May 27, 1958 A. W. KINNEY 2,836,328

CAP FEEDING AND POSITIONING MEANS

Filed Nov. 4, 1955 3 Sheets-Sheet 1

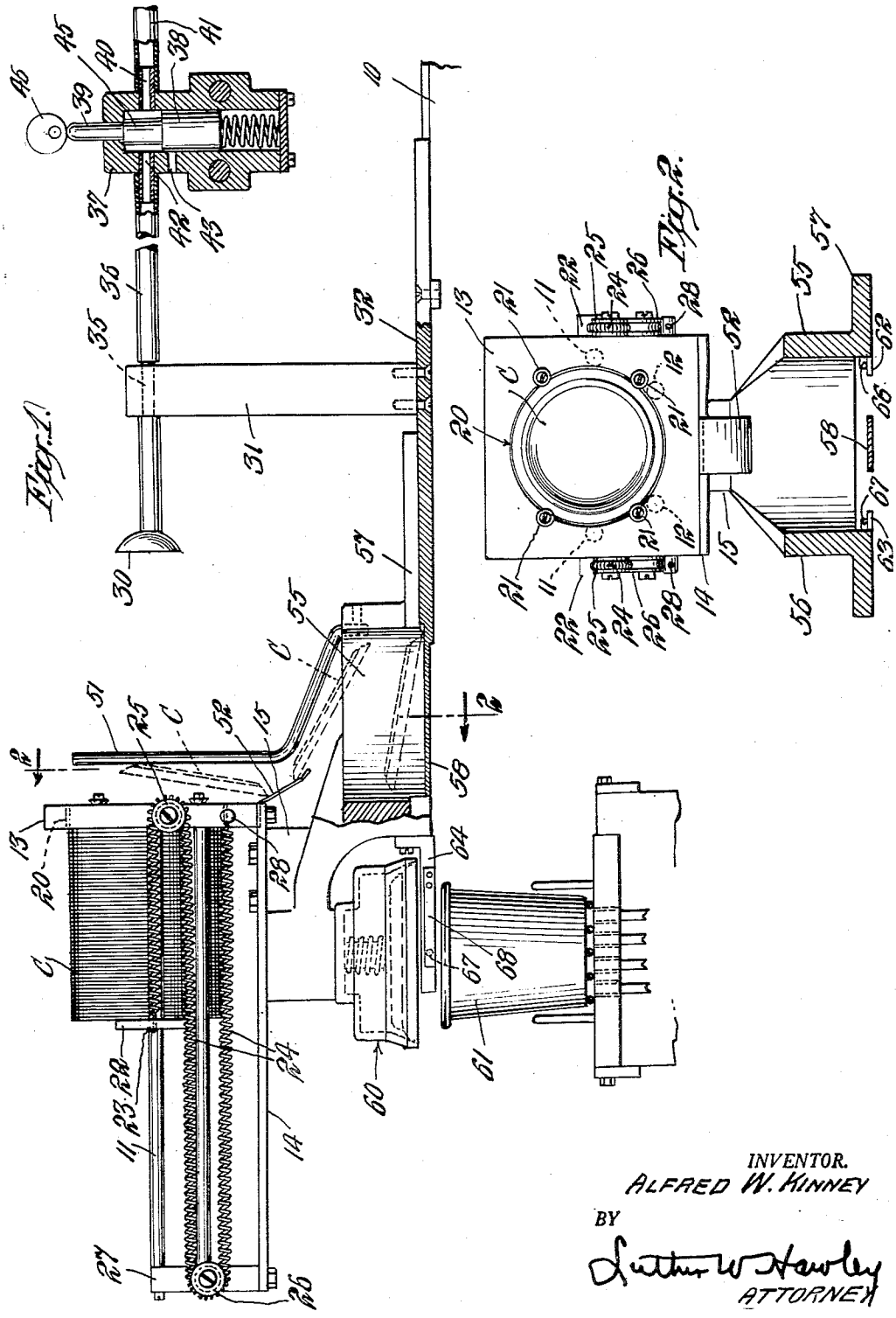

Fig. 1

Fig. 2

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Fig. 5.

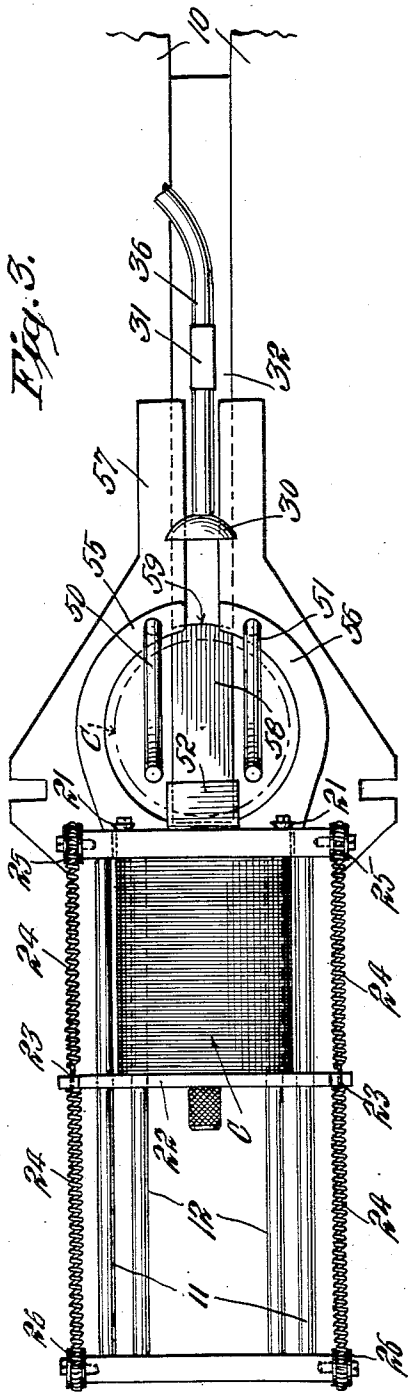
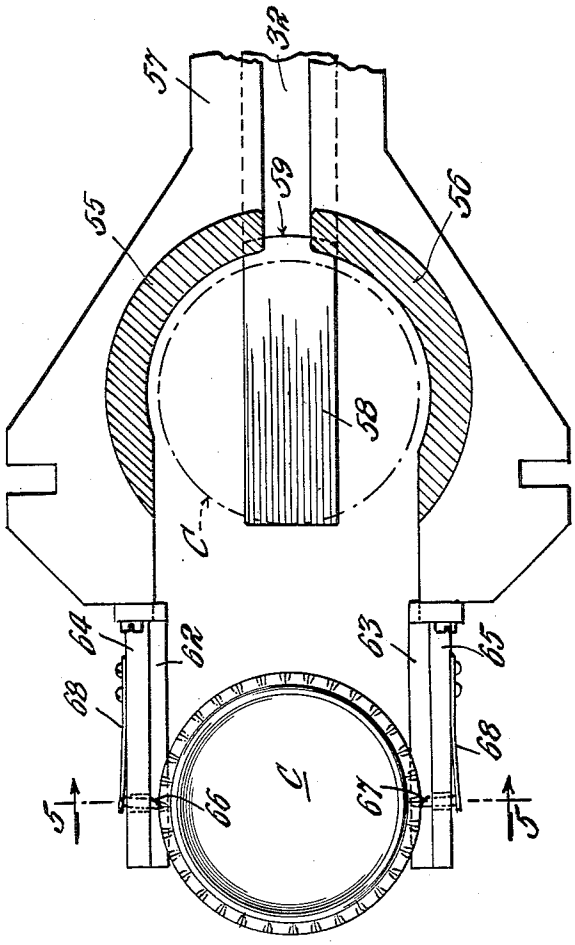


Fig. 6.



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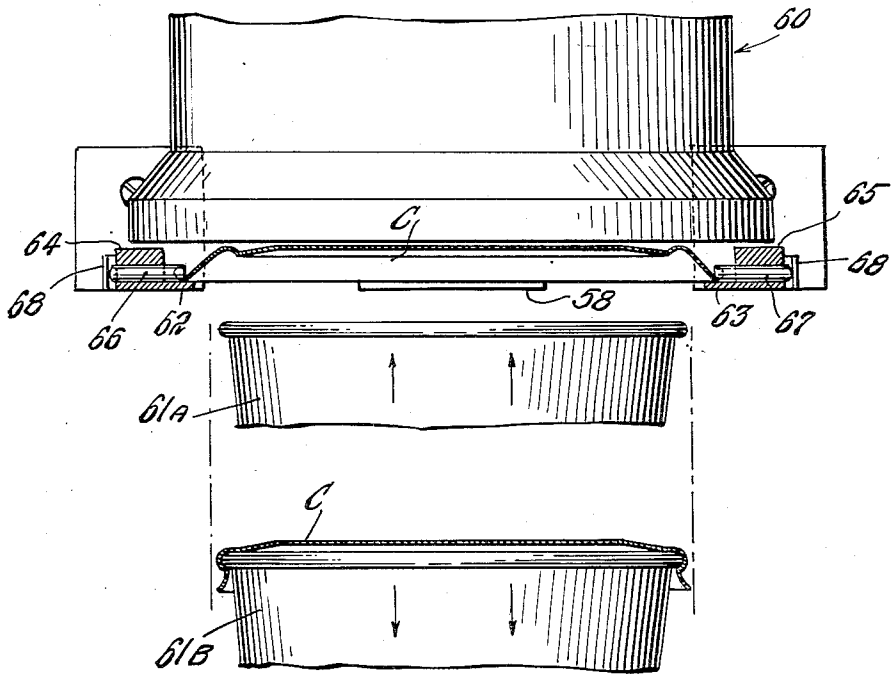

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CAP FEEDING AND POSITIONING MEANS

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Application November 4, 1955, Serial No. 545,076

2 Claims. (Cl. 221—211)

This invention relates to a machine for feeding lids or caps of flexible material from a hopper to capping mechanism.

The invention has for its salient object to provide simple and practical mechanism for efficiently withdrawing flexible caps from a hopper and for feeding the caps into a position above a container to be capped.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

Fig. 1 is an elevational view, partly in section, showing mechanism for withdrawing flexible caps, one at a time, from a hopper, and feeding and delivering the caps in proper position above a container for the operation of capping mechanism;

Fig. 2 is a vertical sectional elevation taken substantially on line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a plan view of the structure shown in Fig. 1;

Fig. 4 is a horizontal sectional elevation and plan view showing the means for supporting the caps above a container to be capped; and

Fig. 5 is a sectional elevation taken substantially on line 5—5 of Fig. 4, looking in the direction of the arrows, this view also showing the capped container in the position taken after the operation of the capping means.

In the particular embodiment of the invention illustrated in the drawings, the mechanism is mounted on a machine support or table **10**. The caps C, which are formed of flexible material, are supported on their edges in a hopper which is formed by two pairs of rods **11** and **12**, disposed in parallel relation to each other and mounted on a vertically extending plate **13** secured to a plate **14**, which in turn is secured to a bracket **15** mounted on the table **10**.

As shown particularly in Fig. 2, the caps C at their peripheries are supported by the pairs of rods **11** and **12**. The plate **13** has an opening **20** and on the front end of the plate, adjacent the opening **20** and slightly overlapping the opening, are mounted four conical resilient washers **21**. These washers engage the outer periphery of the front cap and hold the cap as the stack of caps is resiliently pressed toward the opening **20** in the plate **13**.

The stack of caps is pressed toward the plate **13** by a bar **22** which is slidably mounted on the rods **11**, **11** and is engaged at **23**, **23** by coil springs **24**, **24**. These springs pass around idlers **25**, **25** mounted on the plate **13** and from the idlers **25**, **25** the springs pass rearwardly and around idlers **26**, **26** mounted on a vertically extending support **27** secured to the plate **14**. After passing around the idlers **26**, **26** the springs are carried forwardly and are secured at **28**, **28** to the lateral edges of the plate **13**.

It will be evident that the springs above described will exert a constant uniform pressure through the plate **22** against the stack of caps, pressing the stack toward the opening in the plate **13**.

The caps are withdrawn, one at a time, from the stack by means of a suction cup **30** which is mounted on a post **31** carried by a slide bar **32**, which is slidable in suitable guideways carried by the table **10**.

The suction cup **30** is preferably connected to a vacuum pump so that suction may be exerted or released at the desired points in the sequence of operations of the machine. As shown, a suction pipe **35** is connected to the cup **30** and the pipe **35** is connected by a flexible pipe **36** to a valve casing **37** having mounted therein for vertical reciprocation a cylindrical valve **38** having a stem **39** extending upwardly through the casing **37**. The inlet port **40** of the valve casing is connected by a pipe **41** to a suitable suction pump and the outlet port **42** is connected to the pipe **36**. A second outlet port or vent **43** is provided in the casing **37** below the port **42**.

As shown in Fig. 1, the suction valve is open, passage from the inlet port **40** to the outlet port **42** being provided around the portion **45** of the valve stem. This will be the position of the valve when the suction cup **30** is moved forwardly into engagement with the end cap C at the front end of the stack. After this cap has been pulled past the washers **21**, the valve **38** will be depressed, thus opening the port **43**, which will cut off the suction from the cup **30**. The valve **38** can be controlled in its operation in any suitable manner, as by a cam **46** which is operated in timed relation to the operation of the slide bar **32**.

As shown particularly in Fig. 1, after the cap C at the front end of the stack has been pulled through the plate **13**, it will be released from the suction cup by engagement with a pair of vertically extending rods **50** and **51** which extend upwardly from a portion of the bracket **15**. The cap will then engage, at its lower end, a strip **52** carried by the plate **14** and extending downwardly and outwardly therefrom. The strip **52** will guide the cap C as it falls and the cap will pass between this strip and the rods **50** and **51**. After the cap has fallen downwardly by gravity and been guided in the manner described, it will pass into a space formed by vertically extending arcuate walls **55** and **56** formed on and extending upwardly from the base **57** of the bracket **15**.

The cap C will then come to rest on the upper surface of a portion **58** of the slide **32** and against an arcuate shoulder **59** formed on the slide **32**. The slide **32** will then be actuated by suitable cam mechanism to feed the cap beneath the capping mechanism **60** and to a position above the container **61** to be capped. The cap will be fed by the slide **32** to the position shown in Fig. 4, where its outer periphery rests upon a pair of ledges **62** and **63** which are secured to bars **64** and **65**. The edges of the cap at diametrically opposite points are engaged lightly by pins **66** and **67** which are slidably mounted in the bars **64** and **65** and are pressed inwardly by springs **68**.

In Fig. 5 the container to be capped is shown at **61A** in the position below the capping mechanism **60** and before the cap has been applied thereto. Fig. 5 also shows at **61B** the container with the cap secured thereto.

The particular capping mechanism **60** forms no part of the present invention and has not been illustrated. However, as the container **61** is raised from the position **61A**, it will engage the cap and will move with the cap into the capping mechanism which operates to fold the outer edge portion of the cap around the lip of the container, as shown at **61B**. After the cap has been so folded, the container moves downwardly again and the outer diameter of the cap has been sufficiently reduced so that the periphery will clear the inner edges of the ledges **62** and **63**.

The operation of the cap feeding and positioning mechanism may be summarized as follows. The slide **32** and the suction cup **30** are moved to the left, viewing Fig. 1, until the suction cup engages the outer surface of the cap C. Thereupon the slide and suction cup

are moved to the right, viewing Fig. 1, the suction is released, the cap engages the rods **50** and **51**, and thereupon falls by gravity, as shown in dotted lines in Fig. 1. During its falling movements it is tilted by engagement with the strip **52** and falls into the opening formed by the walls **55** and **56**, coming to rest on the end of the feeding slide **32**, against the arcuate abutment **59**.

When the cap has reached this position the slide moves forwardly to position the cap beneath the capping mechanism and on the ledges **62** and **63**. The cup **61** is then raised to engage the cap which, by the capping mechanism is folded around the rim of the cup or container, as shown at **61B** in Fig. 5. It will be understood that as one cap is moved into position for capping, another cap on the stack of caps in the hopper will be engaged by the suction cup and will be withdrawn upon the retractive movement of the cup and the feeding slide.

Although one specific embodiment of the invention has been particularly shown and described it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. Mechanism for feeding and positioning container caps comprising a horizontal hopper having a vertical outlet for supporting a supply of caps on edge, withdrawing means engageable with the forward cap in the hopper for withdrawing the caps, one at a time, fixed vertical means engageable with the outer surface of the withdrawn cap adjacent opposite edges thereof for releasing the cap from the withdrawing means, means beneath the hopper outlet engageable with the inner edge of the withdrawn cap for turning and guiding the released cap downwardly, a cap supporting and feeding member positioned below the falling cap and in direct communication with the hopper, and means for moving the feeding member to feed the cap into capping position above a container, said cap withdrawing means and cap supporting and feeding means being carried by a common supporting member and fixedly connected to said supporting member and being movable in unison in parallel relation with each other and in a horizontal plane.

2. Mechanism for feeding and positioning container caps comprising a horizontal hopper having a vertical outlet for supporting a supply of caps on edge, withdrawing means engageable with the forward cap in the hopper for withdrawing the caps, one at a time, fixed vertical means engageable with the outer surface of the withdrawn cap adjacent opposite edges thereof for releasing the cap from the withdrawing means, means beneath the hopper outlet engageable with the inner edge of the withdrawn cap for turning and guiding the released cap downwardly, a cap supporting and feeding member positioned below the falling cap and in direct communication with the hopper, and means for moving the feeding member to feed the cap into capping position above a container, said cap withdrawing means being movable into engagement with a cap simultaneously with the feeding movement of the cap feeding means, said cap withdrawing means and cap supporting means being rigidly connected to each other and being disposed in and movable in parallel relation with each other and in a horizontal plane.

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