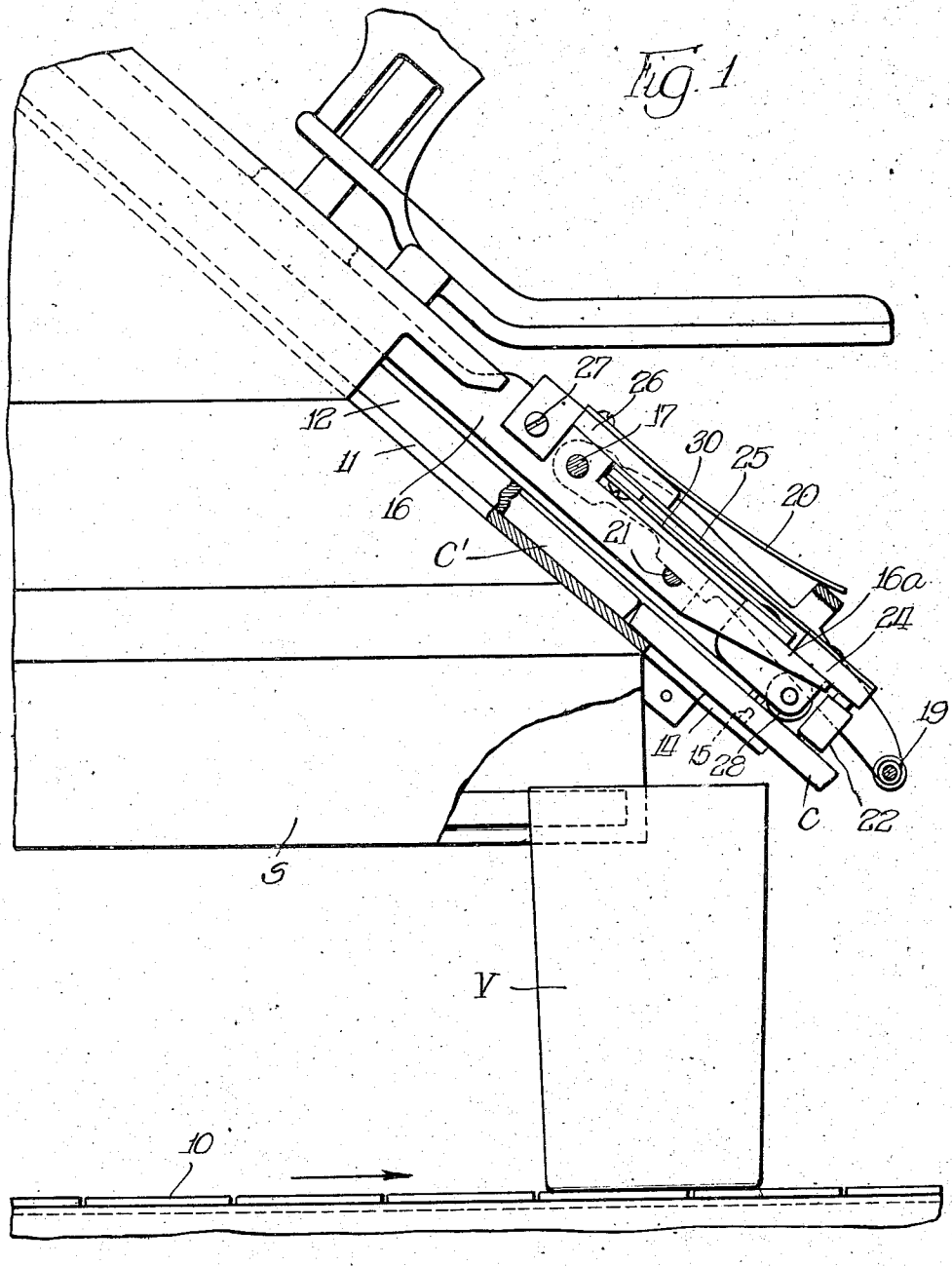
Dec. 21, 1943. L. E. DAVIES 2,337,032

CAP APPLYING APPARATUS

Filed April 17, 1940 2 Sheets-Sheet 1

Fig. 1



INVENTOR.
Lynn E. Davies,
BY Cromwell Greenbaum
ATTORNEYS.

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Fig. 2

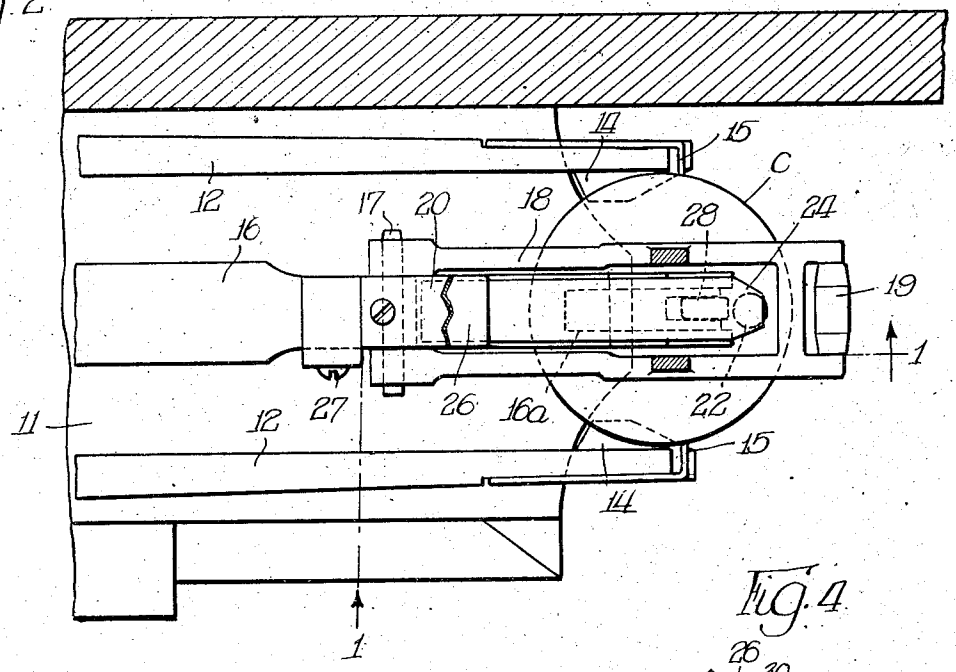


Fig. 4

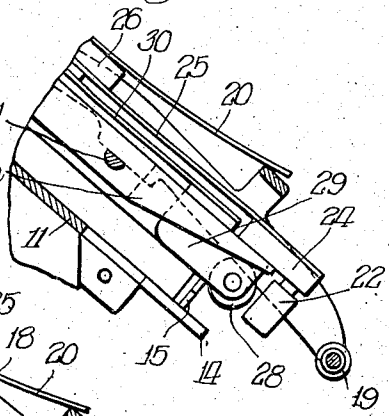
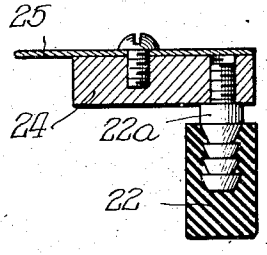


Fig. 3

Fig. 5



INVENTOR.
Lynn E. Davies,
BY Cromwell & Mitchell
ATTORNEYS.

Patented Dec. 21, 1943 2,337,032

UNITED STATES PATENT OFFICE

2,337,032

CAP APPLYING APPARATUS

Lynn E. Davies, Park Ridge, Ill., assignor to White Cap Company, Chicago, Ill., a corporation of Delaware

Application April 17, 1940, Serial No. 330,031

6 Claims. (Cl. 226—88.1)

This invention relates to apparatus for applying closure caps to packing vessels, such as bottles, jars, tumblers or cans, incident to the continuous progressive movement of the containers in close succession one after another past the cap-applying station.

A general object of the invention is the provision of apparatus which will operate automatically and at a high rate of speed to apply the closure caps to the packing vessels with certainty and accuracy in proper positions to be hermetically sealed thereon, and to avoid interference of the successive closure caps with one another even though they may be of very shallow form and of quite small diameter.

A particular object is the provision of such apparatus which will be effective to prevent the closure caps overrunning the packing vessels or being propelled ahead of them in instances where the progressive movement of the vessels is quite rapid.

Other and further objects of the invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon an understanding of it or employment of it in actual practice.

For the purpose of aiding in an explanation of the invention, I show in the accompanying drawings, forming a part of this specification, and hereinafter describe, one form of mechanism in which it may be embodied. It is to be understood, however, that this is presented merely by way of illustration and is not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 is a side elevational view of apparatus embodying the invention, shown with certain parts broken away in order to illustrate the structure more clearly;

Fig. 2 is a top view of same;

Fig. 3 is a view corresponding generally to the lower portion of Fig. 1, but showing the parts in other positions which they assume incident to withdrawal of a closure cap from the cap feeding mechanism and the application of the cap to a packing vessel;

Fig. 4 is a detail similar to Fig. 3 but showing the parts in the relationship which they assume when no cap is present; and

Fig. 5 is a detail in the nature of a sectional view of a snubbing or retarding device forming a part of the mechanism illustrated in the other figures, same being shown on an enlarged scale.

The invention relates generally to the type of cap-applying and sealing mechanism illustrated in the patent to White No. 2,041,891 and in my Patent No, 2,169,973, which machines employ a sloping chute down which the closure caps are fed in succession one after another and presented successively in the path of a series of packing vessels to which they are to be applied respectively, which packing vessels are moved with a continuous progressive movement past the cap-applying station. As it passes the cap-applying station each vessel engages a cap presented by the cap-applying mechanism and withdraws it from the chute, with the purpose of having the closure come to rest in proper position for sealing on top of the packing vessel.

Where the caps are of small diameter or of shallow form, and the packing vessels are moved rapidly and in close succession past the cap-applying station, it may sometimes occur that some of the caps may be propelled too rapidly ahead of the packing vessels, because of the force of the initial impact of the latter upon them, or for other reasons. This may result in the caps not seating properly on the vessels.

The present invention is designed primarily to prevent such occurrences and the manner in which it accomplishes this object will be understood most readily from a consideration of the illustrative embodiments shown in the drawings, which will now be described.

As observed in Fig. 1, let it be understood that the reference numeral 10 designates a continuously operating conveyor in the nature of a chain belt or the like, which is moved in the direction of the arrow to advance progressively, in a series, packing vessels such as tumblers, jars, cans or the like, which are set upon it. One of such packing vessels is illustrated at V.

In sloping position over the conveyor is a cap chute including a runway 11 down which the closure caps may slide by gravity, in a series one after another. The lower end of this runway is positioned sufficiently above the conveyor 10 to permit the packing vessels to pass under it. At the sides of the runway are guide rails 12, which may be adjustable laterally toward and from each other to accommodate the apparatus to caps of different diameters. These guide rails serve the purpose of guiding the closure caps in alignment one after another as they move down and are supported on the runway. At their lower ends these guide rails 12 carry ledge members 14, the upper surfaces of which align with the upper sur-

face of the runway, and these ledge members, in effect, form movable or adjustable extensions of the runway, in that they serve to support the lowermost cap of the series. In order to prevent the lowermost cap sliding off of the runway prematurely, these guide members 12 are provided with stop portions 15 which engage the lowermost cap slightly ahead of its transverse diameter, and thus serve to retain it in a sloping position with its lower portion projecting downwardly and beyond the lower ends of the runway and ledges 14, substantially in the position illustrated at C in Figs. 1 and 2. The succeeding caps, designated C' in Figs. 1 and 3, are held in position by the retention of the lowermost cap C and feed downwardly along the runway by gravity when the lowermost cap is withdrawn from the runway.

Such withdrawal is accomplished by the engagement of the approaching vessel V with the depending portion of the lowermost cap C, substantially as illustrated in Fig. 3, whereupon, incident to the progressive movement of the vessel, the lower portion of said cap is lifted until it clears the retaining parts of the stop members 15, whereupon it is moved forwardly by the vessel and finally withdrawn from the runway.

For the purpose of controlling the caps, both as to positioning the lowermost cap properly for cooperation with the approaching vessel, and retaining it in proper relationship thereto while the vessel is withdrawing it from the chute, I provide cap-applying mechanism which, in the form here illustrated, includes a guide bar 16 which overlies the medial portion of the runway 11, being spaced therefrom a proper distance to accommodate the movement of the closure caps downwardly below it but prevent them riding up on top of one another. The lower end portion of this guide bar is bifurcated and beveled upwardly at its lower side, as illlustared at 16*a* in Figs. 1 and 2. At some distance rearwardly from its lower end, this guide bar carries a pintle pin 17 upon which is hinged a bifurcated yoke frame 18, which straddles the lower end portion of the bar 16 and projects somewhat beyond it, and carries at its lower end a cap-depressing member 19 in the nature of a free-running roller. This roller normally is held at an elevation somewhat below the upper surface of the lowermost closure cap, as illustrated in Fig. 1, and hence is adapted to ride upon and press down the closure cap when the latter is drawn forwardly under it, as illustrated in Fig. 3. The frame 18 and roller 19 are urged toward their lower limit position by a spring 20, and their lower limit position is established by a stop member 21 which the yoke contacts.

In order to restrain the closure cap definitely in cooperative engagement with the vessel, incident to the cap-applying operation, and prevent its being propelled ahead of the vessel by initial impulse upon contact of the latter, I provide a snubbing or restraining device, which includes a non-abrasive friction member 22, in the nature of a block of flexible but firm rubber mounted upon a holder 24 which is supported on and carried by a leaf spring 25, which leaf spring is secured to a bracket 26 that is fastened to the guide bar 16 at 27. The arrangement of parts is such that the snubbing device normally takes the position illustrated in Fig. 1, at which time the holder 24 seats upon the lower end portion 16*a* of the guide bar under the influence of the spring 25, and the lower end of the friction member 22 is just clear of the plane which will be occupied by the lowermost closure cap. Hence the closure cap may move freely to the position illustrated in Fig. 1 without interference from the friction member 22.

However, when the closure cap in this position is contacted by the approaching vessel, it will be lifted immediately into engagement with the friction member 22 and the latter will be held definitely and firmly in engagement with it by spring 25. Hence the closure cap is afforded no opportunity for jumping forward when initially contacted by the vessel, or for outrunning the vessel thereafter. This insures that the leading margin of the closure cap skirt or flange is maintained in contact with the leading margin of the vessel, and hence that the cap will drop down into properly seated position on the vessel when its rearward margin rides off the end of the runway 11, which it is just about to do in the position illustrated in Fig. 3.

For the purpose of insuring that the closure caps will be fed to proper position under the friction member 22 and that they will not be stopped by running against it, I may provide to the rear of the friction member a flexibly mounted guide device, such as here illustrated as comprising a guide roller 28, which is mounted to rotate freely in an adjustable carrier 29. This is carried on a spring 30 which is mounted on the bracket 26. In its lowermost position, which is illustrated in Fig. 4, the periphery of the roller 28 is slightly closer to the plane of the upper surface of the runway 11 than is the lower end of the friction device 22. Hence, a cap sliding down the runway is prevented from running against the friction device 22, as the roller holds the cap down in contact with the runway until its forward portion has passed under and beyond the lower end of the friction member 22. The weight of the guide device and pressure of its spring are only sufficient to deflect the forward margin of the closure cap downwardly should it tend to rise from the runway, and they do not impose any material amount of drag or resistance to the progressive movement of the cap. Hence it is free to move downwardly under them by gravity. However, due to their flexible mounting by means of the spring 30, they are adapted to rise, as to the position illustrated in Fig. 3, to accommodate themselves to the elevating of the closure cap incident to its disengagement from the stops 15 and withdrawal from the runway.

In course of time the friction member is likely to become somewhat abraded or worn, and hence I provide that it may be very quickly and easily replaced. One fashion of accomplishing this is illustrated in Fig. 5, wherein it is shown as of thimble form with a cavity having a channeled or serrated wall which is adapted to fit closely on a mating post member 22*a*. When the friction member is worn, it may be stripped off of the post member and a new one pressed onto the post, where it will be securely retained by virtue of its elastic character and the mating fit of the serrated portions.

By virtue of the cooperatively functioning elements above described, the feeding and application of the closure caps may be definitely and certainly controlled at all times, and therefore permit the packing vessels to be fed past the cap-applying station rapidly and in close succession one after another, with assurance that a closure cap is properly and accurately applied to each.

It will be understood, of course, that this de-

vice is adapted to be employed ahead of a suitable sealing element which may be of the sort designed to apply downward sealing pressure to the closure cap, and that it also may be employed in conjunction with means for evacuating air from the head space of the vessel and cavity of the closure cap, as by displacement with steam, or otherwise. Such a steam displacement apparatus is illustrated in the White patent above referred to.

I claim:

1. In a capping apparatus wherein vessels are moved in succession past a cap-applying station, and including a sloping runway for delivering caps to the cap-applying station in a series one behind another, cap-applying apparatus comprising retaining means at the lower end of the runway for detaining a cap in position for engagement with one of the vessels at the cap-applying station, and a non-abrasive frictional retarding device supported at the cap-applying station above and clear of the path traveled by the caps in their movement into engagement with the retaining means and in position to maintain rubbing contact with the upper surface of the cap incident to its withdrawal past said retaining means, and a non-friction guide member disposed above the runway adjacent the rearward side of the frictional retarding device in position to prevent a cap which is approaching said retarding device from moving into abutment with it.

2. In a capping machine wherein vessels are moved progressively in a horizontal plane past a capping station and including a sloping runway for delivering closure caps to the capping station in a series one after another, cap-applying apparatus comprising a stop cooperating with said runway to support a closure cap in sloping position at the capping station with its forward rim depending in position to be engaged by a passing vessel and swung upwardly to disengage the cap from the stop, and a non-abrasive frictional retarding device disposed forwardly beyond said stop in the direction of the vessels' movement and at an elevation where said retarding device is above but clear of the cap in the normal position of rest of the cap when the cap is in engagement with the stop but where said retarding device will be engaged by the top surface of the cap when the latter is swung upwardly prior to its disengagement from the stop.

3. Cap-applying apparatus as specified in claim 2 and including means for holding the frictional retarding device yieldably in engagement with the cap during withdrawal thereof from the runway by the passing vessel.

4. Cap-applying apparatus as specified in claim 2 and wherein the frictional retarding device is yieldably mounted to permit its being moved upwardly by the cap when the forward rim of the latter is swung upwardly.

5. Cap-applying apparatus as specified in claim 2 and wherein the inclination of the runway toward the cap-applying station exceeds the angle of repose of caps thereon and the frictional retarding device is positioned beyond the lowermost end of the runway.

6. Cap-applying apparatus as specified in claim 2 and wherein the frictional retarding device is movable upwardly against yielding pressure and in its normal position extends into the path in which caps are moved forwardly from the stop by the vessels.

LYNN E. DAVIES.