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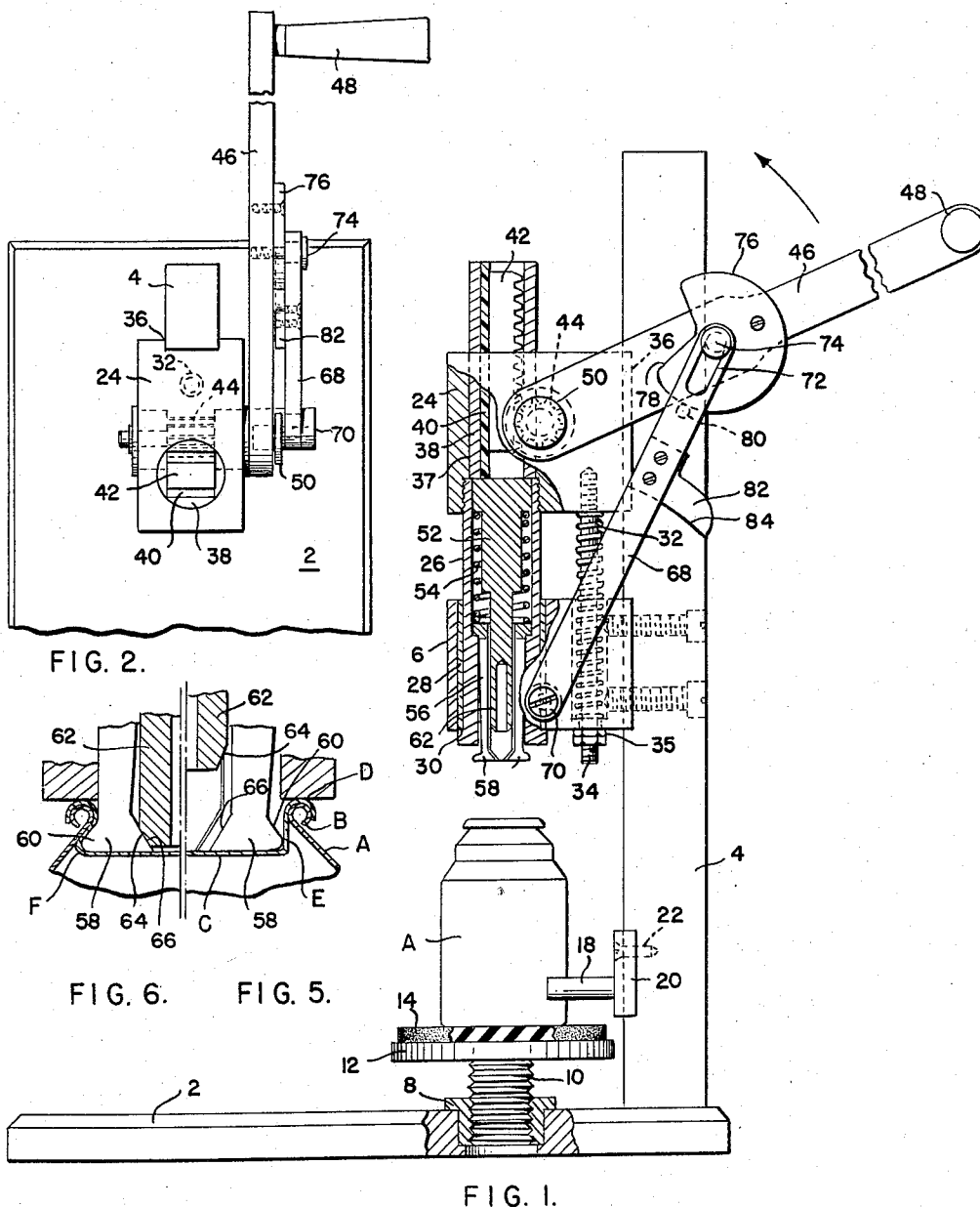
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MACHINE FOR CAPPING CONTAINERS

Filed March 4, 1957

2 Sheets-Sheet 1



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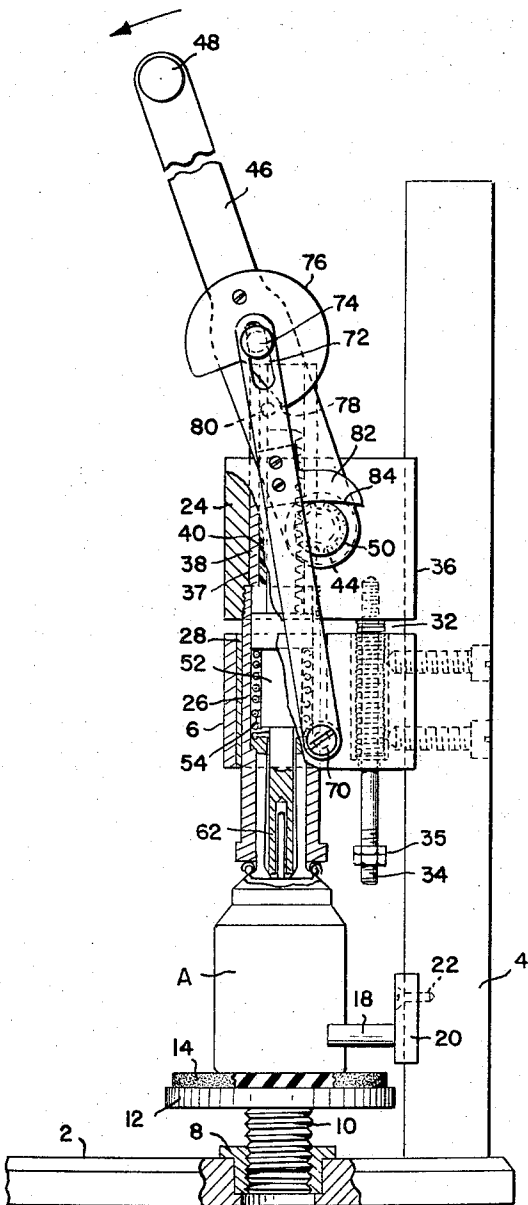


FIG. 4.

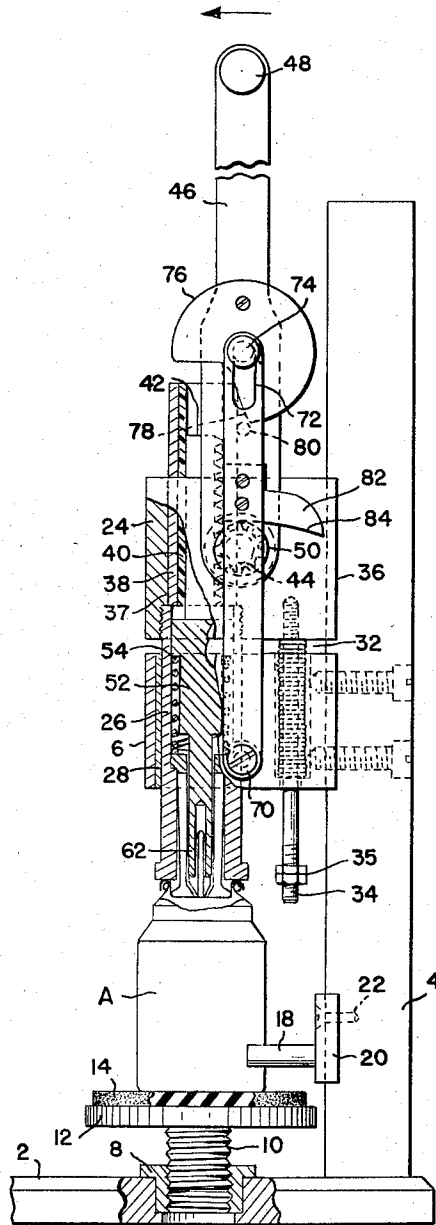


FIG. 3.

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MACHINE FOR CAPPING CONTAINERS

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9 Claims. (Cl. 53—330)

This invention relates to a machine for capping containers, and has particular reference to a machine for securing a cap by pressing radially outwardly the material of a cap which has a portion extending downwardly into the neck of the container.

While the invention may be applied to automatic power operated machinery, it will be shown and described herein in its application to a manually operated capping device which is particularly useful where the number of containers to be capped is insufficient to warrant the expense of automatic machinery. In this use, for example, it is particularly advantageous to small manufacturing concerns or producers of edible products, or the like.

The general object of the present invention is to provide a mechanism which is adapted to secure caps in place with a minimum of complexity but with the attainment of proper and effective capping.

This general object, as well as others particularly relating to details of construction will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Figure 1 is a side elevation, partly in section, showing a preferred embodiment of the invention;

Figure 2 is a fragmentary plan view of the mechanism shown in Figure 1;

Figure 3 is a side elevation, partly in section, of the machine shown in Figure 1 but in an intermediate stage of a capping operation;

Figure 4 is a similar view but showing the final stage of the operation;

Figure 5 is an enlarged detailed sectional view showing an intermediate stage of the operation; and

Figure 6 is a similar view but showing a final stage of the operation.

The mechanism shown in the drawings comprises a base 2 which may be secured to a table, the base being provided with an upright post 4 to which is fixedly secured a block 6 providing a mounting and guideway for the various operating parts of the mechanism.

Within a threaded bushing 8 secured in the base there extends the threaded stem portion of a supporting plate 12 the vertical position of which may be adjusted by rotation in the bushing. The plate 12 desirably is provided with a pad of rubber or similar resilient material 14 on its upper surface for the support of a container A which is to be capped. The container A may be located in proper horizontal position on the base by engagement with a pair of pins 18 carried by block 20 secured at 22 to the post 4. For different sizes or shapes of containers the pins 18, or equivalent guiding elements, and their supporting block 20 may be replaced by others corresponding to the containers to be capped.

A vertically movable block 24 has secured therein a tubular extension 26 which is guided for vertical movement in a bushing 28 secured in the block 6, upward movement of the block being limited by engagement of a shoulder 30 of the tube with the lower end of the bush-

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ing. A spring 32 surrounds a pin 34 secured in the block 24, the spring being seated in a bore in the block 6. Upward movement of the block 24, short of engagement of the shoulder 30 with the bushing 28 may be adjustably limited by nuts 35 threaded on the lower end of pin 34. For proper vertical guidance of the block 24 and prevention of rotation about the axis of tube 26, the block 24 is provided with a guideway at 36 sliding on the post 4.

Block 24 is provided with a cylindrical opening 37 in which there is located a bushing 38 having a rectangular axially extending opening for the guidance vertically of a rack 42 which, for effective anti-friction bearing is desirably backed by a strip of nylon or similar material indicated at 40. The teeth of the rack 42 mesh with a pinion 44 which has its shaft mounted horizontally in bushings in the block 24, the shaft being secured to an arm 46 which at its outer end is provided with an operating handle 48. Mounted co-axially with the pinion 44 there is a roller 50 which has a stub portion received in the arm 46.

Within the cylinder 26 there is slidably mounted a plunger 52 which is adapted to be engaged by the rack 42 upon downward movements of the latter. A spring 54 operates in compression between a head of this plunger and the upper end of a tubular member 56 which is limited in its downward movement by an internal shoulder of the cylinder 26. The tubular member 56 at its lower end is separated into a plurality of segments, for example, six in number, by sawed slits to provide spring fingers 58 which may be flexed outwardly, these fingers clearing the wall of the bore in cylinder 26. As shown in the enlarged Figures 5 and 6, these fingers 58 have rounded outwardly extending flange portions 60. The lower end 62 of the plunger 52 is provided with a cam bevel 64 which is arranged to engage corresponding cam bevels 66 on the inner sides of the fingers 58 for the purpose of flexing them outwardly.

A link 68 is pivoted at 70 to the fixed block 6 and at its upper end is provided with a slot 72 for reception of a pin 74 projecting laterally from the arm 46. The arm 46 carries a cam member 76 which is relieved at a portion 78 and is arranged to cooperate with a pin 80 carried by the link 68. The link 68 also carries a member 82 provided with a cam surface 84 substantially concentric with pivot 70 which is arranged to engage the roller 50.

The operation of the mechanism is as follows:

A container A is located on the pad 14 and in a horizontal position defined by engagement with the guide pins 18. This positioning is not particularly critical since, as will be apparent, the operation is such that the container has its position corrected to a slight extent during the operation. The container A is provided with an inwardly tapering upper end which terminates in a rolled edge B. This would be the case if the container A is of sheet metal. If the container is of glass or other molded material the upper edge may be provided in rounded form in the molding process. The cap which is provided is shown at C in Figure 5 in its initial condition and involves a cylindrical wall portion E terminating in a rolled edge D, the arrangement being such that the cap may be sunk into the neck of the container with the rolled portion D engaging the rolled edge B of the container. With the cap positioned as indicated in Figure 5 and with the container in position, the operator may pull upwardly and forwardly on the handle 48 to rock the arm 46.

Figure 1 shows the initial positions of the parts. At this time, the pin 74 is held in the upper end of slot 72 by engagement of the peripheral portion of the cam 76 with pin 80. As movement of the arm 46 starts, it will be evident that the linkage which exists effects downward

movement of the block 24, and with it the parts connected thereto, against the upward urging of spring 32. During this initial movement of the arm 46, the pinion 44 may be rotated relative to the block 24 and will move the rack 42 downwardly. There is initial clearance between the rack 42 and the plunger 52, but as motion continues, the rack 42 will engage and then move downwardly the plunger 52. When the arm 46 reaches its vertical dead-center position, the parts will be essentially as illustrated in Figure 3. Under this condition the rack 42 will have moved the plunger 52 downwardly so that its cam end 64 is close to the surfaces 66 of the fingers 58. The peripheral portion of cam 76 will clear the pin 80. The downward movement of the block 24 will now have positioned the fingers 58 either just above or in contact with the horizontal disc portion of the cap C, and the cam 84 will have its forward portion located over the roller 44. As the fingers 58 enter the cap there will occur such slight lateral adjustment of the container position as may be required.

As further movement of the arm 46 occurs beyond the dead-center position, the cam 84 engages and holds downwardly the roller 50 to maintain the position of block 24 which was attained by the linkage action despite the fact that the upper end of slot 72 will now clear pin 74. But even more desirably, the cam 84 is so shaped as to move block 24 slightly downwardly to cause the lower end of the cylindrical member 26 to press the upper edge of the cap downwardly, the resilient base 14 permitting some slight downward movement of the container to provide tight engagement. During the continued movement of the arm 46 the pinion drives the rack further downwardly bringing the cam taper 64 of the lower end 62 of plunger 52 into engagement with cam surface 66 on the fingers 58 driving them outwardly so that the edge flange portions 60 thereof distort the metal of the cap into tight engagement with the inner surface of the tapered portion of the container neck to produce, finally, the condition indicated at F in Figure 6, with the cap then securely engaged within the conical neck. Outward movements of fingers 58 are limited by the cylindrical bore of 26 so that destructive expansion of the container neck is prevented. This completes the securing operation. It will be noted that in the final portions of this operation the pin 74 will move downwardly relative to the link 68, this relative movement being permitted by reason of disengagement of pin 80 by the cam 76.

As the arm 46 is then moved backwardly, the cycle of operation is repeated in reverse order, the fingers 58 being relieved for resilient inward movement to clear the neck of the container, this being followed by rise of the movable parts under the action of spring 32 with their final restoration to the initial position in preparation for the capping of a subsequent container.

It will be evident from the foregoing that although hand operation has been described the movement of the arm 46 might well be effected through a linkage to a power drive in an automatic machine.

It will be evident that various changes in details of the mechanism may be made without departure from the invention as defined in the following claims.

What is claimed is:

1. In apparatus for applying a cup-like cap to the open top of a container having a neck converging toward the opening, the combination comprising an assembly including a plurality of fingers, and means for camming said fingers outwardly, and articulated means including a first link pivotally mounted upon said assembly and operatively connected to said cam means for actuating the latter when turned about its pivotal axis, and a second link mounted for pivotal movement about a fixed axis, said pivotal axes being disposed in parallel horizontally extending vertically spaced relation, said articulated link means being movable to an intermediate dead center position wherein each link extends upright from the pivotal

axis thereof, said links being pivotally connected together at a point above the pivotal axis of said first link, said articulated link means being manually operable for lowering said assembly for projecting said fingers into a cap occupying the container opening, and for actuating said cam means for expanding said fingers thereby to force the cap material into sealing engagement internally with the neck of said container.

2. In apparatus for applying a cup-like cap to the open top of a container having a neck converging toward the opening, the combination comprising an assembly including a plurality of fingers, and means for camming said fingers outwardly, and articulated means including a first link pivotally mounted upon said assembly and operatively connected to said cam means for actuating the latter when turned about its pivotal axis, a second link mounted for pivotal movement about a fixed axis, said pivotal axes being disposed in parallel horizontally extending vertically spaced relation, said articulated link means being movable to an intermediate dead center position wherein each link extends upright from the pivotal axis thereof, said links being pivotally connected together at a point above the pivotal axis of said first link for longitudinal shifting movement relative to one another, said articulated link means being manually operable for lowering said assembly for projecting said fingers into a cap occupying the container opening, and for actuating said cam means for expanding said fingers thereby to force the cap material into sealing engagement internally with the neck of said container, and cam means for securing said links against longitudinal shifting movement relative to one another while moving from an initial to said dead center position and releasing said links to permit such relative movement while passing from said dead center to a final position.

3. Apparatus as defined in claim 2 wherein the last mentioned cam means is operatively interposed between the links.

4. Apparatus as defined in claim 2 wherein the last mentioned cam means is operatively interposed between the links, and the connection between said links is a pin and slot connection.

5. In apparatus for applying a cup-like cap to the open top of a container having a neck converging toward the opening, the combination comprising an assembly including a plurality of fingers, and means for camming said fingers outwardly, and articulated means including a first link pivotally mounted upon said assembly and operatively connected to said cam means for actuating the latter when turned about its pivotal axis, a second link mounted for pivotal movement about a fixed axis, said pivotal axes being disposed in parallel horizontally extending vertically spaced relation, said articulated link means being movable to an intermediate dead center position wherein each link extends upright from the pivotal axis thereof, said links being pivotally connected together at a point above the pivotal axis of said first link for longitudinal shifting movement relative to one another, said articulated link means being manually operable for lowering said assembly for projecting said fingers into a cap occupying the container opening, and for actuating said cam means for expanding said fingers thereby to force the cap material into sealing engagement internally with the neck of said container, and cam means for securing said assembly against movement upwardly while said links pass from said dead center to a final position.

6. Apparatus as defined in claim 5 wherein the last mentioned cam means is mounted upon the articulated means for engagement with said assembly.

7. Apparatus as defined in claim 5, wherein the last mentioned cam means is mounted upon the second link for engagement with a cam follower mounted upon said assembly.

8. Apparatus as defined in claim 5 wherein the last mentioned cam means is mounted upon the second link

for engagement with a cam follower mounted upon said assembly, and the cam surface is so formed that the assembly is moved downwardly a short distance when said links pass from dead center to said final position.

9. In apparatus for applying a cup-like cap to the open top of a container having a neck converging toward the opening, the combination comprising an assembly including a plurality of fingers, and means for camming said fingers outwardly, and articulated means including a first link pivotally mounted upon said assembly and operatively connected to said cam means for actuating the latter when turned about its pivotal axis, a second link mounted for pivotal movement about a fixed axis, said pivotal axes being disposed in parallel horizontally extending vertically spaced relation, said articulated link means being movable to an intermediate dead center position wherein each link extends upright from the pivotal axis thereof, said links being pivotally connected together at a point above the pivotal axis of said first link for longitudinal shift-

ing movement relative to one another, said articulated link means being manually operable for lowering said assembly for projecting said fingers into a cap occupying the container opening, and for actuating said cam means for expanding said fingers thereby to force the cap material into sealing engagement internally with the neck of said container, and cam means for securing said links against longitudinal shifting movement relative to one another while moving from an initial to said dead center position and releasing said links to permit such relative movement while passing from said dead center to a final position and securing said assembly against movement upwardly while said links pass from said dead center to a final position.

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