Oct. 28, 1941. R. J. STEWART ET AL 2,260,349

CAPPING MECHANISM

Filed March 4, 1939 2 Sheets-Sheet 1

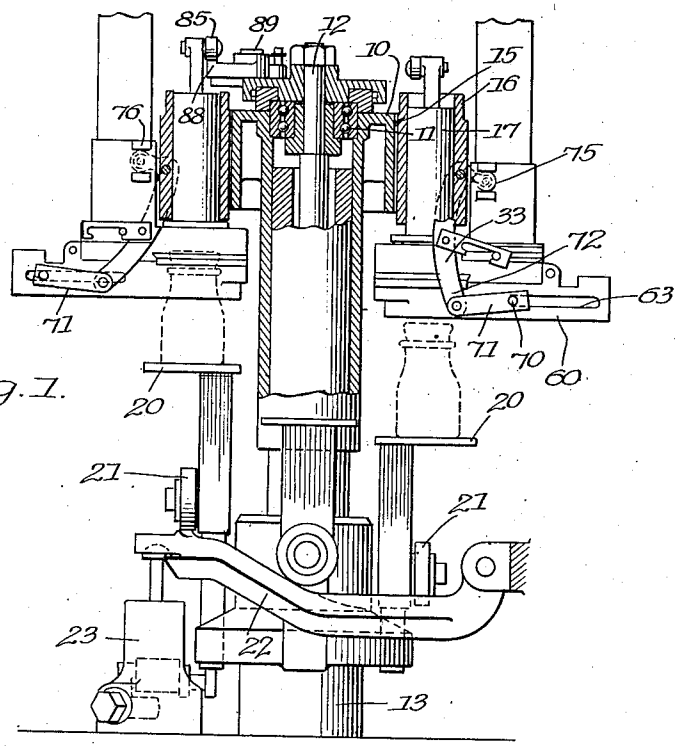

Fig. 1.

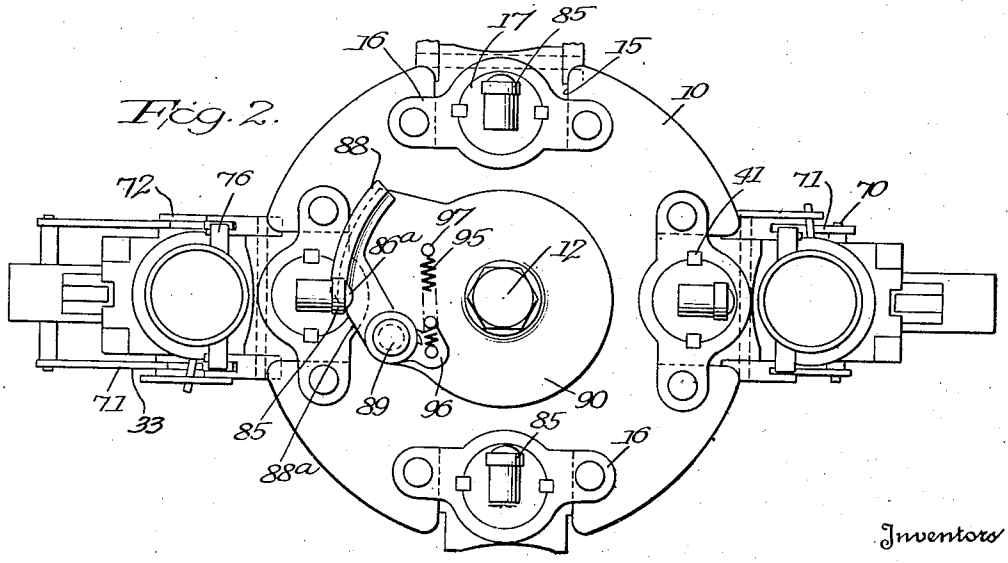

Fig. 2.

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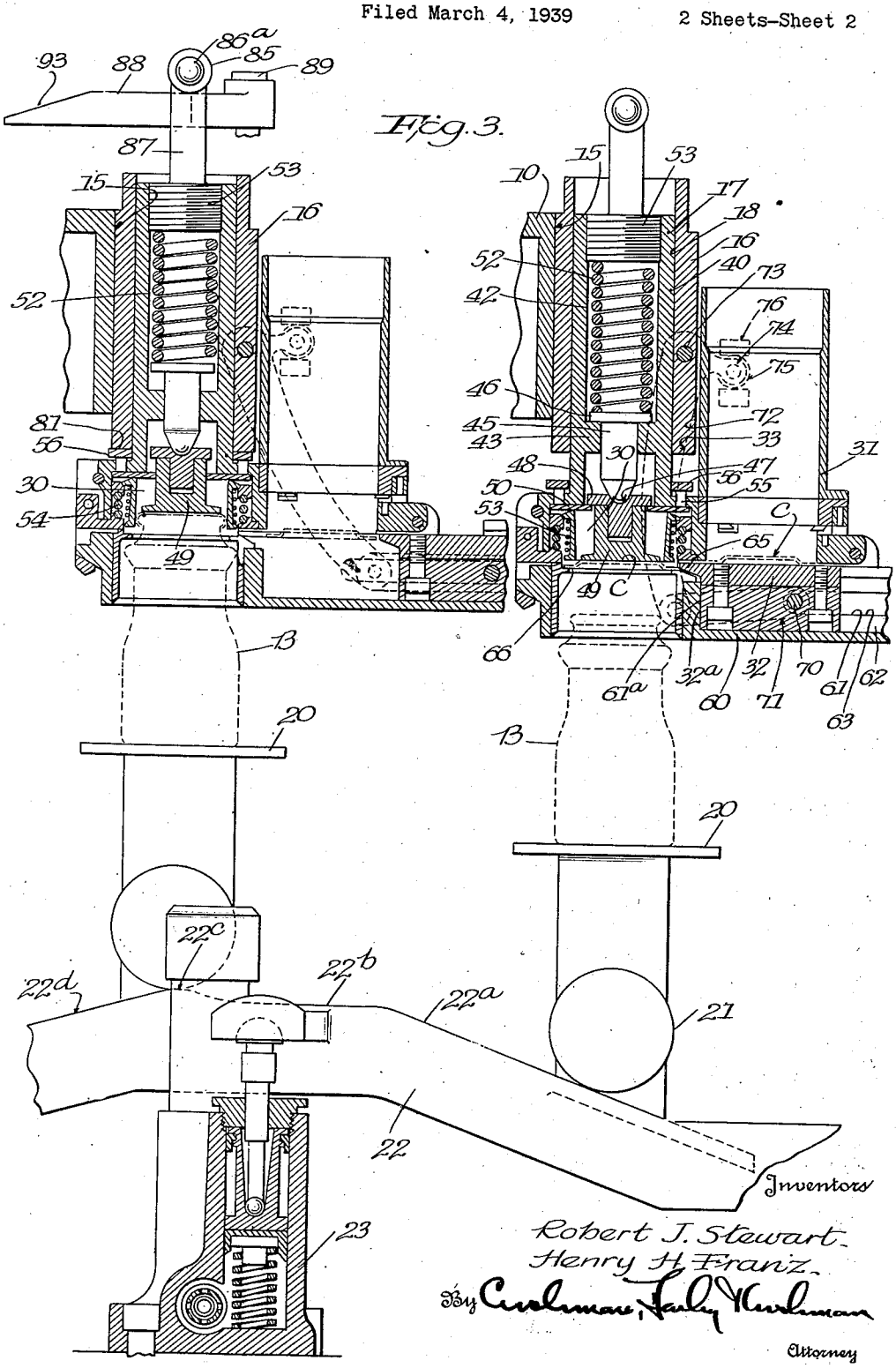
Fig. 3.



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CAPPING MECHANISM

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Application March 4, 1939, Serial No. 259,897

16 Claims. (Cl. 226—84)

The present invention relates to capping mechanisms.

The capping heads used with some types of containers, and particularly milk bottles, comprise a capping chamber, a cap supply chamber, and means to move the lowermost cap in the cap supply compartment to the capping chamber. The cap feeding means is ordinarily operated by reason of the vertical movement of the capping head with respect to a support. Such vertical movement of the capping head results from contact of a bottle with the capping head, either by reason of an upward movement of the bottle toward the capping head, or a downward movement of the capping head and its support toward the bottle. In either case, contact of the bottle with the capping chamber of the capping head will move the capping head upwardly with respect to its support, the cap within the capping chamber being applied to the bottle during such movement. During this same movement, the cap feeding means will be moved backwardly and into engagement with the lowermost cap in the cap supply chamber. Subsequently, when the bottle moves away from the capping head support, or vice versa, permitting the capping head to descend in its support, this descending movement of the capping head will cause the cap feeding means to move the lowermost cap in the cap supply chamber to the capping chamber. Obviously, means must be provided to delay the downward movement of the capping head until after the mouth of the bottle is substantially clear of the capping chamber, otherwise the presence of the bottle in the capping chamber would prevent a fresh cap from being placed in the latter chamber.

Capping heads of this type, that is, capping heads whereby movement of a cap from the cap supply chamber to the capping chamber is controlled by contact of a bottle with the capping head, are extremely advantageous due to the fact that it is impossible to feed an additional cap into the capping chamber if no bottle is presented to that chamber, since the feed of caps to the capping chamber is dependent upon the contact of a bottle with the capping head.

Heretofore, in the use of capping heads of the above general type upon rotary machines, each capping head has been provided with a latch which engaged the capping head support to hold the capping head in raised position after the latter had been lifted by contact of a bottle therewith. In such machines, a fixed trip was provided in the path of movement of the capping head which trip would subsequently be engaged by the latch so that the latch would be released and the capping head dropped a few moments after the bottle had moved away from the capping head. Such arrangement has been open to the disadvantage that the latches would become worn, so that (1) they would not hold the capping head raised for a sufficiently long period, or (2) would not engage at all. In the first instance, that is, if the latch became partially engaged, but later dropped before the bottle had descended sufficiently far, the relatively heavy capping head would drop upon the mouth of the bottle, resulting in breakage of the bottle and waste of the bottle contents. In the second instance, that is, where the latch did not become engaged at all, the capping head would descend simultaneously with the movement of the bottle from the capping head, and the cap feeding means would be actuated while the bottle was still in contact with the capping head, resulting at least in damage to the cap being fed into the chamber. In such case, unless the failure of the latch mechanism was noticed by the operator, the next bottle presented to that capping head would have a deformed cap applied thereto.

The principal object of the present invention is the provision of a simple and very efficient means to hold the capping head of a capping structure of the type described above raised for a suitable interval after the bottle and capping head have separated, as by lowering of the bottle.

A further object of the invention is the provision of a capping head holding means which will be movable from the path of a capping head which has no bottle positioned beneath the same.

Other objects and advantages of the invention will be apparent from the following drawings wherein:

Figure 1 is a side elevation, partly in vertical section, of a capping structure including the present invention.

Figure 2 is a top plan view of the structure of Figure 1, with portions broken away, and

Figure 3 is a view showing two capping heads, each positioned at a different point with regard to the crowning cam, the crowning heads being illustrated in vertical section and the remaining structure being illustrated in side elevation.

Referring to Figures 1 and 2, the numeral 10 designates a supporting casting or table element which is journalled as at 11 upon a post 12. The post 12 extends upwardly from a base 13 and the supporting casting 10 is adapted to be rotated about the post 12 by any suitable means. The

supporting casting 10 is provided with a plurality of circumferentially spaced vertically extending pockets 15, each of which is adapted to receive a capping head carrier bracket or capping head support 16 of the type disclosed in our application for Closure applying mechanism filed March 4, 1939, Serial No. 259,898. Each carrier plate or support 16 has a capping head 17 reciprocably mounted in a vertical bore 18 thereof and a vertically reciprocable bottle supporting platform 20 is aligned with the lower end of each capping head as shown in Figure 1.

The bottle supporting platforms 20 are adapted to have bottles positioned thereon by any suitable feeding means, and each platform has a roller 21 associated therewith. Each platform will be moved upwardly from the position shown at the right of Figure 1 to that shown at the left of Figure 1 by engagement of the corresponding roller 21 with an arcuate cam 22 which partially encircles the base 13 of the mechanism. The cam 22 may be of any form, the embodiment illustrated in the present figures being of a compensating type disclosed in our said application for Closure applying mechanism.

The capping heads 17 are generally similar to those disclosed in Patent No. 1,956,218, for Capping heads, issued to George J. Huntley and Harry A. Rau, on April 24, 1934, in that each capping head 17 is vertically reciprocable in a support, and each capping head has a capping chamber 30 at its lower end into which cap blanks C are delivered from a cap supply chamber 31 by a pusher 32 controlled by a bell crank 33 adapted to be swung from the position indicated at the right of Figures 1 and 3 to that shown at the left of these two figures by the vertical movement of the capping head 17, including the cap supply chamber 31.

More specifically, each capping head 17 includes a throat carrier in the form of a cylinder 40 which is slidably mounted for vertical movement in the bore 18 of carrier bracket 16, cylinder 40 being provided with vertically extending diametrically opposite keys 41 (Figure 2) to guide its vertical movement. The vertical bore 42 of cylinder 40 is restricted adjacent its lower end by an annular shoulder 43 and the extreme lower end of the bore and the cylinder are enlarged to form the capping chamber 30. A spindle 45 seats in the restricted portion of the bore 42, the spindle having an enlarged head 46 which normally bears upon the upper surface of shoulder 43. The lower end of spindle 45 is rounded and seats in a socket 47 of a plate 48 which forms the upper part of a presser foot 49. The lower edge of the upper portion 48 of presser foot 49 normally rests upon a plate 50 secured in the upper portion of capping chamber 30.

A spring 52 is positioned in the upper portion of the bore 42, the upper end of the spring bearing against a block 53 which is threaded in the upper end of bore 42 and the lower end of the spring bearing on the head 46 of spindle 45. By this arrangement, the presser foot 49 is normally held in the position shown in the right hand capping head of Figure 3.

A throat ring 53 of well known type surrounds the presser foot 49. In the present embodiment the throat ring and presser foot are of the type disclosed in the patent to George W. Booth No. 1,956,208 issued April 24, 1934, for Capping machine and is designed to mold a flexible cap blank of disc-like form about the locking ring of a milk bottle. In accordance with the Booth patent, and as shown in Figure 3, the upper end of throat ring 53 bears upon a coil spring device 54 and the extreme upper edge of throat ring 53 supports the plate 50. Furthermore, plate 50 has pins 55 extending upwardly through apertures in the upper wall of the capping chamber 30, which pins have a ring 56 secured to their upper ends.

A slide chamber 60 extends horizontally from the capping chamber 30, preferably radially with respect to the supporting post 12 of the entire crowning structure, the slide chamber 60 including a closed bottom wall 61 and side walls 62 each provided with a longitudinally extending slot 63. The upper wall of the slide chamber 60 opens to the lower end of the cap supply cylinder or chamber 31. The pusher block 32 moves in slide chamber 60 and is provided at its inner and upper portion with a tongue 65 which is adapted to engage the lowermost cap blank or disc C in the supply chamber 31 and move it into the crowning chamber 30. During such movement two opposite edge portions of the disc C will rest upon a ledge extending along the side walls 62 of slide chamber 60 in the manner described in said Huntley and Rau patent and when a disc C has been delivered to the crowning chamber 30 its edges will rest upon a horizontal shoulder 66 within said chamber, with the central portion of the disc positioned beneath and substantially in contact with the lower face of the presser foot 49 as shown in the crowning head at the right hand portion of Figure 3.

The pusher block 32 has a pin 70 extending through the same and each outer end of this pin has a link 71 secured thereto, the opposite ends of the links being pivotally connected to the extreme lower ends of a vertically extending and relatively long arm 72 of the bell crank 33. Each bell crank 33 is pivoted to one end of a pin 73 which extends through the carrier or support 16 and the other and short arm 74 of bell crank 33 carries a roller 75 positioned between laterally extending and spaced lugs 76 on the adjacent outer wall of the cap supply cylinder 31.

In the normal operation of the capping structure of the present invention, that is, its operation when a bottle is positioned upon the bottle supporting platform 20 arranged beneath a capping head 17, the rotation of the supporting casting 10 and the bottle supporting platform 20 about the post 12 will cause the platform 20 and bottle B to be moved upwardly by reason of the engagement of the roller 21 of the platform 20 with the incline 22*a* of platform lifting cam 22 as shown in Figure 3. It will be understood that at the time a bottle is positioned upon the platform 20, the platform will be at a slightly lower position than that indicated at the right of Figure 3 so that the lip of the bottle will be below the lowermost portion of the capping chamber 30. Also, at this time, as indicated at the right hand portion of Figure 3, the capping head 46 will be in its lowermost position with respect to the bore 18 of carrier 16, the entire capping head, including the slide chamber 60 and the supply chamber 31, being supported by the vertically extending leg 72 of bell crank 33, pusher 32 being in the inward position shown in the right hand portion of Figure 3 so that its inner face 32*a* contacts with a shoulder 61*a* projecting upwardly from the lower wall 61 of the slide chamber 60. It will be noted that shoulder 61*a* forms the inner end of the slide chamber 60 and termi-

nates slightly below the upper wall of the chamber so that a cap C may be moved above the upper edge of the shoulder by the pusher 32.

As the roller 21 of the bottle platform 20 moves upwardly upon the incline 22a of cam 22, the mouth of the bottle will be moved upwardly into the capping chamber 30 as shown at the right hand capping head of Figure 3. Continued upward movement of the bottle platform 20 will bring the mouth of the bottle B into contact with the underside of the central portion of the cap C positioned beneath the presser foot 49. If desired, a compensating mechanism 23 such as is describel in detail in our said application entitled "Closure applying mechanism" filed of even date herewith may be used to insure that the mouth of the bottle will be in firm contact with the underside of the cap C and that the latter will bear firmly against the lower end of the presser foot 49 during the time that the bottle platform roller 21 is moving over the dwell 22b of cam 22. Cam 22 includes a further incline or rise 22c past dwell 22b and when the roller 21 moves up this incline the bottle supporting platform 20 will rise to force the bottle upwardly so that the presser foot 49 will be raised as shown in connection with the capping head at the left of Figure 3. The contact of the bottle B with the presser foot 49 will initially cause the entire capping head 17 to be raised within the bore 18 of carrier 16 so that the ring 56 will contact with the lower surface 81 of the carrier 16.

This upward movement of the capping head, including the capping cylinder 40, cap supply chamber 31 and slide chamber 60, will cause the lugs 76 fixed to the exterior wall of cap supply chamber 31 to exert upward pressure upon the short horizontal arms 74 of the bell cranks 33, and since the pivot pin 73 of the bell cranks is mounted in the vertically fixed carrier or bracket 6, the bell cranks will swing from the position shown in the right hand capping head of Figure to the position illustrated in the left hand capping head of the same figure. As a result, the pusher 32 will be moved outwardly along the slide chamber 60 so that its tongue 65 will be positioned behind the lowermost cap in the cap supply chamber 31.

Continued upward movement of the bottle B will cause the presser foot 49 to be raised in the now stationary capping head 17 and against the action of the spring 52. During this latter upward movement the central portion of the disc C will be locked between the mouth of the bottle and the presser foot 49, while the edge of the cap C will be molded downwardly about the mouth of the bottle by the throat ring 53 as described in said Booth patent.

At the moment that the presser foot is raised to the extreme upward position shown in the left hand capping head of Figure 3, a roller 85 positioned on a vertical stud 87 extending upwardly from the block 53 of the capping head will move into contact with the upper surface of a cam 88 mounted for pivotal movement in a horizontal plane on a pin 89 secured to a disc 90 fixed to the upper end of the non-rotating central post 12. With the rotation of the supporting casting 10 continuing, the bottle platform roller 21 will move downwardly along a decline 22d of cam 22 so that the bottle B will be moved downwardly out of the capping chamber 30. During the initial portion of this downward movement of the bottle B, the roller 85 at the top of the capping head will still be in engagement with the upper surface of cam 88 so that the crowning head will not descend with the bottle, though the presser foot 49 will, of course, resume its normal downward position by action of the spring 52. When the bottle platform cam 21 has descended a predetermined distance along the decline 22d, the roller 85 will move down a decline 93 of cam 88 so that the capping head 17 may move downwardly in the bore 18 of carrier 16.

The dropping of the capping head 17 in the bore 18 of carrier 16 occasioned by the movement of roller 85 down decline 93 will cause the bell cranks 33 to be swung inwardly from the position indicated in the left hand capping head of Figure 3 to that indicated in the right hand capping head. Such movement of the bell cranks is due to the fact that the lugs 76 on the downwardly moving capping supply chamber 31 will engage the rollers 75 of the bell cranks so that the latter will be swung in a clockwise direction to move the lowermost cap blank C of the cap supply chamber into position beneath the presser foot 49.

As indicated above, the mouth of the bottle will be below the cap supporting ledge 66 of the capping chamber 30 before roller 85 begins to move downwardly along decline 93 of cam 88 so that the inward and cap feeding movement of the pusher 32, with the cap in advance of the same, will not be obstructed.

In the event that no bottle is positioned upon a bottle supporting platform 20, that platform will be raised toward the aligned capping head 17 due to engagement of its roller 21 with the cam 22, but with no bottle positioned upon the platform, the capping head will not be raised with respect to the carrier 16. Consequently, the roller 85 of the capping head will not be raised to the position indicated in connection with the left hand capping head of Figure 3 so as to move upon the top surface of cam 88. The pivotal mounting of cam 88 upon its pin 89 will enable it to swing out of the way of a roller 85 which has not been raised, the leading vertical face of the cam member 88 being bevelled as indicated at 88a in Figure 2 so that the rounded end 86a of the roller carrying pin 86 will readily brush the cam aside. A spring 95 connected to an arm 96 of the cam 88 has its opposite end secured to a pin 97 on the fixed plate 90. The spring 95 serves to normally hold the cam 88 in the position shown in Figure 2 but enables it to swing out of the path of an unraised roller 85.

It will be obvious that by the construction described above, the vertical movements of the capping head will be positively controlled and without damage to containers. Also, we eliminate all possibility of a cap being distorted by reason of being moved toward the capping chamber while the mouth of a container is in the path of movement of the cap.

The phraseology employed in the specification is for the purpose of description and not of limitation, the scope of the invention being indicated in the following claims.

We claim:

1. In a mechanism for applying closures to containers, a fixed support, a table member movable on said support, a closure applying element and a container supporting element carried by said table member, a plurality of cam means to control vertical movement of said elements to apply a closure to a container supported on said container supporting element, one of said cam means being movable from the path of said ele-

ments when no container is carried by said container supporting element.

2. In a mechanism for applying closures to containers, a fixed support, a table member rotatable about said support, a closure applying element and a container supporting element carried by said table member, a plurality of cam means to control vertical movement of said elements to apply a closure to a container supported on said container supporting element, one of said cam means being movable from the path of said elements when no container is carried by said container supporting element.

3. In a mechanism for applying closures to containers, a fixed support, a table member movable on said support, a closure applying element and a container supporting element carried by said table member, a plurality of cam means successively effective to control the vertical position of said elements and thereby apply a closure to a container supported on said container supporting element, one of said cam means being movable from the path of said elements when no container is carried by said container supporting element.

4. In a mechanism for applying closures to containers, a fixed support, a table member rotatable about said support, a closure applying element and a container supporting element carried by said table member, a plurality of cam means successively effective to control the vertical position of said elements and thereby apply a closure to a container supported on said container supporting element, one of said cam means being movable from the path of said elements when no container is carried by said container supporting element.

5. In a mechanism for applying closures to containers, a fixed support, a table member rotatable about said support, a closure applying element and a container supporting element carried by said table member, cam means to move said container supporting element upwardly and, acting through a container supported on said element, to also move said closure applying element upwardly, and cam means to control the vertical position of said closure applying element, one of said cam means being movable from the path of said closure applying element when the latter is not raised by a container.

6. In a mechanism for applying closures to containers, a fixed support, a table member rotatable about said support, a closure applying element and a container supporting element carried by said table member, cam means to move said container supporting element upwardly and, acting through a container supported on said element, to also move said closure applying element upwardly, and cam means to control the vertical position of said closure applying element, said last-named cam means being movable from the path of said closure applying element when the latter is not raised by a container.

7. In a mechansm for applying closures to containers, a fixed support, a carrier movable with respect to said support, a closure applying element and a container supporting element mounted on and reciprocable with respect to said carrier, a plurality of members to control reciprocation of both of said elements when a container is supported on said container supporting element so that a closure will be applied to such container, means to supply closures to said closure applying element upon such movement, at least one of said reciprocation controlling members being movable out of the path of the corresponding element when no container is carried by said container supporting element.

8. In a mechanism for applying closures to containers, a fixed support, a carrier movable with respect to said support, a closure applying element and a container supporting element mounted on and reciprocable with respect to said carrier, a plurality of members to control reciprocation of both of said elements when a container is supported on said container supporting element so that a closure will be applied to such container, means to supply closures to said closure applying element upon such movement, at least one of said reciprocation controlling members being movable from the path of said elements when no container is carried by said container supporting element.

9. In a mechanism for applying closures to containers, a fixed support, a carrier movable with respect to said support, a closure applying element and a container supporting element mounted on and reciprocable with respect to said carrier, means to move one of said elements toward the other and, acting through a container supported on said container supporting element, to move the latter element in the same direction, means to control subsequent reverse movement of said elements, a device to supply closures to said closure applying element actuated by such movements of the latter element, said closure applying element moving means being movable out of the path of the closure applying means when no container is carried by said container supporting element.

10. In a mechanism for applying closures to containers, a fixed support, a carrier movable with respect to said support, a closure applying element and a container supporting element mounted on and reciprocable with respect to said carrier, means to move one of said elements toward the other and, acting through a container supported on said container supporting element to move the latter element in the same direction means to control subsequent reverse movemen of said elements, a device to supply closures t said closure applying element actuated by suc movements of the latter element, one of said ele ment moving means being movable from th path of the corresponding element when no con tainer is carried by said container supportin element.

11. In a mechanism for applying closures t containers, a fixed support, a carrier movabl with respect to said support, a closure applyin element and a container supporting elemer mounted on and reciprocable with respect to sai carrier, means to move said container supportir element upwardly and, acting through a cor tainer supported on the latter, to move the cl sure applying element in the same directio means to control downward movement of sa elements, a device to supply closures to said cl sure applying element actuated by such mov ment of the latter element, one of said eleme moving means being movable from the path the corresponding element when no contain is carried by said container supporting eleme

12. In a mechanism for applying closures containers, a fixed support, a carrier rotatal about said support, a closure applying eleme and a container supporting element mounted reciprocation with respect to said carrier, a c about said fixed support to raise said contai supporting element and, acting through a c

tainer supported by said element, to likewise raise said container applying element, said cam controlling downward movement of said container supporting element, a second cam to control downward movement of said closure applying means, and a device to supply closures to said closure applying element actuated by movement of the latter element.

13. In a mechanism for applying closures to containers, a fixed support, a carrier rotatable about said support, a closure applying element and a container supporting element mounted for reciprocation with respect to said carrier, a cam about said fixed support to raise said container supporting element and, acting through a container supported by said element, to likewise raise said container applying element, said cam controlling downward movement of said container supporting element, a second cam to control downward movement of said closure applying means when the latter has been raised, and a device to supply closures to said closure applying element actuated by movement of the latter element, said last-named cam being movable from the path of said closure applying element when no container is moved to the latter and it is therefore not raised.

14. In a mechanism for applying closures to containers, a fixed support, a carrier rotatable about said support, a closure applying element and a container supporting element mounted for reciprocation with respect to said carrier, a cam about said fixed support to raise said container supporting element and, acting through a container supported by said element, to likewise raise said container applying element, said cam controlling downward movement of said container supporting element, a second cam to control downward movement of said closure applying means when the latter has been raised, and a device to supply closures to said closure applying element actuated by movement of the latter element, said last-named cam being pivotally mounted to be movable from the path of said closure applying element when no container is moved to the latter and it is therefore not raised.

15. In a mechanism for applying closures to containers, a support defining a path of movement, carrier means, closure applying means and container supporting means mounted on said carrier and movable together in said path, means to move said container supporting means relative to said applying means, said applying means being movable with respect to said carrier means by contact of a container upon said container supporting means with the applying means, closure feeding means actuated by movement of said applying means relative to said carrier means, and cam means along said path to control reverse movement of said feeding means, said cam being movable out of said path upon contact of the unraised applying means therewith.

16. In a mechanism for applying closures to containers, a fixed support, a carrier movable with respect to said support, a closure applying element and a container supporting element mounted on and vertically reciprocable with respect to said carrier, means to raise said elements with respect to said carrier when a container is supported on said container supporting element so that a closure will be applied to such container, and a horizontally swinging member carried by said fixed support to control downward movement of said closure applying element.

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