Aug. 10, 1943. L. H. BROWNE 2,326,284

BOTTLE CAPPING MECHANISM

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Fig. 1.

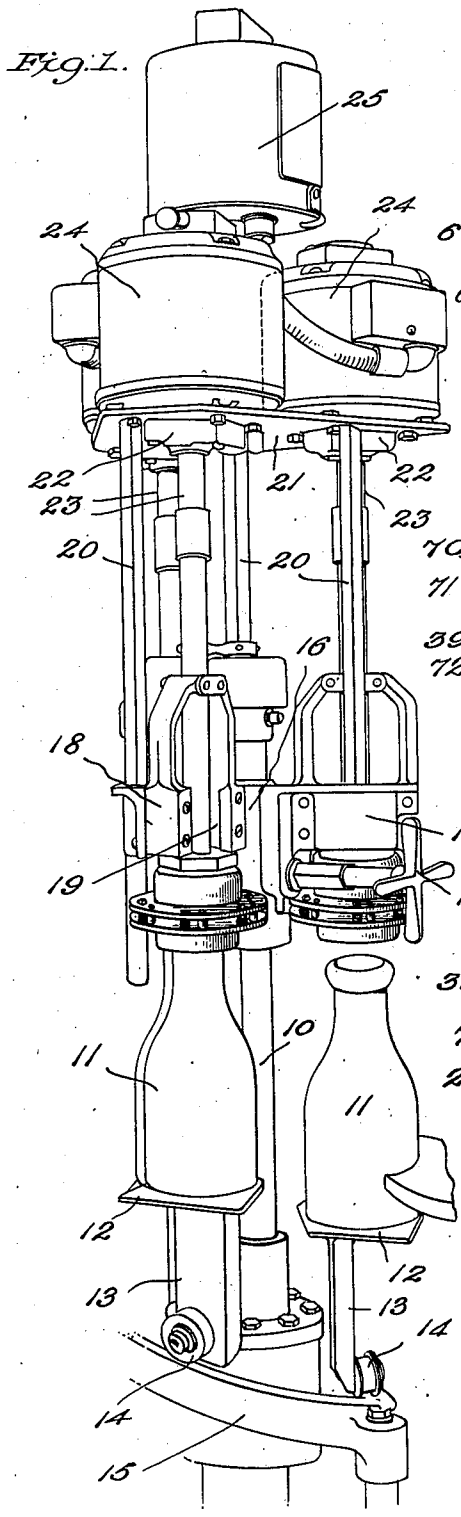


Fig. 2.

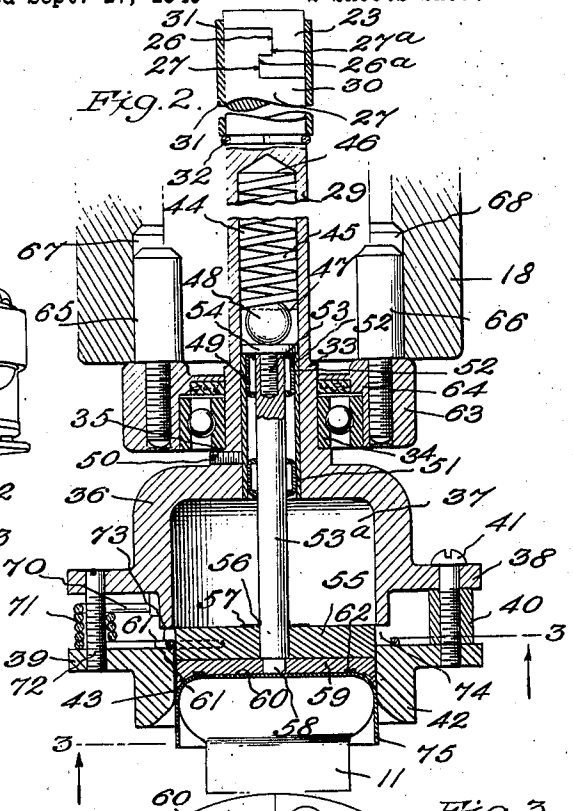


Fig. 3.

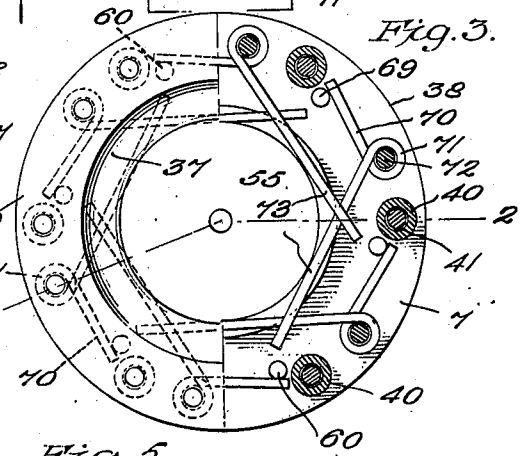
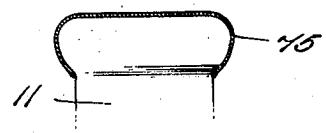


Fig. 5.



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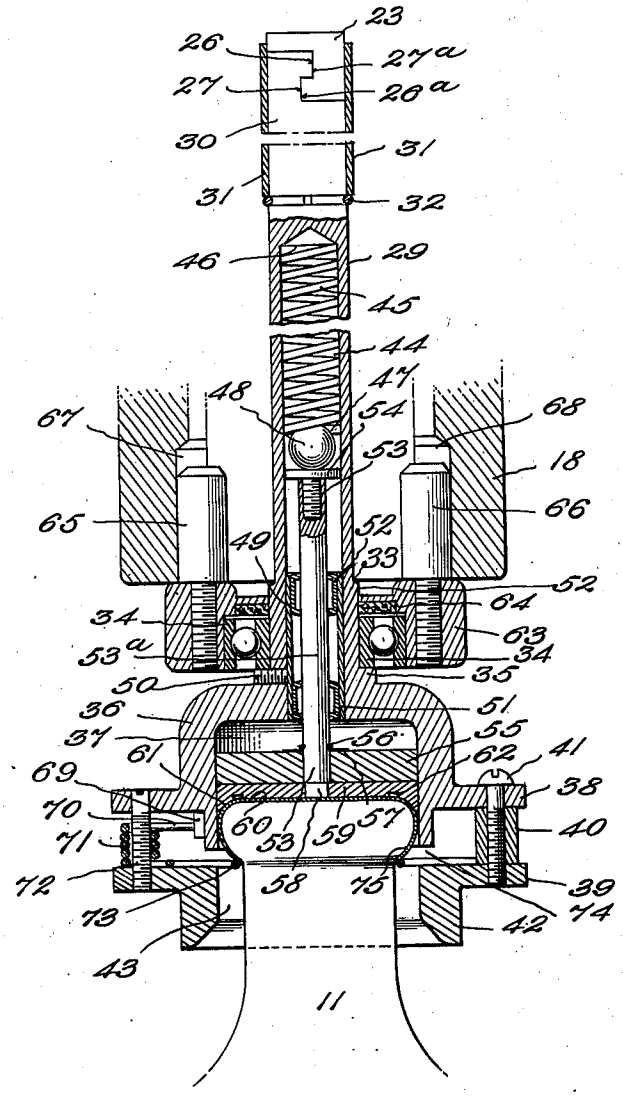
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Fig. 4.



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Patented Aug. 10, 1943

2,326,284

UNITED STATES PATENT OFFICE

2,326,284

BOTTLE CAPPING MECHANISM

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Application September 17, 1940, Serial No. 357,085

3 Claims. (Cl. 226—87)

This invention relates to improvements in bottle capping mechanisms and has for the main object the provision of mechanism by means of which aluminum or other thin metallic caps may be applied to and ironed evenly over the mouths of bottles to closely conform to the external surfaces of the lips of the bottles terminating thereon at the junction of said lips with the necks of the bottles.

In many dairies several classes of milk and/or cream may be bottles and capped differently; for example, some types may have the usual plain disc caps positioned on a ledge formed within the neck opening of the bottle for the purpose, while others may have the more protective metallic caps conforming to the external surface of the lips of the bottles contemplated by the present invention; whether the bottles also have a disc type of inner cap or not.

It is true that heretofore metallic caps have been applied to bottles but these caps conform to a portion of the lip of the bottle instead of embracing the entire lip portion down to the neck, as contemplated by the present invention.

An important object of the present invention is to provide a mechanism for conforming thin metallic caps to the lip ends of bottles, said mechanism being adapted to be interchanged with the regular capping heads commonly employed, therefore making existing capping machines capable, in addition to performing their own function of applying discs, of also applying thin metallic caps to the lips of milk or cream bottles.

Other objects and advantages of the invention will be apparent to those skilled in the art.

Referring to the drawings:

Figure 1 is a perspective view of a portion of a complete capping mechanism such as now exists, said capping mechanism being equipped with capping heads constituting the present invention;

Figure 2 is a cross-sectional elevation of a preferred form of the new and improved capping device as seen along the lines 2—2 of Figure 3;

Figure 3 is a view of the capping device taken along the lines 3—3, Figure 2;

Figure 4 is a cross-sectional elevation, like Figure 2 except that the bottle has been raised its full stroke, to show the spinning action of the spring arms; and

Figure 5 is an elevation of a bottle neck with the metallic cap applied thereto broken away to show how it conforms to the entire lip surface of the bottle.

Referring first to Figure 1, an upright rotatable shaft 10 forms an integral part of a capping machine such as is ordinarily used for the application of the usual discs to milk bottles 11, disposed on moving bottle holders 12. The holders 12 move along on supporting uprights 13 having rollers 14 at their lower ends which move along a cam track 15 and are thereby raised and lowered in the course of their movement. The bottles 11 carried on the holders 12 are raised and lowered relative to the capping heads as will presently be explained.

A capping head support, generally designated by the numeral 16, is adjustable, both rotatably and vertically, on the upright shaft 10 and may be clamped in any desired position thereon by clamping means 17.

A plurality of circumferentially spaced supporting members 18 are radially disposed about the support 16. Each supporting member has a laterally open body portion provided with spaced parallel webs having opposed vertical grooves 19 formed therein. Extensions of these webs join a vertical guide 20.

The grooves 19 receive corresponding slide portions on the sides of the usual fiber cap applying heads and the vertical guide 20 cooperates with the upper end of a vertical stem portion of such capping heads, the engagement of these parts being normally a detachable one, whereby they may be readily removed for cleaning purposes, or for repair and substitution of parts.

According to the present invention, a metallic cap applying device is provided which may be substituted for the disc cap applying heads and carried on the same supporting members 18 of the same capping head support 16.

A horizontal platform 21 is rigidly supported in spaced relation to the members 18 by the vertical guides 20. Upon the under side of this platform 21 at spaced points therearound are a plurality of fixed bearing supports 22 which are formed in the platform 21 in vertical alignment with the axes of the several supporting members 18.

Motors 24, mounted on the platform 21, individually drive the vertical depending stub shafts 23 which may be provided with suitable bearings mounted in the bearing supports 22. A current distributor 25, also carried on the platform, is provided for distributing the necessary operating current to the motors 24. This distributor consists of a member relatively fixed on the supporting frame and insulatedly carrying two collector rings and two terminals connected to said collector rings and adapted to be connected to the

source of current. In the movable part of the device, which is the housing designated by the numeral 25, is mounted a pair of brushes, one of which bears on one collector ring, and the other of which bears on the other collector ring. These brushes are connected to the motors 24 so that they may receive current from the source as they rotate about the axis 10 of the machine.

As current is supplied to the individual motors 24, the several stub shafts rapidly rotate.

It must be understood that the motors and stub shafts are provided only for my new and improved head, to be presently described, therefore the individual motors and the distributor 25 also form a part of my invention.

The lower end of each of the stub shafts 23 has a portion milled off leaving a surface 27 slightly to the left of the center line, as seen in Figure 2, and a second portion milled away leaving a surface 26 to the right of the center line, so that a tongue portion faced by the surface 27 overhangs the surface 26.

My new and improved capping mechanism, which is in effect a spinning device for spinning and forming metallic caps on the lips of milk bottles or the like so as to entirely embrace said lips, has a shaft 29, the upper portion 30 of which is formed exactly like the lower end of the stub shaft 23 just described.

In Figure 2 the surface 27*a* on the shaft 30 corresponds to the surface 27 of the stud shaft 23 and the surface 26*a* corresponds to the surface 26 on the stud shaft 23. When the upper end 30 is placed in cooperative relation with the stub shaft 23 the surface 27*a* abuts the surface 26 and the surface 26*a* abuts the surface 27, thereby placing the stub shaft and the shaft 29 in alignment axially.

In order to maintain these shafts in alignment a sleeve 31, normally slidably mounted on the stub shaft 23, is slid downwardly until it comes to rest against the stop ring 32.

The shaft 29 has a shouldered portion 33 on which is pressed a suitable frictionless bearing 34, a second shoulder 35 forming a shoulder against which the inner race of the bearing 34 is pressed. The shaft 29 may also have formed integral therewith or secured thereto a cup-shaped portion 36 having a cylindrical cavity 37 formed therein.

About the cup-shaped member 36 and preferably formed integral therewith is a flange 38. Spaced apart from the flange 38 is a second flange 39.

A plurality of tubular members, one of which is designated by the numeral 40, form spacers defining the space between the flange 38 and flange 39. These spacers are held into position by screws, designated by the numeral 41, passing through the flange 38 and threaded into the flange 39.

The flange 39 has a boss portion 42 having an interior bore 43 of substantially the same diameter as that of the cylindrical cavity 37.

Beginning at the cylindrical cavity 37 and extending up into the shaft 29 is formed a hole 44 preferably concentric with the shaft 29. A spring 45 is mounted in the hole 44 so that one end 46 contacts the end of the hole and the end 47 contacts a ball 48. A sleeve 49 forms a working fit in the hole 44 and is secured therein by means of a set screw 50. The sleeve 49 carries "needle" roller bearings 51, 52. The shaft 53*a* is carried on the "needle" bearings 51, 52 and carries on its upper end a screw 53, the head 54 of which is hardened, ground and polished. The head 54 is of sufficient diameter to overlie the upper end of the sleeve 49 and yet provide clearance between itself and the bore of the hole 44, therefore the sleeve 49 forms a stop to limit the lower position of the member carried on the lower end of said shaft, which member will presently be described.

The ball 48, under the urge of the spring 45, tends to normally hold the head 54 of the screw 53 against the upper end of the sleeve 49. The lower end of the shaft 53*a* carries a disc 55 which forms a working fit in the cylindrical cavity 37 and the bore 43.

The shaft 53*a* has a groove formed therein in which is mounted a spring ring 56, and a washer 57 is positioned between the disc 55 and the spring ring 56. The lower end 58 of the shaft is of reduced diameter and carries in fixed relation to the shaft a disc 59 which has a hollow 60 formed therein, the peripheral edges 61 of which are rounded to conform to a portion of the upper surface of the lip of a milk bottle. Within the hollow 60 is formed an annular groove 62.

The outer race of the bearing 34 is pressed into a hole formed in a body 63. The hole in the body 63 is stepped and carries within the stepped portion a felt washer or the like 64. Extending vertically from the body 63 are rectangular studs 65, 66. These studs may be formed integral with the body or they may be threaded into the body, as shown in Figure 2.

The studs 65, 66 engage respectively slots 67 and 68 formed in the supporting members 18, of which a fragmentary portion of one is shown in Figure 2.

A plurality of downwardly extending studs 69 are mounted in the flange 38 and each is adapted to be engaged by the tail 70 of a helical spring 71. Each spring 71 is supported between the flange 38 and flange 39 by a screw 72. The screws 72 are preferably headless screws and extend through clearance holes in the flange 38 and engage threaded holes in the flange 39.

The long arm 73 of each of the springs 71 normally rests against the periphery of the disc 55 within the clearance space 74 between the arm of the cup-shaped member 36 and the upper surface of the flange 39.

In the embodiment herein shown and described six of the springs 71 are shown. However, I do not intend to limit myself to any given number of springs.

The bottles 11, after having been properly filled with the product and delivered to the capping machine, are successively raised into engagement with the new and improved capping device, a metallic cap blank 75 having been positioned over the mouth of said bottle.

It might be pointed out that where desired the usual inside disc cap may have been previously applied. However it has been found that metallic caps alone are sufficient to retain the product in the bottle and at the same time protect the lips of the bottle from contamination due to the fact that my new and improved device spins the metallic cap over the entire lips of the bottles in fluid tight relation thereto. In other words, not only does my new and improved device apply a metallic cap to prevent the lip of the bottle from being contaminated but it also applies it in sufficiently tight relation to the lip of the bottle to prevent the product from leaking out, even though the bottle be overturned or inverted.

As the bottle 11 is raised in its holder 12, due to the travel of the roller 14 over the cam track 15, the mouth of the bottle, together with the metallic cap blank, first encounters the hole 60 in the disc 59 and starts raising this disc, together with the shaft 53a, against the urge of the spring 45. This causes the portion of the cap blank 75 in contact with the hollow surface of the disc 59 to conform to the shape of that surface.

As the bottle causes the disc 59, together with the shaft 53a, to continue to rise, the long arms 73 of the springs, which might be termed "spinning arms," and which normally rest against the periphery of the disc 55, to first come in contact with the periphery of the disc 59 and thereafter, after the bottle continues to raise the disc 59, the spinning arms 73 establish contact with the foil blank 75 and thereby progressively spin the metal of the cap into intimate contact with the entire surface of the lip of the bottle.

The cam track is so proportioned that it raises the bottle up to the point where the spinning arms 73 have traversed the entire lip surface down to the actual neck of the bottle, as shown in Figure 4.

Then the bottle starts receding, due to the action of the cam track, and the spinning arms again traverse the entire lip surface of the spun metallic cap, all the way up until they again contact the periphery of the disc 59 and upon further withdrawal of the bottle, they contact the periphery of the disc 55.

It is, of course, understood that as the bottle is withdrawn from the spinning head the disc 59 remains in contact with the cap, due to the urge of the spring 45, until the head 54 of the screw 53 comes to rest against the upper end of the bushing 49 and thereafter the bottle is free for the remainder of its stroke downwardly.

Since the bottle does not rotate on its holder 12 and since the disc 59 and the shaft 53a are rotating at a high speed, the disc 59 stops rotating when it comes into firm contact with the cap, which is to be applied to the bottle. This disc and the shaft 53a then become stationary and the frictionless bearings 51 and 52 continue to rotate about the shaft 53a. There is, therefore, very little friction load tending to urge the disc into rotation when the latter is in contact with the cap on the mouth of the bottle.

The presence of the ball 48, which makes practically point contact with the hardened surface of the head 54, therefore reduces the friction on the stationary portion of the device while the metallic cap is being spun onto the lip of the bottle.

Although I have herein shown and described a preferred embodiment of my new and improved spinning head in which a plurality of spring loaded spinning arms traverse a metallic cap blank and cause it to conform to the entire lip of the bottle of milk or the like, it must be understood that many changes may be made in the embodiment herein shown and described without departing from the spirit of the invention as set forth in the annexed claims.

What is claimed is:

1. In bottle capping mechanism, in combination, a capping head support having a radially projecting supporting member, a vertical opening formed in said supporting member with oppositely disposed vertical grooves therein, guide means extending above said opening, a second support rigidly connected to and vertically spaced apart from said first support, an electric motor having a stub shaft thereof vertically journaled in said second support in vertical alignment with said supporting member, a rotatable capping head positioned below said supporting member, a shaft carried by said capping head and vertically extending through said supporting member and its guide, coupling means detachably connecting the said capping head shaft to said stub shaft, bearing means carried on the lower portion of said capping head shaft and having vertical guide arms engaging said grooves, and cap spinning members carried by and operating in connection with the said capping head, said spinning members including spring means urging said members toward the axis of said head.

2. In a capping mechanism, in combination, a revolving support having an outwardly extending supporting member, opposed parallel vertical grooves formed therein, a capping head positioned below said supporting member, a shaft carried by said head and extending vertically through said supporting member, a bearing member for the lower portion of said shaft, a metallic plate for said bearing member carrying spaced parallel vertical arms engaging said grooves, cap spinning tools carried on said head, a second support rigidly connected to and spaced above said first support, a motor-actuated vertical stub shaft journaled in means carried on said second support and depending there below in inter-connected driving relation with said capping head shaft, and a sleeve vertically shiftable on the stub shaft to cover and uncover the inter-connected ends of said shafts.

3. In a capping mechanism, in combination, a revolving support having an outwardly extending supporting member, opposed parallel vertical grooves formed therein, a capping head positioned below said supporting member, a shaft carried by said head and extending vertically through said supporting member, a bearing member for the lower portion of said shaft, a metallic plate for said bearing member carrying spaced parallel vertical arms engaging said grooves, cap spinning devices carried on said head, a second support rigidly connected to and spaced above said first support, a motor positioned on said second support and having a vertical stub shaft extending downwardly therefrom to a position below said second support and in interconnected driving relation with said capping head shaft, and a sleeve vertically shiftable on the stub shaft covering the inter-connected ends of said shafts and adapted to be moved upwardly on said stub shaft by an operator when said shafts are to be disconnected.

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