

Feb. 2, 1937.

A. J. BRIGGS

2,069,351

MILK BOTTLE CAPPING MACHINE

Filed July 3, 1933

5 Sheets-Sheet 1

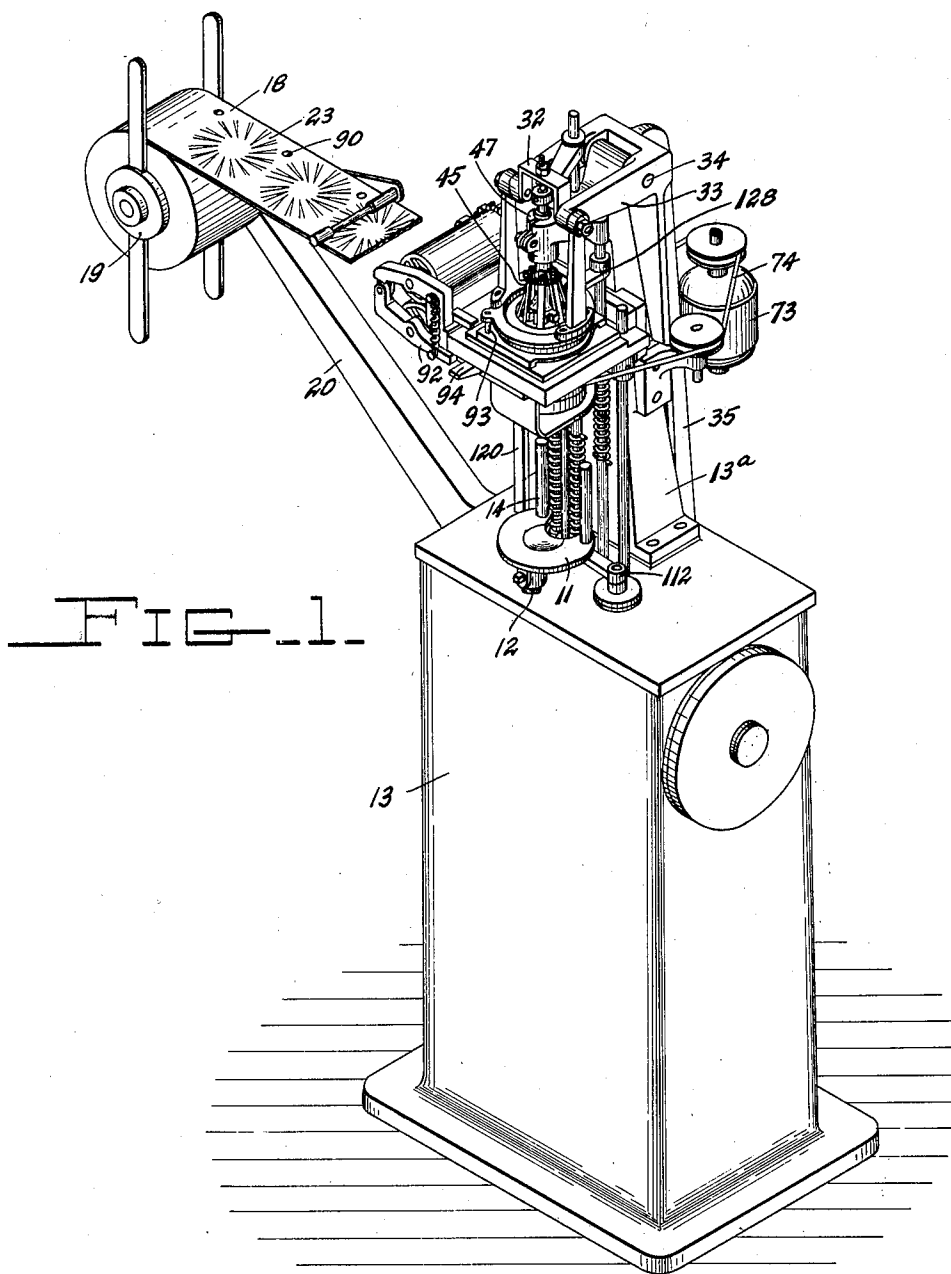


FIG. 1.

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Feb. 2, 1937.

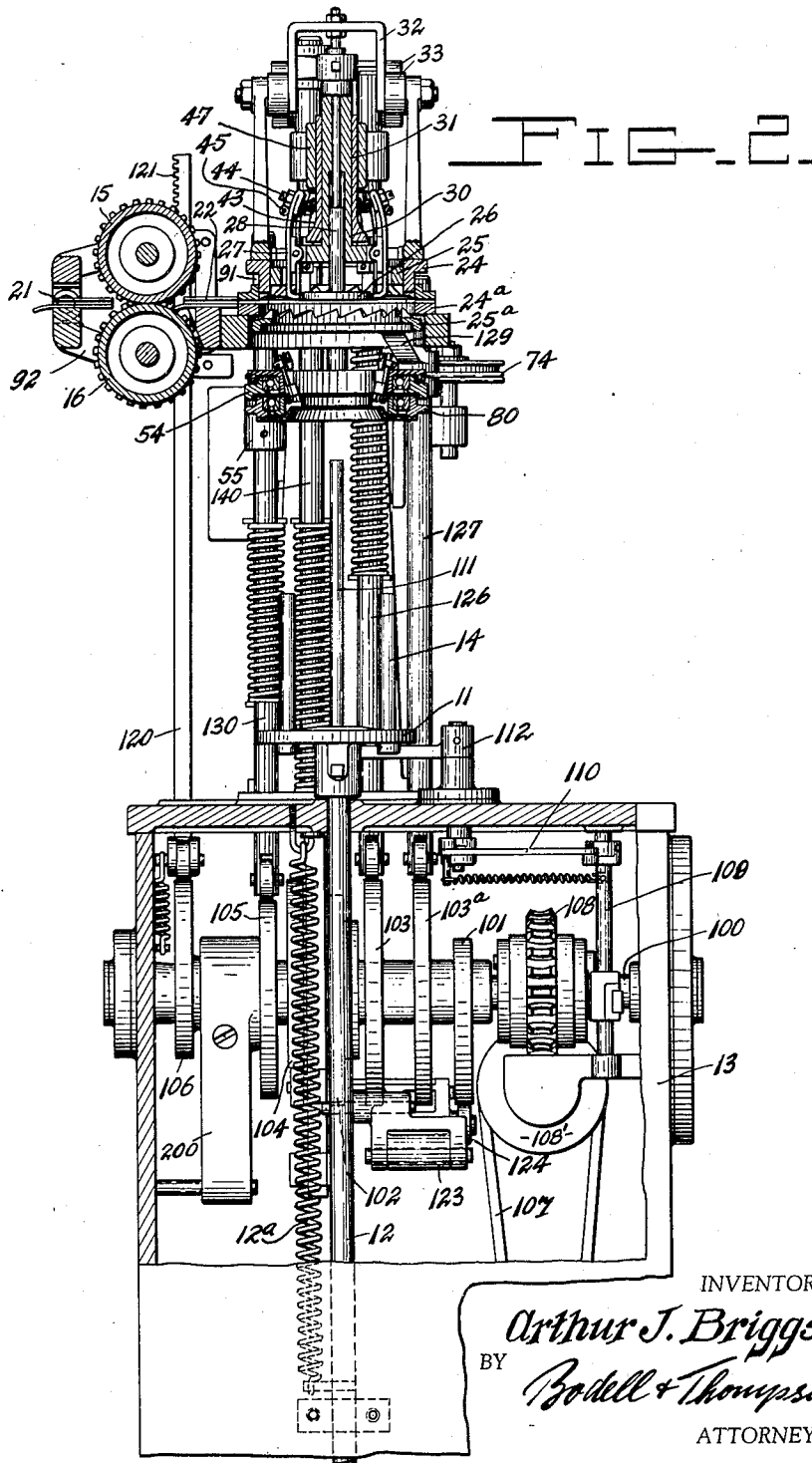
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5 Sheets-Sheet 3

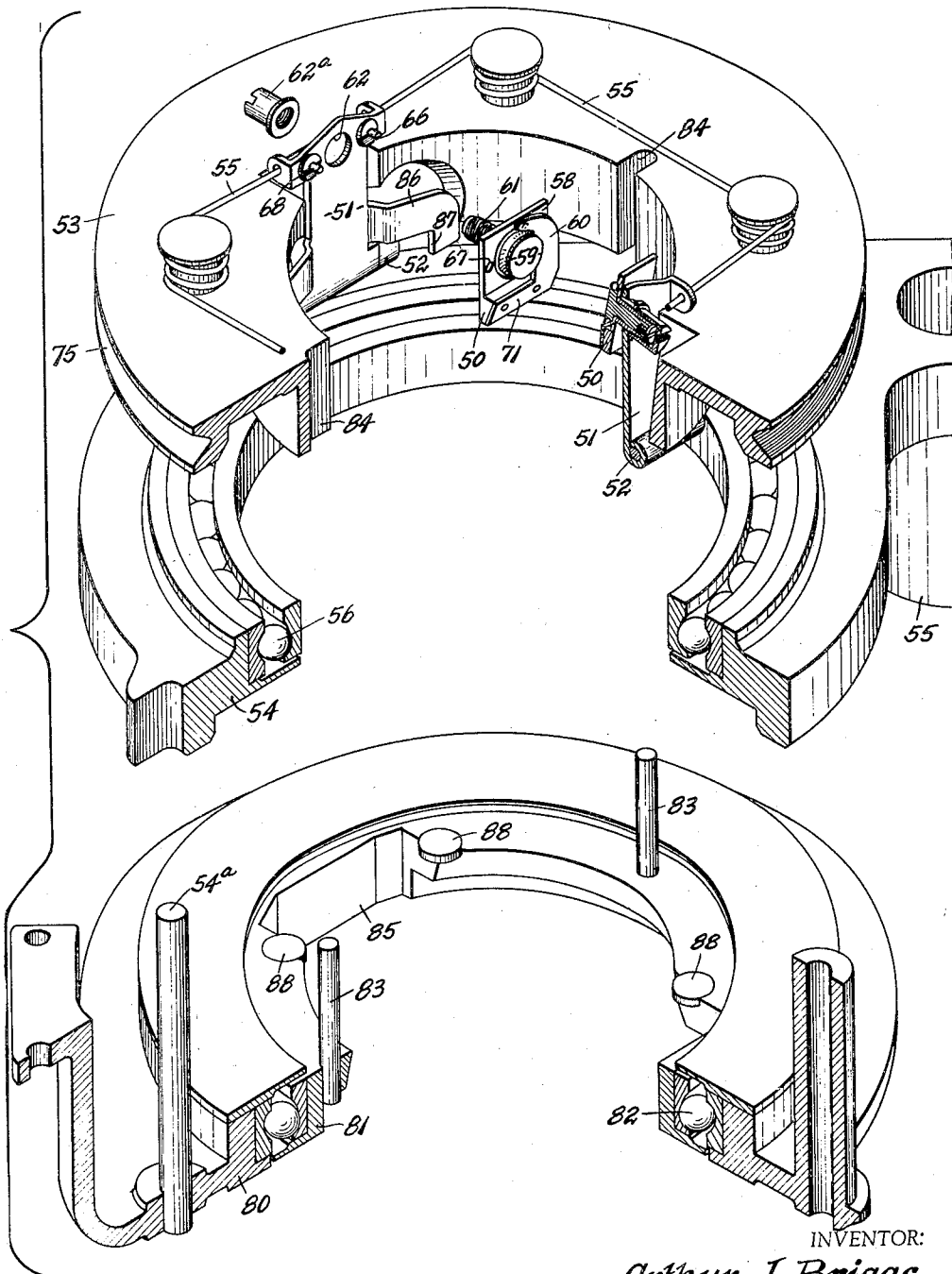


FIG. 3.

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MILK BOTTLE CAPPING MACHINE

Filed July 3, 1933

5 Sheets-Sheet 4

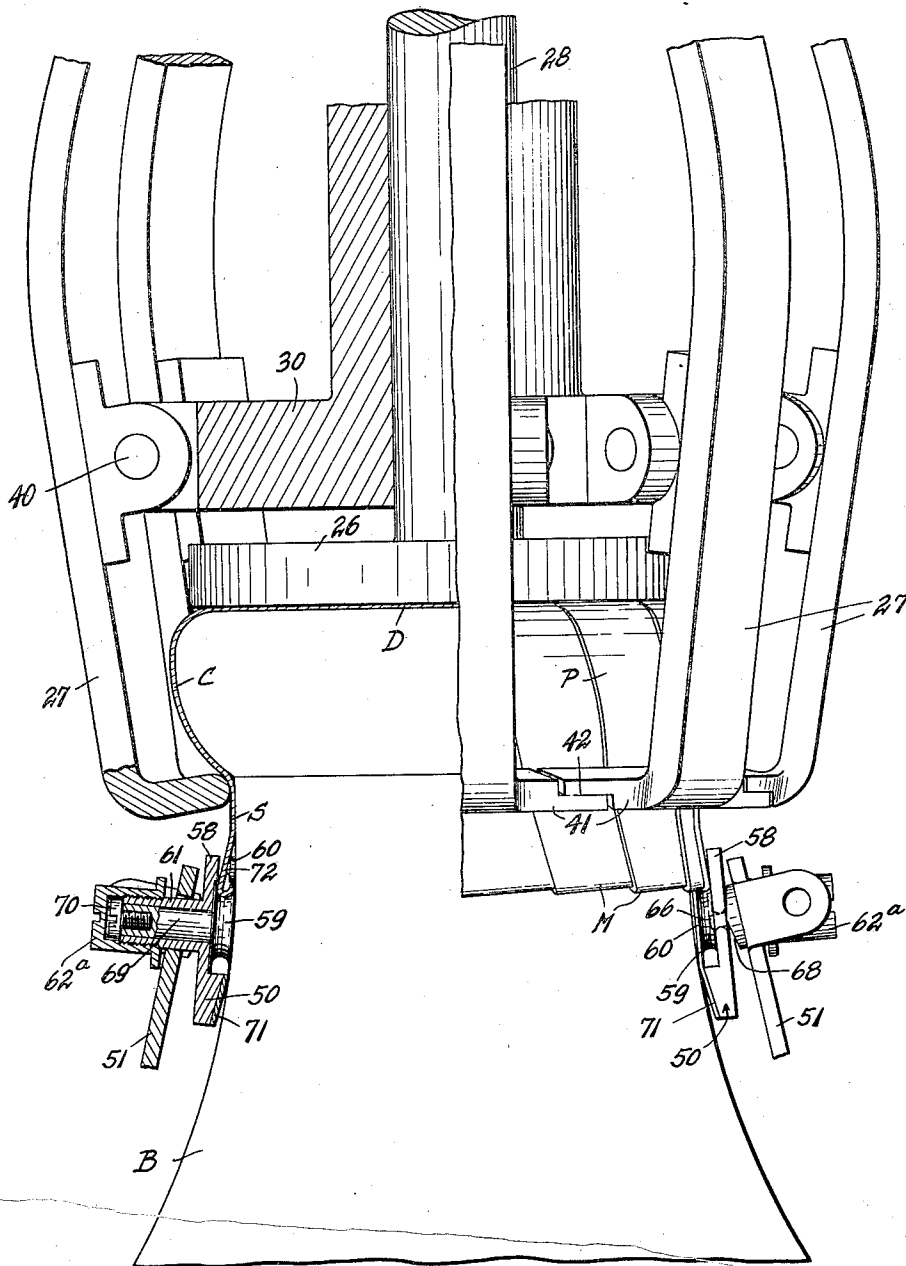


FIG. 4.

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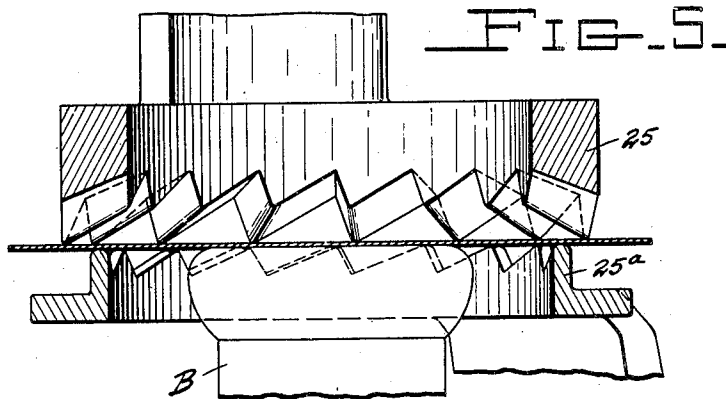
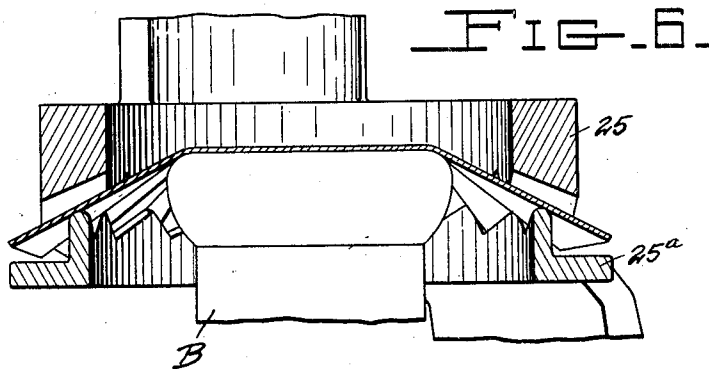
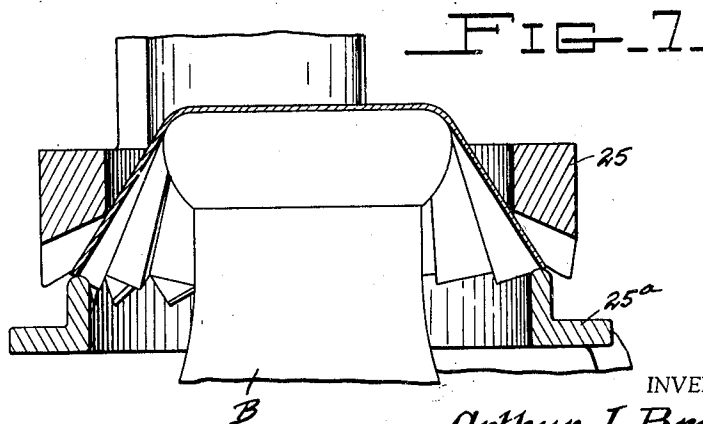
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MILK BOTTLE CAPPING MACHINE

Filed July 3, 1933

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,069,351

MILK BOTTLE CAPPING MACHINE

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Application July 3, 1933, Serial No. 678,846

21 Claims. (Cl. 226—80)

This invention relates to applying caps to bottles as milk bottle caps with skirts which enclose the bottle neck a considerable distance below the bead at the top of the bottle, and has for its object a method and machine for forming the caps from a strip or ribbon, and applying them while forming them to the bottles. It further has for its object a mechanism for providing the cap with self-contained means for holding the cap or skirt thereof contracted on the bottle neck, which means must be distorted or mutilated by the removal of the cap, that it can be readily seen or detected that the cap has been removed and the contents of the bottle tampered with or the bottle refilled after being emptied of its original contents.

It further has for its object a mechanism for rolling, spinning, or otherwise turning back the lower annular margin of the skirt, so as to form a self-contained hem, bead or fold which contracts the skirt on the bottle neck and more particularly, for forming or spinning or rolling a hem, fold or bead on a cap having a plaited skirt.

It further has for its object a mechanism for forming the skirt with a bead or fold by tucking under the annular margin of the skirt between the major part of the skirt and the bottle neck, and more particularly, for tucking back or under the margin of the cap, such as that shown in the Klist Patent No. 1,845,421.

It also has for its object a machine for forming the caps of the Klist patent from a scored blank and applying them to milk bottles.

It also has for its object a folding back or tucking under mechanism which includes a member acting on the margin of the skirt and in effect movable orbitally around the bottle neck, while relative axial movement is being effected between the bottle and the cap thereon, as one unit, and the turning back or tucking under mechanism, as another unit.

It further has for its object, a particularly simple and efficient arrangement of the folding back or tucking under mechanism and the supporting and arrangement of the orbitally movable member so that it can conform, during its operation, to variations in the contours and diameters of milk bottle necks; and also, a particularly simple mechanism by which the orbitally movable member or members, while continuously moving in their orbits, are shifted out of their operating position to permit the removal of the bottle, it being understood that the neck of the bottle is provided with an enlarged head or bead at its upper

end of larger diameter than the neck of the bottle engaged by the skirt of the cap.

It further has for its object a particularly simple and efficient mechanism for cutting the cap blanks from a sheet, forming and applying them to the bottle and centering the blank and the upper end of the bottle.

Other objects will appear throughout the specification.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designated corresponding parts in all the views.

Figure 1 is an isometric view of a machine embodying this invention.

Figure 2 is an enlarged vertical sectional view.

Figure 3 is an isometric exploded view, partly broken away, of the mechanism for turning back, spinning or tucking under the lower margin of the cap and the support therefor.

Figure 4 is an enlarged fragmentary sectional view of the cap applying and tucking under mechanism showing the same as coacting with the milk bottle.

Figures 5, 6, and 7 are fragmentary sectional views of the plaiting dies illustrating the successive positions of the dies relative to the bottle, cap and to each other during the capping operation.

This bottle capping machine comprises, generally, a suitable frame, a suitable support or holder for the bottle, mechanism for feeding a ribbon, sheet tape or strip on which the caps are scored or blanked, into juxtaposition to the capping mechanism and upper end of the bottle on the support, mechanism for cutting the blank from the ribbon or strip, forming it into the cap and applying it to the bottle with the skirt of the cap enclosing the neck of the bottle, mechanism for spinning, folding or turning upward, and preferably tucking upward and inward, the lower annular margin of the skirt, and timed actuating mechanism including connections which effect relative axial movement of the bottle and cap forming mechanism, and relative axial movements of the bottle with the cap thereon and the folding, spinning or turning up mechanism. The method consists in bringing successive portions of a blank strip over the bottle top, severing the portion over the bottle top from the strip and forming it into a hooded cap on the bottle and securing it thereto.

In Figure 4, B designates the bottle; C the cap; S the skirt portion thereof; D the head or disk portion; and P the spiral plaits. M designates the folded margin.

11 designates the bottle support, this being of any convenient and suitable construction. It comprises a shelf which is movable to carry the bottle upward and downward, to carry the upper end thereof into and out of juxtaposition to the cap forming and applying mechanism, the shelf being here shown as carried by a suitable guide, as a rod or stem 12, suitably mounted and guided in the base portion 13 of the frame of the machine in which the timed actuating mechanism or cam shaft is mounted. The shelf 11 is provided with suitable centering gages for the bottle, these being shown as spaced apart rods or pins 14.

The feeding mechanism for the sheet, strip, ribbon or tape from which the caps are formed, comprises a pair of feed rolls 15 and 16 supported in suitable brackets on the frame of the machine and actuated from the cam shaft in the base 13 as will be hereinafter described.

The sheet from which the caps are blanked is preferably a wide tape or ribbon 18 wound upon a suitable reel 19 supported by a bracket 20 from the frame of the machine. The ribbon 18 feeds through guide passages 21, 22 on opposite sides of the feed rolls and into a position over the top of the bottle on the support 11 and in juxtaposition to the cap forming mechanism. The feed rolls have a separating movement during the operation of the mechanism, which centers the blank cap over the top of the bottle, preliminary to applying the cap to the bottle. The separating mechanism will be hereinafter described.

The caps are of the type having a skirt which encloses the neck of the bottle, and the caps are scored on the tape or ribbon 18, as shown at 23 (Figure 1). The machine here illustrated is for the purpose of applying caps of the Klist Patent No. 1,845,421, which caps consist of a central head or disk portion D and a spirally plaited skirt portion P, the margin M of which is upturned or tucked under when the cap is fully applied to the bottle. The caps may be formed of any suitable material, usually of paper, and when the word "paper" is mentioned herein, it is understood that any other material may be used suitable for the purpose.

The mechanism for forming the cap from the tape or ribbon 18 and applying the cap to the bottle top comprises upper and lower dies 24, 24^a respectively for cutting a circular blank from the tape 18, complementary upper and lower plaiting dies 25, 25^a respectively for initiating the plaiting or folding operation of the skirt of the caps according to the scoring of the blank as shown at 23 (Figure 1), a member 26 for holding the head D of the cap C against the bottle top during plaiting and tucking operations and grippers 27 for contracting the plaited skirt around the bottle neck, all of these mechanisms being actuated from a cam shaft within the base 13 of the housing.

The order of the operating steps is as follows:

The bottle is lifted by its support under and into juxtaposition to the capping mechanism and at the same time the ribbon or strip 18 fed to bring a blank into juxtaposition to the capping mechanism and the bottle top. The cutter or die 24 moves downward cutting the cap blank from the ribbon 18 and the holder member 26 then presses the cap blank against the bottle top. The plaiting dies 25, 25^a then move to initiate the

folding of the plaits which have been previously scored on the cap blank and thereafter the grippers 27 complete the plaiting operation and contract the plaited skirt around the neck of the bottle underneath the bead or collar at the upper end of the bottle. Thereafter, the tucking or margin folding mechanism comes into action.

The holder member 26 is provided with a stem 28 guided in an axial passage formed in a carrier 30 for the grippers 27, this carrier being slidably mounted in a stationary vertical sleeve or bearing 31 suitably supported from the frame. The stem 28 extends above the stem of the carrier 30 which supports the gripper fingers 27 and co-acts with suitable means, as a yoke 32, carried by the actuating mechanism for the upper cutting die 24, so that the die 24 and holder 26 move as a unit. The yoke here shown is carried between the bifurcations of a lever 33 which is an angle lever pivoted at 34 to an upright bracket 13^a on the base 13 of the frame, the lever having an arm 35 constituting part of the connections to a cam on the cam shaft which will be hereinafter described. As this lever 35 is actuated, the holder member 26 is moved downward against the head of the bottle cap at the same time the upper shearing die 24 is actuated downwardly to cut out the cap blank from the ribbon or sheet.

The grippers 27 are here shown as levers pivoted at 40 to the carrier 30 and as having arcuate jaws 41 at their lower ends, each jaw 41 lapping the adjacent jaw as at 42 in order to maintain the continuity of the arcuate gripping faces of the jaws during expansion and contraction of the levers 27. The levers 27 are actuated during the movement of the carrier 30 by stationary cam surfaces 43 provided on the lower end of the stationary sleeve or bearing 31, which surfaces co-act with adjustable followers 44 at the upper ends of the levers. The cam 43 is conical in general outline and acts as an expander on the upper arms of the levers 27 to cause their lower arms carrying the jaws 41 to contract when the carrier 30 moves downwardly to carry the jaws 41 below the bead at the upper end of the bottle B.

The expanding movement of the gripper levers 27 is restrained or the followers 44 are held against the cam 43 by suitable spring means, here shown as an annular coiled spring 45 surrounding the upper arms of the levers 27. The bearing 31 is supported by an arm 47 extending from the upright bracket 13^a of the frame, the arm 47 being here shown as provided with a split bearing which is clamped on the sleeve or bearing 31.

The operation of the machine thus far described is as follows: The operator places the filled bottle on the shelf or support 11. The placing of the bottle against the gages 14 centers the bottle and also operates a control member which causes the actuation of the actuating mechanism or cam shaft first lifting the bottle up under the blank bottle cap which has been fed over to the position to be occupied by the top of the bottle. Thereafter, the pressure head or cap holder 26 and the cutting die 24 move downward and the die severs the cap blank from the strip or ribbon 18. Thereafter, the upper plaiting die 25, which is formed with serrations corresponding to the scoring of the blank moves downwardly into the position shown in Figure 5, where it meets the blank, this being level with the plane of the top of the bottle, the lower die 25^a meeting the lower face of the blank. The two dies then move downward together into the position shown in

Figure 6 and finally into the position shown in Figure 7 to complete the crimping operation. The lower die 25^a moves farther downward than the upper die 25 to separate the dies and release the plaited skirt which now stands at an angle of about 45°. During this operation of the dies, or immediately after, the carrier 30 has moved far enough downward relative to the fixed bearing 31 to cause the followers 44 to ride on the cam or conical lower end 43 of the bearing 31 and hence cause the upper ends of the gripper levers 27 to expand and the lower ends to grip inwardly into the position shown in Figure 4, and wrap the plaited skirt tightly around the bottle neck beneath the bead of the bottle B. During these operations, the bottle is held in its elevated position.

The mechanism for spinning, turning back, and preferably tucking under, the lower annular margin of the plaited skirt, in order to provide the skirt with means formed therefrom, or self-contained therewith, for holding or locking the skirt contracted on the bottle neck, comprises a folding member movable orbitally around the bottle neck, and also in this embodiment of my invention, movable axially during its orbital movement, said member having means for co-acting with the lower edge of the skirt to bend, roll or spin it backwardly during the axial and orbital movements. As, preferably, the bending back is an inward or tucking operation to fold the lower margin of the plaited skirt into a position between the major part of the skirt and the bottle neck, means is provided for guiding the margin so that it will fold inwardly. There are preferably two of such folding or tucking members arranged diametrically opposite each other and carried by an annular rotating spinner head, each of said members being connected to the rotating head by a support or carrier shiftable to have a radial movement, the radial shifting being for the purpose of shifting the tucking members outwardly in order to permit the bottle with the cap thereon to clear said members during retrograde movement of the bottle after it has been capped.

50 (Figures 3 and 4) designates the folding or tucking members, these being carried by radially movable carriers, as levers 51, pivoted or hinged at 52 to a rotating or spinning head 53, which is rotatably mounted on an annular carrier 54 shiftable axially by the timed actuating mechanism or cam shaft, it having a bracket 55 connected to a lift rod operated by the cam shaft to be presently described. An antifriction bearing 56 is interposed between the rotating head 53 and its carrier 54. Each folding or tucking member 50 is connected to its supporting lever 51 by a coupling having a rocking movement on a horizontal axis to permit the member 50 to have sufficient play to conform to different diameters and different contours of the bottles. The carriers 51 are normally placed in such position as to shift the members 50 inwardly radially toward the bottle by springs 55 and are shifted radially outwardly for the purpose of permitting the bottle to clear them when the bottle support is moved downward with the capped bottle by means to be presently described.

As seen in Figures 3 and 4, each tucking member comprises a back plate 58 having a die, deflector or grooved folder 59 on the face thereof, guide means, as a finger 60, for guiding the lower edge of the skirt into the side of the groove of the member 59 nearest the back plate 58, so that

as the rotating head 53 moves axially upward, this margin will be turned back in a predetermined direction, as upward and inward. As here shown, the back plate 58 is secured to the carrier lever 51 by means of a stem 61 extending through an opening 62 in the lever 51 and held in position by a cap 62^a threading on the outer end of the stem, the cap being spaced from the outer side of the lever 61. The stem loosely fits the opening 62 so that the back plate can have freedom of movement, or something in the nature of a rocking movement, and in order to accurately position the back plate or the folder without interfering with its rocking movement, the lever 51 is provided with pins or studs 66 on opposite sides of the opening 62, which studs enter openings 67 in the back plate, and fulcrums on knife edges 68 are provided on the bases of the pins 65, these being edges extending in a horizontal direction. Thus, the back plate, owing to the fulcrums and the loose fits of the stem 61 in the opening 62 and of pins 66 in the holes 67 can have a rocking movement, so that the back plate 58 and mechanism carried thereby has sufficient play to conform to the contour of the bottle necks and to the contours of the plaited skirts. The die, deflector or folder 59 is here shown as a grooved roller having an axle 69 mounted in the bore of the stem 61 and held in position by a screw 70 threading into the axle and having its head coacting with the outer end of the stem 51, the screw being located within the hollow cap 62^a.

The guide finger 60 includes a base portion 71 secured to the base plate 58 below the roller 59 and a curved arm extending in the rear of the roller 59 and upwardly over the same in the direction of rotation of the head 53, the finger being provided at its end with a deflector 72 which is spaced apart from the base plate 58 forming a passage through which the margin of the cap passes, the overhanging portion of the finger being spaced apart from the periphery of the roller a distance determined by the width of the margin folded back or tucked under. As seen in Figure 4, the margin M of the cap C is shown as deflected away from the bottle toward the outer side of the groove of the roller 59 so that during upward feeding of the head 53, the margin will be folded inwardly and upwardly. The deflecting finger 60, it will be noted, runs next to the periphery of the bottle.

The head 53 is located to carry the folding or tucking member 50 orbitally, preferably by a constantly running motor 73 suitably carried by the vertical bracket 13^a of the machine and the motion is transmitted from the motor shaft to the head 53 by a belt 74 running in a peripheral groove 75 in the head 53, the carrier 54 for the head 53 being fed axially from the cam shaft as will be hereinafter described.

The means for shifting the folding or tucking members 50 outwardly to permit the capped head of the bottle to clear the folding means at the end of the capping operation will now be described. The springs 55, as before stated, tend to move the carrier levers 51 for the tucking members 50 radially inwardly, and the means for moving them radially outwardly acts on the levers to press the levers outwardly against the springs 55 during or at the end of the downward movement of the carrier 54. As here shown, the carrier 54 for the rotating head 53 is held from rotating by a pin 54^a on an annular bracket 80 suitably fixed to the frame and carrying a rotating abutment ring 81, there being an antifriction bearing

82 between the annular bracket or support 80 and the abutment ring 81. The abutment ring is coupled to the head 53 in any suitable manner, as by pins 83, extending through the passage 5 confined by the carrier 54 and slidably fitting passages 84 in the head 53. The abutment ring is formed with diametrically opposite clearances 85 for the levers or carriers 51 for the tucking members and these levers 51 are provided, with 10 angular arms 86 having down-turned extensions 87 for engaging the abutment ring at opposite ends of the clearances 85. Usually, the abutment ring is provided with hardened inserts 88 for coacting with the ends 87 of the arms 86. While 15 the cap is first being plaited and the skirt wrapped around the bottle neck, the carrier 54 is contiguous to the support 80 and the head 53 and the abutment ring 81 are rotated due to the fact that the motor 73 is constantly running. At this time, 20 the ends 87 of the levers 86 are engaged with abutments 88 and the levers swung radially outwardly against the action of their returning springs 55 and hence, the tucking members are displaced radially far enough to permit the bottle or the 25 bead at the upper end thereof to pass upwardly to the capping mechanism without being interfered with by the tucking members 50. When the carrier 54 is moved upwardly, through connections from the cam shaft, the ends 87 of the lever arms 86 move away from the abutments or 30 inserts 88 permitting the springs 55 to react and carry the tucking members in position so that the guide finger 60 engages the periphery of the neck of the bottle and the grooved die or guide roller 59 is under the edge of the skirt. Hence, 35 during the upward feeding of the carrier 54 and head 53, the grooved die roller 59 turns the margin of the plaited cap upwardly and inwardly. At the end of this operation, the carrier 54 again 40 moves downward until the ends 87 of the lever arms 86 engage the inserts 88, thus moving the tucking members 50 radially outwardly so that the bottle with the cap thereon will pass between and clear the tucking members. Thus, after the 45 gripping fingers 27 have contracted about the skirt, as shown in Figure 4, the carrier 54 and spinner head 53 move upwardly to perform the tucking operation and then downwardly to its starting position to displace radially the tucking 50 members out of the path of the capped bottle.

In order to center the blank ribbon or tape 18 relatively to the bottle or to the cutting die 24, the ribbon, from which the blanks are cut, is formed with holes 90, one for each blank and a 55 pointed centering pin 91 is provided for entering the hole of the blank in position to be cut out from the tape and applied. This pin moves with and is carried by the cutting die 24 and projects slightly in advance thereof. In order to 60 give the tape sufficient play to permit the centering pin to act, the feed rollers 15, 16 are separated during the downward movement of the cutting die 24 and before it engages the blank. As here shown, the lower feed roll 16 is carried 65 at its ends by spring pressed levers 92 arranged in the path of a pin 93 which moves vertically with the cutter die 24 and the centering pin and engages at 94 the levers 92 and separates the roller 16 from the roller 15, so that the ribbon 70 can shift, if necessary, slightly to permit the pin to enter the hole 90 and center the cap blank in position under the cap applying mechanism.

The feed roller 15 is actuated from the cam shaft through suitable mechanism to be described. 75 The paper feeding mechanism, with the exception

of the centering of the blank, the cap forming mechanism, with the exception of the turning back of the lower edge of the cap, the actuating mechanism or cam shaft and connections operated thereby to time the operations, in themselves, form no part of this invention, and this invention pertains primarily to the means for providing the plaited cap with a turned back or tucked under margin and the centering of the blank per se and combined with a bottle capping 10 mechanism generally.

100 designates a cam shaft having a cam 101 for performing the bottle lifting operation, cams 102, 103, 103^a for operating holder 26, cutting die 24, and the plaiting dies, cam 104 for oper- 15 ating the gripping fingers 27, cam 105 for operating the carrier 54 for the tucking back or spinner mechanism, and cam 106 for operating the feed rollers 15, 16. As the operation of cam shafts and the laying out and arranging of timing cams 20 to produce any given sequence of operations is well known in the mechanical arts, further description and illustration of the cams is thought to be unnecessary. The cam shaft is operated 25 from an electric motor, not shown, suitably mounted in the base 13 of the housing, and the motion of the motor shaft is transferred to the cam shaft through a periodic clutch, preferably a one-revolution clutch, the throwing in of the 30 clutch being controlled by the placing of the bottle in proper position upon the support, and the throwing out of the clutch occurring after the cam shaft has rotated, in this instance, one revolution. As the operation of periodic clutches is well known, further description is thought to 35 be unnecessary.

The motor actuates a worm which meshes with the worm gear 108 on the driving section of the periodic clutch. The motion is transmitted from the motor through a belt 107 and pulley 108' ro- 40 tatable with the worm. The clutch is normally in its "out" position and is thrown to its "in" position in any well known manner, as by a rock shaft 109 and connections including a link 110 between it and a control member 111 adjacent 45 the support 11, this controlling member being mounted on a lever arm 112 on a shaft extending through the top of the base 13. The control member 111 is located in position to be engaged by the bottle when the bottle engages the gage 50 pins 14.

Milk bottles are usually of three different sizes, to wit: quart, pint and one-half pints. There are three supports, one for each class of bottles, and these are detachably mounted in any suitable 55 manner on the rod 12 and are the same, except that that for pint bottles is lower than that for one-half pints, and that for quart bottles is lower than that for pint bottles. Each of these supports is provided with its own gage pin 14 and oper- 60 ating member 111 and the connections between each of the operating members 111 are made with the arm 112 in accordance with the size or diameter of the bottle.

In operation, when a bottle is placed on the 65 support 11 against the gage pins 14, it operates the member 111 which in turn, through the arm 112, link 110, rock shaft 109, throws in a periodic clutch, so that the cam shaft is turned one revolution. At the end of the revolution, the clutch is 70 automatically thrown out, a feature incidental to periodic clutches. As the shaft rotates, the strip or paper feeding rolls 15, 16 are actuated by the cam 106, the bottle support 11 is lifted through the cam 101 and follower operated there- 75

by, to carry the upper part of the bottle through the annular bracket 80, carrier 54 and spinner head 53 and up under the cap blank. At the same time, the cam 102, which is in the rear of the rod or stem 12 of the bottle support, actuates the arm 35 of the lever 33 to operate the cutter 24 and the centering pin 91 and to bring down the holder 26 on the top of the cap. Immediately thereafter, the cams 103, 103^a bring the plaiting dies 25, 25^a into cooperation. Then the gripper head 30 is shifted downward by the cam 104 and causes the gripper fingers 27 to contract the skirt about the bottle neck. Thereafter, the cam 105 lifts the spinner mechanism into and out of position to cause the tucking members 50 to tuck up the lower margin of the plaited cap and to move downwardly into position to permit the bottle support 11 to lower and the capped bottle to clear the tucking mechanism.

The connections between the various cams and the mechanism they operate may be of any suitable form, size and construction, all of them including returning springs for holding the followers of said connections against the cam. The connections for operating the feed rolls 15, 16 includes a rod 120 having a follower coacting with the cam 106 and a rack 121 at its upper end coacting with a gear, not shown, on the axle of the upper roll 15, which gear is connected to the axle of the roller 15 by a one-way clutch device, as a ratchet and pawl, not shown, so that the paper is fed only during the upward movement of the rod 120 by the cam 106. The rolls 15, 16 are geared together. The connections between the cam 101 and the bottle support 11 or the stem 12 thereof includes a lever 123 pivoted to the rear wall of the base 13 and actuated by a follower 124 coacting with the cam 102. The stem 12 is elevated by the helical tension spring 12^a and is moved downwardly against the action of the spring 12^a by the cam 101. The connections between the cam 102 and the lever arm 33 include the arm 35, previously referred to. The cams 103, 103^a operate respectively the upper and lower plaiting dies 25, 25^a downwardly through connections including rods 126 and 127 having followers coacting with the cams 103, 103^a, these rods being connected at 128 and 129 to arms on said dies respectively. The gripper head 30 is actuated by cam 104, through rod 140 having a follower coacting with the cam 104.

The tucking back or spinner mechanism, that is, the spinner head 53 and its support 54, is raised and lowered through a lift rod 130 having a follower coacting with the cam 105, this rod being connected to the bracket 55 of the carrier 54. A suitable brake 200 is applied to the cam shaft to prevent over-running thereof.

Thus, upon the placing of a bottle on the bottle support 11, the automatic one-revolution clutch is thrown "in" by reason of the bottle operating the operating member 111 so that the ribbon with the cap blanks thereon is fed one step to carry a blank in juxtaposition to the cap forming mechanism and to carry the bottle up into juxtaposition to the blank, and the blank applying mechanism is then actuated by the cam 102, the crimping or plaiting dies and then actuated by the cams 103, 103^a and thereafter the gripper actuated by cam 104. Thereafter, the tucking mechanism carried by the spinner head 53 is moved upwardly causing the tucking members 50 to form the tuck at the lower end of the skirt, and the tucking mechanism moved downwardly to cause the tucking members 50 to move

out of the path of the capped bottle and then the bottle support lowered with the capped bottle, where the bottle can be removed and another one placed on the support and the operation repeated.

What I claim is:

1. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt, and means for holding the bottle with the cap thereon stationary and rotating and moving said folding mechanism axially of the bottle.

2. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle and forming the skirt with plaits, of mechanism for folding the lower annular margin of the skirt throughout its circumference to bind the skirt on the bottle neck, and means for effecting relative axial and rotary movements of the bottle and the cap thereon and said folding means.

3. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle and forming the skirt with plaits, of mechanism for folding the margin of the plaited skirt throughout its circumference to bind the skirt on the bottle neck, and means for holding the bottle with plaited cap thereon stationary and rotating and moving said folding mechanism axially of the bottle.

4. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for tucking inwardly the lower margin of the skirt between the body of the skirt and the bottle neck, and means for holding the bottle and cap stationary and rotating and moving axially the tucking mechanism.

5. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt adjacent the body of the skirt, and means for rotating the folding mechanism and feeding the same axially while the bottle and the cap are held stationary, said folding mechanism including a member movable orbitally during rotation of the folding mechanism around the bottle neck and coacting with the margin of the skirt to fold it upwardly during the orbital movement.

6. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt adjacent the body of the skirt and means for rotating the folding mechanism and feeding the same axially while the bottle with the cap thereon is held stationary, said folding mechanism including a member movable orbitally during rotation of the folding mechanism around the bottle neck and coacting with the margin of the skirt to fold it inwardly during the orbital movement, said member having a folder die for coacting with the lower edge of the skirt, and means for guiding the lower edge of the skirt against the folder die during the orbital movement of said member.

7. In a bottle capping machine, the combination with mechanism for applying a cap with a

skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt adjacent the body of the skirt and means for rotating the folding mechanism and feeding the same axially while the bottle and the cap are held stationary, said folding mechanism including a die member movable orbitally during rotation of the folding mechanism around the bottle neck and coacting with the margin of the skirt to fold it upwardly during the orbital movement, and a guide member extending above the folder and located at one side of the folder in position to deflect the margin against the die member at a predetermined angle.

8. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, mechanism for folding inward and upward the lower annular margin of the skirt between the body of the skirt and the bottle neck, and means for rotating the folding mechanism and feeding the same axially while the bottle with the cap thereon is held stationary, said folding mechanism including a member movable orbitally around the bottle neck and coacting with the margin of the skirt to fold upwardly and inwardly during the orbital movement.

9. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, mechanism for folding inward and upward the lower annular margin of the skirt between the body of the skirt and the bottle neck, and means for rotating the folding mechanism and feeding the same axially while the bottle with the cap thereon is held stationary, said folding mechanism including a member movable orbitally around the bottle neck and coating with the margin of the skirt to fold the same upward and inward during the orbital movement, said member having a folder for engaging the lower edge of the skirt and means for guiding the lower edge of the skirt toward the outer side of the folder during the orbital movement of said member.

10. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, mechanism for folding inward and upward the lower annular margin of the skirt between the body of the skirt and the bottle neck, and means for rotating the folding mechanism and feeding the same axially while the bottle with the cap thereon is held stationary, said folding mechanism including a member movable orbitally around the bottle neck and coacting with the margin of the skirt to fold it upward and inward during the orbital movement, the folding member including a back plate, a folder die mounted on the inner face of the back plate, and a guide finger carried by the back plate and having a portion spaced from the back plate forming a passage through which the margin of the cap extends, the guide finger extending above the folder and serving to press the margin of the cap toward the outer side of the folder die.

11. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt to the bottle with the skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt adjacent the body of the skirt, and means for rotating the folding mechanism and feeding the same axially while the bottle and the cap are held stationary, said folding mechanism including a member movable orbitally during rotation of the

folding mechanism around the bottle neck and coacting with the margin of the skirt to fold it up during the orbital movement, and a carrier for said member, said member being connected to the carrier by a coupling having a rocking compensating action.

12. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, of mechanism for folding inward and upward the lower annular margin of the skirt between the body of the skirt and the bottle neck, and means for rotating the folding mechanism and feeding the same axially while the bottle with the cap thereon is held stationary, said folding mechanism including a member movable orbitally around the bottle neck and coacting with the margin of the skirt to fold upward and inward during the orbital movement, said member including a back plate, a folder die mounted on the inner face of the back plate, a guide finger carried by the back plate and having a guiding portion spaced from the back plate forming a passage through which the margin of the cap extends, the guide finger extending above the folder and serving to press the margin of the cap toward the outer side of the folder die whereby the margin is folded inwardly by the folder die during the axial movement of said member, a carrier for the folding member, the back plate being connected to the carrier by a coupling having a rocking compensating action.

13. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, and a support for the bottle operable for lifting the support to carry the bottle axially into and out of juxtaposition to the capping mechanism, of spinner mechanism for turning upward the margin of the cap to lock the cap on the neck of the bottle, the spinner mechanism comprising a rotating head having an axial passage for the bottle, an orbitally movable margin folding member carried by the head and shiftable radially into and out of position to engage the body of the margin of the cap, said head being movable axially of the bottle, means for shifting said member radially inwardly during the upward movement of the head and for shifting it outwardly radially during the downward movement of the spinner head and timed actuating means for operating the capping mechanism, the bottle support and shifting the spinner head axially.

14. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, and a support for the bottle, operable to carry the bottle axially into and out of juxtaposition to the capping mechanism, of spinner mechanism for turning upward the margin of the cap to lock the cap on the neck of the bottle, comprising a rotating head having an axial passage for the bottle, a folder member movable orbitally in said passage and around the passage, a radially shiftable carrier for the folder member, the carrier being mounted in the head, the head being movable axially, means for causing the carrier to shift radially inward during upward axial movement of the head and to shift radially outward during downward movement of the head.

15. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle, and a support for the bottle, operable to carry the bottle axially into and out of juxtaposition to the cap-

ping mechanism, of spinner mechanism for turning upward the margin of the cap to lock the cap on the neck of the bottle, comprising a rotating head having an axial passage for the bottle, a folder member movable orbitally around said passage, a radially shiftable carrier for the folder member pivoted to the head and shiftable on its pivot radially relative to the head, the head being shiftable axially, means for causing the carrier to move radially inwardly on its pivot during upward axial movement of the head and to shift the carrier radially outward on its pivot during downward movement of the head.

16. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle and a support for the bottle operable to carry the bottle axially into and out of juxtaposition to the bottle capping mechanism, of spinner mechanism for turning upward the margin of the cap to lock the cap on the bottle comprising an abutment member fixed from axial movement, an axially shiftable rotating head, the head and abutment member being provided with passages for the bottle in its axial movement toward and from the capping mechanism, a folder member rotatable with the head and movable orbitally around the bottle passage, a carrier for said member mounted on the head to shift radially, the carrier having an arm normally engaging the abutment to hold the carrier and the folding member in its outward radial position and movable out of engagement with the abutment during upward movement of the head to permit the carrier to shift and carry said member inward radially, timed means, and connections operated thereby for operating the bottle support, capping mechanism, and for moving the spinner head upward and downward.

17. In a bottle capping machine, the combination with mechanism for applying a cap with a skirt enclosing the neck of the bottle and a support for the bottle operable to carry the bottle axially into and out of juxtaposition to the bottle capping mechanism, of spinner mechanism for turning upward the margin of the cap to lock the cap on the bottle comprising an abutment member fixed from axial movement, a rotating head, the head and abutment member being provided with passages for the bottle, a folding member rotatable with the head and movable orbitally around the bottle passage, a carrier lever pivoted to the head and movable on its pivot radially relatively to the axis of the head to carry said member radially toward and from the axis of said passage, means for pressing the lever inwardly, the lever having an angular arm normally coacting with the abutment to hold the carrier in its outward position and movable out of engagement with the abutment during the upward movement of the spinner head to permit the carrier to move inward on its pivot, actuating mechanism and connections operated thereby for operating the

bottle support, the capping mechanism and shifting the spinner head upward and downward.

18. In a bottle capping machine, a bottle support, capping mechanism for applying a cap to the bottle and actuating mechanism and connections operated thereby for effecting relative movement of the bottle and capping mechanism, of means for feeding a blank strip from which the caps are formed into juxtaposition to the capping mechanism and the bottle, including a pair of feed rollers coacting with the strip, the rolls having a separating movement to release the strip of the feeding mechanism and the strip having a centering hole for each blank, a centering pin operated by the capping mechanism for entering said hole, and means timed with the actuating mechanism for separating the rolls preliminary to the applying of the cap blank which is in juxtaposition to the cap applying mechanism and the bottle.

19. In a bottle capping machine, the combination of mechanism for forming caps with skirts from blanks and forming the caps on the bottles, with the skirt enclosing the neck of the bottle, means for supporting the bottle in juxtaposition to the capping mechanism and the cap blanks, said mechanism including upper and lower crimping dies, and timed means for actuating the upper die toward the lower and interposed margin of the blank and for moving both dies downwardly, as a unit, plaiting the skirt and folding it downward at an inclined angle around the bottle neck so that it flares outward, and timed means for wrapping the flared skirt around the bottle neck.

20. In a bottle capping machine, the combination of mechanism for forming caps with skirts from blanks and forming the caps on the bottles, with the skirt enclosing the neck of the bottle, means for supporting the bottle in juxtaposition to the capping mechanism and the cap blanks, said mechanism including upper and lower crimping dies, and timed means for actuating the upper die toward the lower and interposed margin of the blank and for moving both dies downwardly, as a unit, plaiting the skirt and folding it downward at an inclined angle around the bottle neck so that it flares outward and separating the dies at the end of their downward movement, and timed means for moving the flared skirt clear of the dies and wrapping it around the bottle neck.

21. In a bottle capping machine, the combination with mechanism for applying a disk of paper or like material to the top of the bottle with the disk extending radially beyond the top of the bottle, of mechanism for forming the extending portion of the disk into a pleated skirt enclosing the neck of the bottle, of mechanism for folding upward the lower annular margin of the skirt, and means for effecting relative axial and rotary movements of the bottle with the cap thereon, and the turning up mechanism.

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