May 25, 1926. 1,585,820

E. G. BAUM

BOTTLE CAPPING DEVICE

Filed Oct. 25, 1921 2 Sheets-Sheet 1

Fig. 1.

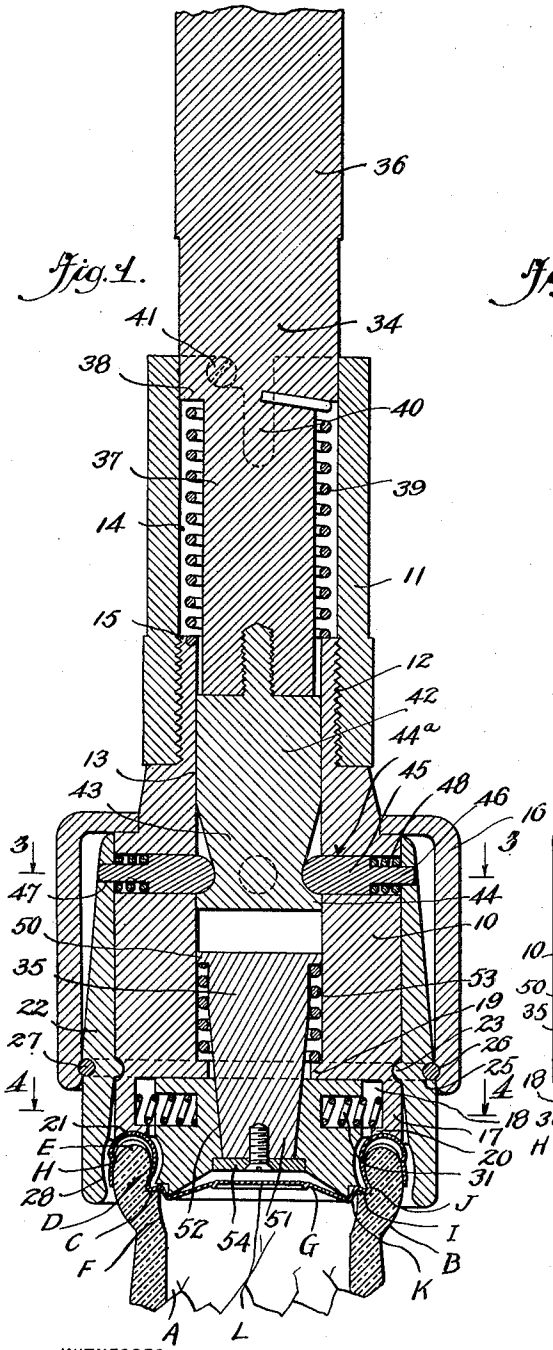
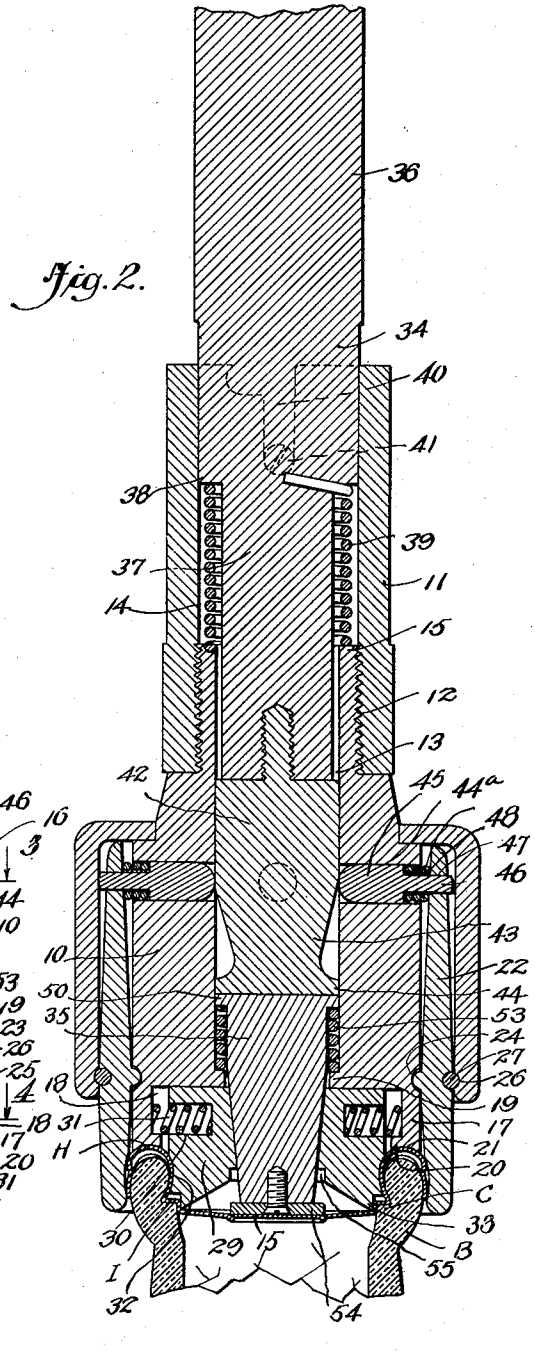


Fig. 2.



WITNESSES

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Fig. 3.

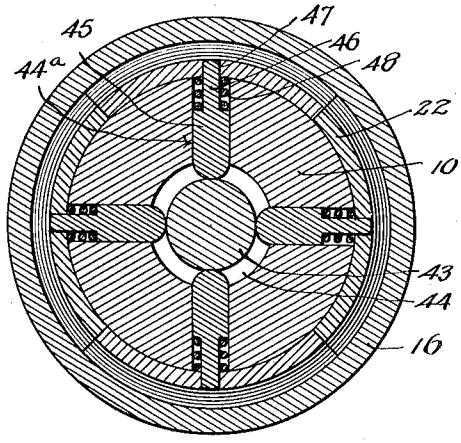


Fig. 4.

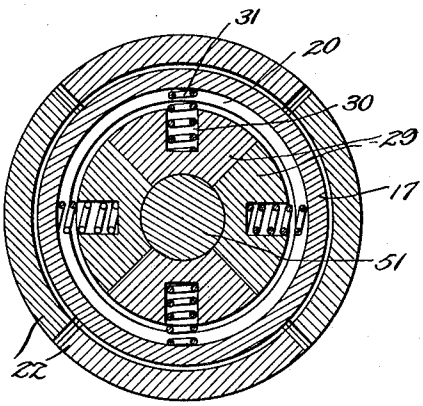
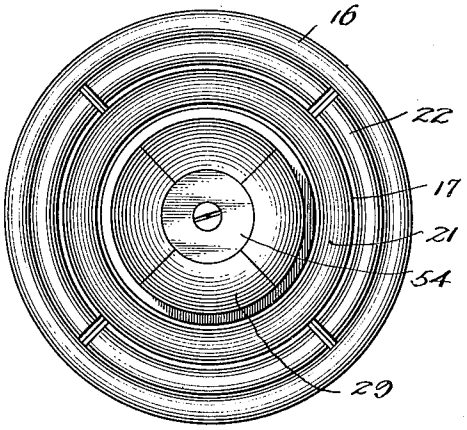


Fig. 5.



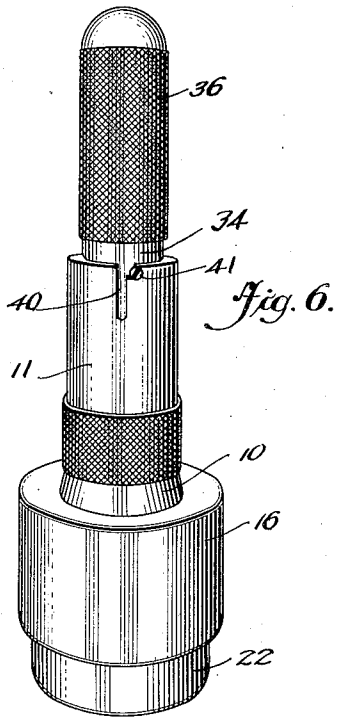


Fig. 6.

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UNITED STATES PATENT OFFICE.

EWALD GEORGE BAUM, OF NATICK, MASSACHUSETTS, ASSIGNOR TO SEAL-KAP COMPANY, OF NATICK, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BOTTLE-CAPPING DEVICE.

Application filed October 25, 1921. Serial No. 510,219.

This invention has relation to bottle capping devices and refers more particularly to a device of this character which is especially designed for effecting the application to standard milk bottles caps or closures of the type set forth in Letters Patent of the United States No. 1,357,831, granted on November 2, 1920.

The present invention contemplates a simple and effective capping device for expeditiously applying caps of the type set forth to milk bottles and sealing the same in place thereon.

As a further object the invention contemplates a capping device which automatically accomplishes the application and sealing of the cap or closure with the mouth of the bottle by direct pressure of the same over the bottle mouth and neck, said device including means for returning the movable elements thereof to normal position when the pressure is released.

The invention further contemplates a capping device which employs a minimum of working parts or elements capable of ready assembly or disassembly for the purpose of repairs or adjustments, and which is extremely strong and durable in its construction.

The invention aims as a further object to provide a device of the character described which may be employed as a hand operated tool or which may be associated with a machine for accomplishing the desired result.

With the above recited and other objects in view, the invention resides in the novel construction, set forth in the following specification, particularly pointed out in the appended claims and illustrated in the accompanying drawings, it being understood that the right is reserved to embodiments other than those actually illustrated herein to the full extent indicated by the general meaning of the terms in which the claims are expressed and by variations in the phraseology of the same.

In the drawings—

Figure 1 is a vertical sectional view through the capping device, illustrating the same associated with a bottle and cap with the parts thereof in normal position prior to the capping and sealing operation.

Fig. 2 is a similar view illustrating the parts thereof shifted to effect the capping and sealing operation.

Fig. 3 is a horizontal sectional view taken approximately on the line 3—3 of Fig. 1.

Fig. 4 is a similar view taken on the line 4—4 of Fig. 1.

Fig. 5 is a bottom plan view illustrating the arrangement of parts as in Fig. 1.

Fig. 6 is a perspective view of the device.

Referring to the drawings by characters of reference, A designates the neck of a standard milk bottle having the usual enlarged external bead B. The bore of the neck is formed with a horizontal shoulder C constituting a seat for the usual form of cap and the portion D of the bore lying between the shoulder C and the pouring lip E is frusto-conical and of gradually decreasing diameter toward the outer end. The portion F of the bore which communicates with the neck proper is of gradually increasing diameter toward its lower end immediately adjacent the shoulder. The cap or closure for the bottle with which the capping device is especially designed to operate is preferably pressed, molded, cast, or otherwise formed of a suitable piece of material to provide a bore covering portion G and a bore lip housing H, the juncture of said portions being horizontally stepped to provide the horizontal and vertical annular sealing faces I, J and K adapted for respective engagement with the horizontal shoulder C and the portions D and F of the bore of the bottle. The central bore covering portion G is provided with a concentric circular portion L formed by a circular score, said portion being longitudinally or axially adjustable in the neck for a purpose which will later appear.

The capping device constituting the invention comprises a substantially tubular member having a base section 10 and a head section 11 threadedly connected to each other at 12 and provided with aligned bores 13 and 14, the latter bore being of a slightly greater diameter than the former to provide an intermediate shoulder 15. The base section 10 has mounted thereover an external substantially cup-shaped housing 16 spaced from the outer wall thereof and concentric thereto. The extreme lower end of the base section is provided with an annular extension 17 which projects outwardly from the

lower open end of the housing 16 and defines an enlarged bore 18 communicating with the lower end of the bore 13. The bore 13 at its juncture with the bore 18 is provided with an inwardly projecting annular rib 19 and the lower edge of the extension 17 is provided with an inwardly projecting annular rib 20. The lower edge or face of the extension 17 and rib 20 are provided with a concaved annular groove 21 which corresponds substantially to the convexity of the upper end of the pouring lip housing portion H of the cap or closure. A plurality of sector-shaped outer clamping jaws 22 are mounted between the housing 16 and the base section 10 with the lower extremities of said jaws projecting outwardly of the housing and beyond the extension 17 and the upper extremities disposed within the space between the housing and the base section. The inner face of each jaw has formed thereon a transverse rib 23 accommodated by the annular groove 24 in the outer wall of the base section approximately at its juncture with the extension 17. The outer wall of each jaw is formed with a transverse groove 25 and the inner wall of the housing 16 is provided with a complementary annular groove 26, said grooves being located in substantial alignment with the ribs 23 and being adapted to receive a split retaining ring 27 for operatively associating the outer clamping jaws 22 with the housing and the base 10. The lower or outwardly projecting extremities of the jaws 22 are interiorly beveled or inclined from the ribs 23 to their outer ends and the upper extremities thereof are exteriorly beveled or inclined inwardly from the grooves 25 to their upper ends whereby to permit of rocking of said jaws on the ribs 23 which constitute fulcrums. The inner face of each jaw adjacent its lowermost end is provided with an arcuate transverse groove 28 which corresponds substantially with the shape of the convex outer side of the pouring lip housing portion H of the cap and is designed to coact therewith when the jaws are rocked to contract their lower ends for clamping the outer portion of the pouring lip housing against the outer bead of the bottle. A plurality of inner clamping jaws 29 of substantially sector-shape in cross section are mounted within the extension 17 for radial contraction and expansion. The inner clamping jaws 29 are provided adjacent their outer ends with recesses 30 in their outer sides, the lower peripheral edge of said recesses being disposed in substantial alignment with the upper edge of the rib 20. The coiled contractile springs 31 are disposed within the recesses 30 and extend outwardly therefrom into engagement with the inner periphery of the extension 17 to normally effect radial contraction of the jaws. The lower outer face of each jaw 29 is provided with a transverse concave groove 32 which corresponds in shape substantially with the shape of the inner wall of the pouring lip housing H and is designed to coact therewith upon radial expansion of the jaws to clamp said inner wall against the portion D of the bore lying between the shoulder C and pouring lip E. The lower extremity of each jaw is provided with a reduced extension 33 which is designed to engage with the inner side of the sealing face K of the cap upon radial expansion of the jaws.

The means for effecting the radial contraction of the outer jaws and radial expansion of the inner jaws includes a plunger 34 mounted within the tubular member and axially shiftable in the bores 13 and 14 of the sections thereof and a spreader 35 mounted within the lower end of the bore 13 and axially shiftable therein. The plunger 34 extends outwardly from the upper end of the head section 11, and said exposed portion thereof constitutes an operating handle 36 where the device is designed as a hand operated tool. Where the device is designed to be used in connection with a machine, the handle is dispensed with and the upper exposed extremity of the plunger is suitably formed to be associated with the machine. The lower portion 37 of the plunger is of a reduced diameter and provides a shoulder 38 at its juncture with the upper portion. A coiled contractile spring 39 encircles the reduced portion of the plunger with its opposite extremities respectively engaging the shoulders 38 and 15 to normally effect upward movement of the plunger. The opposite extremities of the spring 39 are respectively anchored in the plunger and the base section to effect rotation of the plunger relative to the tubular member. The upper end of the head section 11 is provided with a bayonet slot 40 and the plunger is provided with a pin or screw 41 which coacts with the enlarged end of the bayonet slot under the action of the spring to prevent axial shifting of the plunger downwardly until the same has been rotated to bring the pin into alignment with the restricted portion of the slot. The plunger is provided at its lower extremity with a detachable head 42 having a frusto-conical lower end 43 with the restricted portion thereof disposed downwardly and terminating in an enlarged annular bead 44 of a diameter substantially equal to the diameter of the bore 13. The base section 10 is provided with a plurality of radially disposed openings 44a in which the radially shiftable plugs 45 are arranged, said plugs corresponding in number to the number of outer jaw sections. The outer extremities of the plugs are provided with reduced stems 46 which project through apertures 47 in the upper extremi-

ties of the jaws 22. Coiled compression springs 48 encircle the stems 46 and are interposed between the inner surface of the jaws and the shoulder formed at the juncture of the stem 46 with the plugs 45. The inner extremities of the plugs 45 are rounded and project through the openings 44[a] under the action of the springs 48 into engagement with the frusto-conical portion 43 of the plunger head 42 whereby upon downward movement of the plunger the plugs will be radially shifted to effect the rocking of the jaws 22 and the outward movement of their upper extremities to radially contract the lower extremities thereof. The spreader 35 arranged within the lower end of the bore 13 is provided with an annular shoulder 50 at its upper end and is provided with a frusto-conical lower extremity 51 projecting through the lower end of the bore and engageable with the inclined inner walls 52 of the inner jaws 29. A coiled compression spring 53 surrounds the upper portion of the spreader member with its opposite extremities respectively engaging the rib 19 at the lower end of the bore 13 and the annular shoulder 50 of the spreader member to normally effect upward movement thereof. The lower extremity of the spreader member is provided with an enlarged head 54, which head is of a diameter equal to the diameter of the concentric circular portion L of the closure or cap. The jaws 29 are cut away at 55 to accommodate the head 54 when the spreader member is normally retracted under the action of the spring 53.

In operation the bottle cap is set into the lower end of the device with the upper wall of the pouring lip housing portion in engagement with and seated in the groove 21 of the extension 17, the plunger being in its normal retracted position. The lower end of the device is then inserted over the bottle neck or mouth and the plunger 34 is rotated to bring the pin 41 into the restricted portion of the bayonet slot 40. Downward movement of the plunger is now effected against the action of the spring 39. The downward movement of the plunger will cause the enlarged end of the frusto-conical portion 43 of its head to gradually effect radial outward movement of the plugs 45, the springs 48 serving to throw the upper ends of the outer clamping jaws 22 outwardly under their tension whereby to effect inward movement or radial contraction to bring the arcuate transverse grooves 28 of their lower extremities into clamping engagement with the outer side walls of the pouring lip housing, said outer side walls being impinged against the outer side of the bead B. Continued downward movement of the plunger will effect its engagement with the upper end of the spreader member 35, which in turn will be moved downwardly against the action of the spring 53 to effect radial expansion or outward movement of the inner clamping jaws 29 against the action of the springs 31 whereby to bring the transverse grooves 32 in the lower outer faces of the jaws 29 into clamping engagement with the inner walls of the pouring lip housing to impinge said inner walls against the portion D of the bore. At the same time the extensions 33 at the lower end of the jaws 29 will force the sealing face K of the cap into engagement with portion F of the bore, the sealing face I into engagement with the shoulder C and the sealing face J into engagement with the portion D of the bore. Further downward movement of the plunger will effect the engagement of the head 54 with the central portion L of the cap to force the same past its horizontal center. In practice milk bottles are filled substantially to the level of the horizontal shoulder C. Flexing of the central portion L of the bore-covering portion G of the cap below the plane of its margin and consequently below the shoulder portion G, thus serves to force out most, if not all, the air between the surface of the milk and the lower face of the bore-covering portion, and also to place the bore-covering portion under tension, the scoring of this portion adding to its elasticity. When the capping device is removed this tension is released and the flexed portion immediately contracts somewhat, decreasing the extent of flexure, and creating a partial vacuum above the surface of the milk beneath the cap, adding to the tenacity with which the cap holds to the bottle. When the plunger is released the same will move upwardly under the action of the spring 39 until the annular bead 44 of its head engages with the inner ends of the plugs 45 which will have been again shifted radially inward under the action of their springs 48. At the same time the pin 41 of the plunger will have reached the enlarged upper end of the slot, the spring 39 will function to effect a rotative movement of the plunger to bring the pin 40 into said enlarged portion of the bayonet slot. The upward movement of the plunger will permit the spring 53 to retract the spreader member 35 to bring the restricted end of its frusto-conical portion adjacent the inclined walls 52 of the inner clamping jaws 29 to allow the springs 31 to effect their radial contraction. This will permit the withdrawal of the device from the bottle as the tension of the springs 48 on the upper ends of the outer jaws 22 is relieved by the inward movement of the plugs 45. It will thus be seen that a simple and effective means for applying bottle closures or caps of the character set forth has been devised which is entirely automatic in its operation to effect the proper application of

said cap and to return the parts to normal when the pressure on the plunger has been released.

Having thus described my invention, what I claim is:

1. A bottle capping device adapted to be brought axially into contact with a bottle mouth, having oppositely disposed radially contractible means and radially expansible means for impinging the bottle cap on the bottle mouth, and having axially projectable means operatively associated with said contractible and expansible means for flexing the cap.

2. A device for applying bottle caps of the character set forth comprising pouring lip housing and bore covering portions to standard milk bottles, comprising means engaging over said housing for impinging the pouring lip housing portion of said cap to the bottle mouth, and means operatively associated with said impinging means for axially flexing the bore covering portion of said cap.

3. A device for applying bottle closures of the character described each having a pouring lip housing and a bore covering portion to standard milk bottles, comprising a tubular body having a stationary cap engaging extension, outer contractible and inner expansible jaws carried by said body, and means longitudinally shiftable through said body for actuating said jaws and for flexing the bore covering portion of the closure inwardly.

4. A device for applying a bottle cap including a bore covering portion and a pouring lip housing having a juncture therebetween stepped to constitute a horizontal sealing face and outer vertical sealing peripheries adapted to respectively engage and coact with the horizontal seat and inclined bores of a standard milk bottle above and below said seat, said device being adapted to be brought axially into contact with the bottle mouth, and comprising radially contractible and radially expansible means for impinging the pouring lip housing over the bottle mouth, and projectable means associated therewith for flexing the bore covering portion of said cap inwardly.

5. A device for effecting the application of a bottle closure of the character described to a standard milk bottle, comprising a tubular body having an extension therefrom adapted to engage the closure, inner and outer clamping jaws carried thereby, a plunger movable through said body, means engageable by said plunger for effecting the radial contraction of the outer jaws, means engageable by said plunger for effecting the radial expansion of the inner jaws, and means engageable by said plunger for flexing the central portion of the closure inwardly.

6. A device for effecting the application to a standard milk bottle, of a bottle cap including a bore covering portion, a pouring lip housing having a stepped juncture constituting a horizontal sealing face and outer vertical sealing peripheries adapted to respectively engage and coact with the horizontal seat and inclined bores of the milk bottle, comprising a tubular body having an extension therefrom adapted to be axially moved into contact with the upper wall of the pouring lip housing, inner and outer clamping jaws carried thereby, a plunger movable through said body, means engageable by said plunger for effecting the radial contraction of the outer jaws, means engageable by said plunger for effecting the radial expansion of the inner jaws whereby to impinge and clamp the side walls of the pouring lip housing against the bottle mouth, and for flexing the bore covering portion of the closure inwardly of the bottle neck.

7. A bottle capping device for sealing a bottle cap having a bore covering portion and a pouring lip housing, which device comprises an open ended member having a stationary extension from its open end engageable with the pouring lip housing of the bottle cap, an outer radially contractible member formed to engage the outside of said housing, an inner radially expansible member formed to engage the inner wall of said housing, and a member engaging with the bore closing portion of said cap and axially projectable from said extension to flex said portion.

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