is adapted to be compressed or deformed by upward axial movement of the outer sleeve relatively to the intermediate member. The sealing element preferably consists of a ring of suitable rubber or elastic material, but it might be of other construction adapted to be compressed or deformed or squeezed inwardly by endwise pressure thereon produced by relative axial movement of the outer sleeve 23 and intermediate member 21.

The lower end of the outer pressure sleeve 23 is large enough to surround and receive the upper end of the bottle and preferably has its bottom edge bevelled or outwardly flared at 32 to facilitate the introduction and centering of the upper end of the bottle in the sealing head, and the pressure sleeve is provided below the sealing ring 30 with a downwardly facing internal shoulder 33 adapted to bear on the upwardly facing portion of the wash ring 34 of the bottle.

In the operation of the sealing mechanism, the bottle with a cupped or skirted cap 11 thereon is elevated to move its upper end into the sealing head, with the cap engaging the lower end of the plunger 22. Continued upward movement of the bottle moves the central plunger upwardly in the head, compressing the plunger spring 27, and thus clamps or holds the cap tightly against the end of the bottle. In the continued upward movement of the bottle, its wash ring will engage the internal shoulder 33 of the pressure sleeve 23, and the upper end of the bottle and the cap will extend up within the sealing ring 30, as shown in Figs. 3 and 4. Further upward movement or pressure of the bottle will then press the outer pressure sleeve 23 upwardly and compress the sealing ring endwise between the shoulder 31 of the pressure sleeve and the end of the intermediate member 21. This contracts or squeezes the sealing ring inwardly, as shown in Fig. 5, and thereby presses or molds the skirt of the cap into conformity with the cap-securing portion 35 of the bottle, thus sealing the cap on the bottle. The bottle with the cap sealed thereon is then lowered and the pressure sleeve 23 will follow downwardly with the bottle until arrested by the engagement of the upper ends of its slots 26 with the pin 24, thus relieving the pressure on the sealing ring and permitting it to expand and allow the withdrawal of the capped bottle from the sealing head.

It will thus be seen that the pressure for compressing the sealing ring 30 to seal the cap on the bottle is applied directly to the pressure sleeve 23 by the wash ring 34 of the bottle, and the pressure is not applied as in previous constructions, by the upper end of the bottle and its cap against the cap clamping plunger. Therefore, the sealing edge or face for the cap and the pouring rim of the bottle are not subjected to the pressure required to seal the cap on the bottle, and the danger of chipping or breaking the upper end, or the sealing or pouring rim or edge is prevented. Furthermore, there is no lost motion in applying the pressure to the sealing ring, and lever or other parts or connections for operating the pressure sleeve from the central plunger are eliminated and the construction of the sealing head thus greatly simplified.

If bottles were all of uniform size, the sealing head could be stationarily secured in the support 16, but since, in the manufacture of the bottles, they do vary somewhat in length or size, the sealing head is preferably mounted yieldingly on its support 16 so as to prevent possible injury to the bottles or sealing head, due to inaccuracies in the bottles. For this purpose, in the construction shown, the upper end of the intermediate member 21 of the sealing head is mounted so as to have limited axial movement in the suporting sleeve 17, as by a pin 37 extending diametrically through a vertically elongated slot 38 in the member 21 and fixed at its ends in the supporting sleeve 17. The member 21 is pressed downwardly in the supporting sleeve 17 to the limit permitted by the slot 38 and pin 37, by a strong spring 39 in the supporting sleeve between the upper end of the member 21 and an abutment 40 which may consist of a cap screwed into the threaded upper end of the supporting sleeve. This yieldable mounting of the sealing head in the supporting sleeve thus allows the necessary give of the sleeve to prevent injury to the bottle or sealing mechanism, but except in the case of variations in the lengths of the bottles, the sealing head remains stationary and may be considered as a stationary part, the spring 39 being strong enough to hold the head against upward movement unless an abnormal bottle is being capped.

The vertical movement of the bottle to and from the sealing head may be effected by any suitable means, such for example, as a cam represented diagrammatically at 41 which operates by relative movement between the same and the bottle support, which latter preferably carries a roller 42 adapted to roll on the cam. A single bottle holder and companion sealing head only have been shown, but it is common practice to mount a plurality of such companion sealing heads and bottle holders on a turret, formed as by the carriers 15 and 16 and their supporting vertical column 43, adapted to be rotated to carry the bottle supports in succession past the cam 41, which is stationary, so that each bottle support in succession will ride over the cam and be lifted thereby for sealing the cap on the bottle, as explained.

In the capping or sealing mechanism illustrated in Figs. 6–8, the sealing head is constructed and operates to seal the cap on the bottle in the manner hereinbefore described, but in this construction the bottle remains stationary and the sealing head is moved down and up to and from the bottle. For this purpose, as here illustrated, the middle member 21 of the sealing head is suitably pivoted at its upper end at 45 to a hand lever 46 which is suitably fulcrumed at 47 on a stationary standard or part 48 and is provided with an operating handle 49. By depressing the handle end of the lever, the sealing head is moved downwardly over the upper end of the bottle, which is centered with reference to the sealing head by a semicircular bottle gage or guide 50. After the sealing head has been thus lowered over the upper end of the bottle and the cap thereon, until the downwardly facing shoulder 33 in the outer pressure member 23 bears against the wash ring 34 of the bottle, the head is forced down by pressure on the handle end of the lever, thus moving the intermediate member 23 downwardly relatively to the pressure member 21 of the sealing head to thereby compress the sealing ring 30 and press or

mold the skirt of the cap into conformed engagement with the cap-securing portion of the bottle for sealing the cap thereon, as before explained. The operating lever for the sealing head is adapted to be raised and be held normally in its raised position to permit the bottle to be placed against the gage beneath the sealing head by suitable means, such for example, as a spring 51 connected at opposite ends to the inner end of the lever in rear of its fulcrum and to the standard 48.

We claim as our invention:

1. A bottle capping mechanism comprising in combination, a capping head adapted to receive the mouth end of a bottle formed with a cap-securing portion and a rigid pressure abutment below said cap-securing portion, said capping head comprising a member formed to receive the end of the bottle and endwise engage said pressure abutment of the bottle, a second member relative to which said first member is axially movable, and a deformable sealing element disposed between endwise opposed parts of said members and arranged to surround and press against a cap on the bottle, and means for producing relative movement of the bottle and capping head axially one towards the other, whereby the engagement of said first member with said bottle abutment moves said member axially of said second member and deforms said sealing element to press a portion of the cap into holding engagement with said cap-securing portion of the bottle.

2. A bottle capping mechanism comprising in combination, a capping head adapted to receive the mouth end of a bottle formed with a cap-securing portion and a lateral enlargement below said cap-securing portion, said capping head comprising an outer hollow member formed to surround the end of the bottle and endwise engage said bottle enlargement, a second member within and on which said first member is axially movable, and a compressible sealing ring confined within said outer member between endwise opposed parts of said members and adapted to encircle a cap on the bottle, and means for producing relative movement of the bottle and sealing head one towards the other, whereby the engagement of the bottle enlargement with said outer head member moves the same axially of said second member and compresses said sealing ring about the cap to seal the cap on the bottle.

3. A mechanism for sealing caps on bottles provided at their upper ends with cap-securing portions and below the same with rigid pressure abutments, comprising a sealing head arranged over the bottle, and means for effecting relative vertical movement between the sealing head and the bottle, said sealing head comprising hollow members one within the other which are relatively movable axially of each other, and a compressible sealing ring which is confined in the sealing head between endwise opposed parts of said members and is adapted to be compressed about a cap on the bottle by relative axial movement of said members, one of said members being constructed to surround the upper end of the bottle and endwise engage said pressure abutment of the bottle, whereby relative movement of the bottle and sealing head towards each other produces a relative axial movement between said sealing head members and compresses said sealing ring about the cap for sealing it on the bottle.

4. A mechanism for sealing skirted caps on bottles formed at their mouth ends with cap-securing portions and below the same with pressure abutments, comprising a sealing head arranged opposite the mouth of the bottle, and comprising a hollow cylindrical pressure member adapted to surround the mouth end of the bottle and bear endwise against said pressure abutment, an inner hollow cylindrical member within said pressure member and on which said pressure member is axially movable, and a compressible sealing ring confined in the sealing head between an internal annular shoulder on said pressure member and the end of said inner member and arranged to surround the skirt of a cap on the bottle, and means for producing relative axial movement of the sealing head and bottle towards each other, whereby said bearing of said pressure member against said abutment of the bottle produces relative axial movement of said two members and compresses said sealing ring to seal the cap on the bottle.

5. A mechanism for sealing skirted caps on bottles formed at their mouth ends with cap-securing portions, comprising a sealing head arranged opposite the mouth of the bottle, and comprising a hollow cylindrical intermediate member adapted to surround the mouth end of the bottle, a hollow outer member surrounding and axially movable on said intermediate member, a spring-pressed cap clamping plunger within said intermediate member and movable axially relatively to the latter and to said outer member, a compressible sealing ring confined within the sealing head between endwise opposed parts of said outer and intermediate members and adapted to surround the skirt of a cap on the bottle, a transverse pin fixed in said intermediate member and movable axially in slots in said outer member and plunger, means for producing relative movement of the sealing head and bottle one towards the other, and a pressure abutment arranged to be engaged by said outer member by said relative movement of the bottle and sealing head, whereby said bearing of said outer member against the abutment produces relative axial movement of said outer and intermediate members and compresses said sealing ring to seal the cap on the bottle.

6. A mechanism for sealing skirted caps on bottles formed at their mouth ends with cap-securing portions and below the same with pressure abutments, comprising a sealing head arranged opposite the mouth of the bottle, and comprising a hollow cylindrical intermediate member, a hollow outer member carried by and axially movable on said intermediate member and adapted to surround the end of the bottle and bear endwise against said pressure abutment of the bottle, a spring-pressed cap clamping plunger within and carried by said intermediate member and movable axially relatively to the latter and to said outer member, and a compressible elastic sealing ring confined within the sealing head between endwise opposed parts of said outer and intermediate members and adapted to engage the skirt of a cap on the bottle, and means for producing a positive relative movement between said intermediate member and the bottle, one towards the other, whereby said bearing of said outer member against the bottle abutment produces a relative axial movement of said outer and intermediate members and compresses said sealing ring to seal the cap on the bottle.

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