Aug. 6, 1935. A. C. GOUGH 2,010,392

MACHINE FOR APPLYING SKIRTED CAPS TO RECEPTACLES

Original Filed March 29, 1933 3 Sheets-Sheet 1

Fig. 1

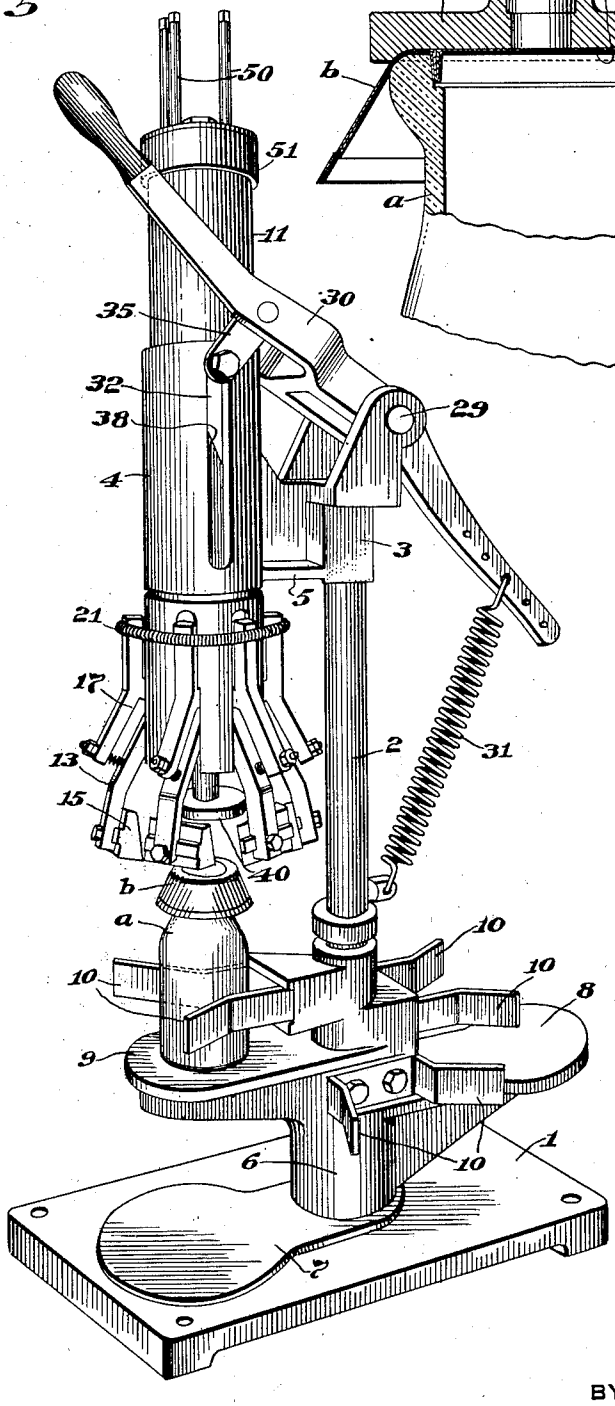


Fig. 2

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Fig.4

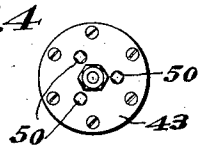


Fig.5

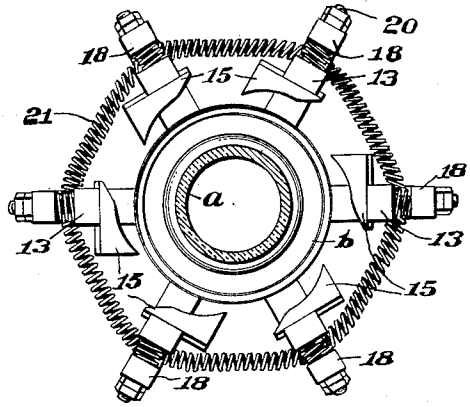
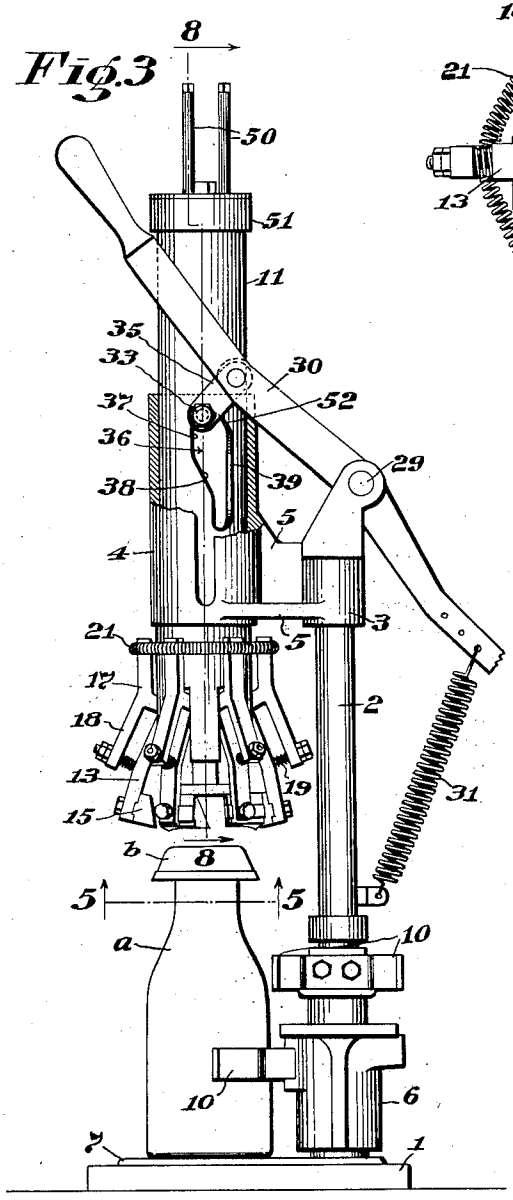


Fig.3



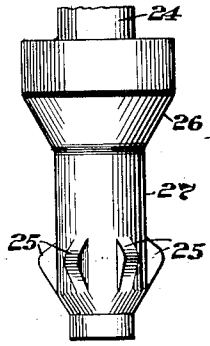
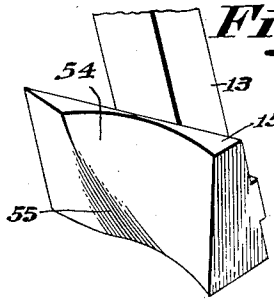


Fig.6

Fig.7



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Fig. 8

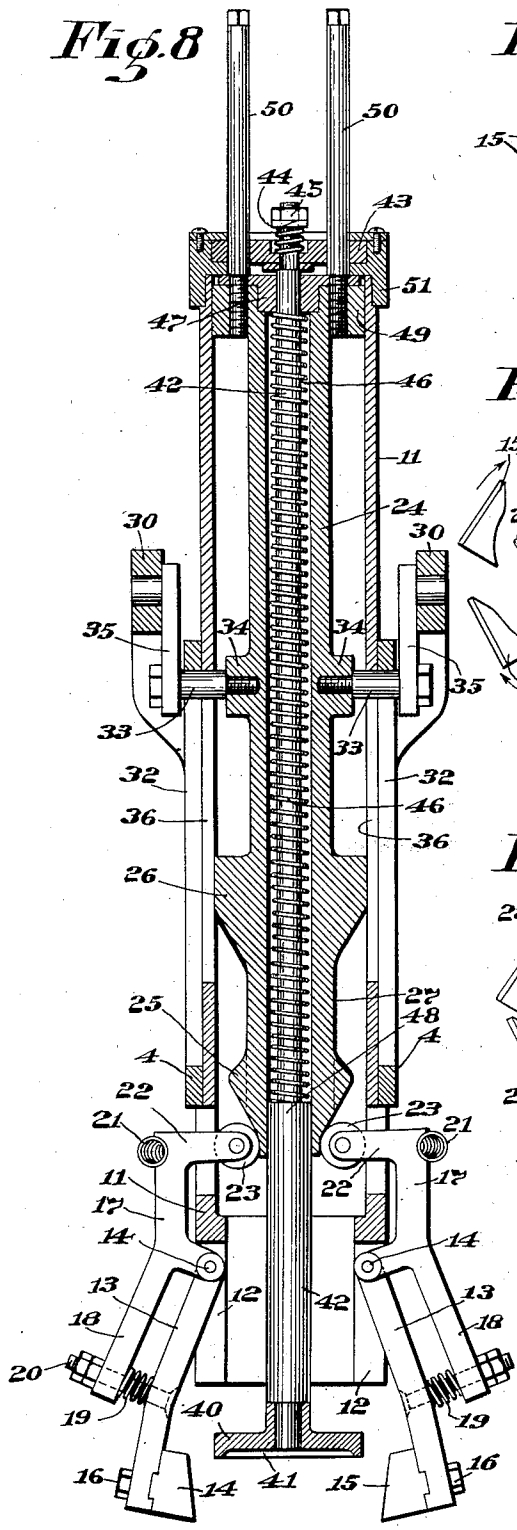


Fig. 9

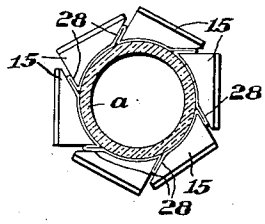


Fig. 10

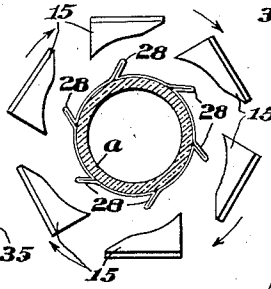


Fig. 11

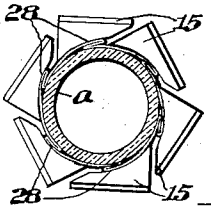


Fig. 14

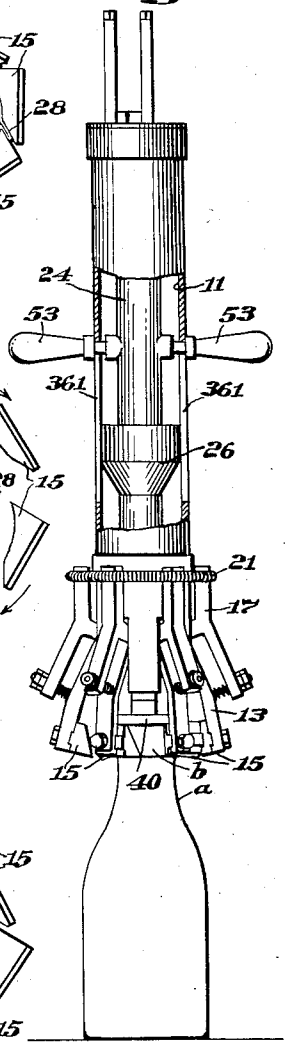


Fig. 12

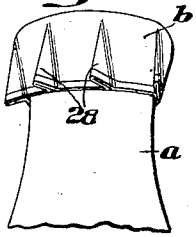
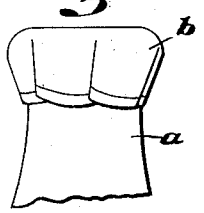


Fig. 13



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MACHINE FOR APPLYING SKIRTED CAPS TO RECEPTACLES

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Application March 29, 1933, Serial No. 663,312
Renewed June 22, 1935

11 Claims. (Cl. 226—86)

This invention relates to machines for applying closures to receptacles or containers, and is more particularly concerned with the application of skirted caps to milk bottles and the like.

In a prior application, Ser. No. 659,470, filed March 3, 1933, there was shown, described and claimed a skirted bottle cap having a non-resilient metallic member or ring permanently embedded in the skirt of the cap during its manufacture and prior to its application to a container or receptacle, and while the machine of the present application may be used for applying any character of skirted caps to receptacles, its advantages are more clearly observable in applying the skirted caps of the above mentioned application to receptacles, such as milk bottles and the like.

One of the objects of the present invention is to provide a machine of compact and simple construction for the application of skirted caps to receptacles by forming preliminary folds in the skirt after the cap and receptacle have been assembled and thereafter subjecting the folds to a sealing pressure about the exterior of the receptacle.

In accordance with one aspect of the present invention a jaw carrier is provided with a series of skirt folding jaws which are operated by movement of an actuator to, first, form the skirt of the cap into preliminary folds and then release the folding jaws from the skirt to permit the jaw carrier to be turned, and, second, by further movement of the actuator to cause the jaws to again engage the skirt and subject the folds of the skirt to a sealing pressure. Where the skirt of the cap is provided with a permanently attached non-resilient metallic member or ring, the latter will respond to the action of the jaws in forming preliminary folds in the skirt, and when the jaws again act the non-resilient metallic member or ring will be forced with the folds of the skirt into sealing position and retain the cap in place.

The invention and novel features thereof will be best made clear from the following description and accompanying drawings of one good practical form thereof.

In the drawings:—

Fig. 1 is a perspective view of a machine containing the present invention;

Fig. 2 is an enlarged sectional view showing the top portion of a milk bottle with a skirted cap assembled therewith and a portion of a centering device engaged with the top of the cap;

Fig. 3 is a side elevation of the machine of Fig. 1 with parts broken away to show the jaw carrier rotating means;

Fig. 4 is a detached detail in plan;

Fig. 5 is a section on the line 5—5 of Fig. 3;

Fig. 6 is a detail elevation of the two jaw operating portions on the actuator;

Fig. 7 is a detached view of one of the jaws showing more particularly the inner face of the jaw;

Fig. 8 is an enlarged vertical section on the line 8—8 of Fig. 3;

Fig. 9 is a diagrammatic and sectional view showing the first action of the jaws in forming the preliminary folds in the skirt of the cap;

Fig. 10 is a similar view showing the second position of the parts after the jaws have formed the preliminary folds and been released from the skirt of the cap to permit rotative movement of the jaw carrier;

Fig. 11 is a similar view showing the jaws as again engaged with the skirt and forcing the skirt into sealing engagement with the exterior of the receptacle or bottle;

Fig. 12 is a perspective view showing the preliminary folds in the skirt resulting from the first action of the jaws as in Fig. 9;

Fig. 13 is a side view showing the skirted cap in its final sealing position; and

Fig. 14 is a side elevation of a slightly modified form of the actuator operating means to adapt the machine for application of skirted caps to bottles on the floor.

The machine frame for supporting the operating parts may be of any desired character and as depicted in Fig. 1 it comprises a base plate 1 from which arises the fixed standard 2 having a head portion 3 to which the cylinder 4 is secured. In the present instance the head 3 has laterally projecting portions 5 which are secured to the cylinder 4 and hold it in fixed position.

Mounted on the standard 2 is the hub portion 6 of a bottle supporting device which is adapted to be rotated about the stand 2 to present any one of the bottle supports in operative relation with the capping machine.

As more clearly indicated in Fig. 1 the bottle support comprises a fixed member 7 on which bottles of the maximum height may be placed, and the hub portion 6 which as before stated, may be turned upon the standard 2, has the bottle supports 8 and 9 each adapted to support a bottle of different height. Associated with each of the bottle supports are the bottle positioning members 10 which may embrace the body portion of a bottle and maintain it in position upon its support. When a bottle of maximum height is placed upon the support 7 the positioning elements 10, the lowest of the series, are adapted to embrace and hold the bottle on its support as clearly illustrated in Fig. 3.

Within the cylinder 4 is the jaw carrier 11 which fits the cylinder with permissive rotative movement.

The lower portion of the jaw carrier 11 is pro-

vided with a series of slots or openings 12 in which the jaw carrying arms 13 are pivoted, as at 14. Each of the jaw carrying arms 13 is provided with a jaw 15 which may be secured each to its respective jaw carrying arm by suitable bolts 16, the construction being such that the jaws 15 may move towards and from each other. Pivotally mounted on the same axis with the jaw carrying arms at 14 are a series of jaw actuating members 17 having their lower extensions 18 yieldingly associated with the jaw carrying arms 13. In the present instance of the invention the yielding connection between the jaw carrying arms 13 and the jaw actuating members 17 is constituted by a spring 19 surrounding a stem 20 which passes through the lower extensions 18 of the jaw actuating arms and through an opening in the lower portion of the jaw carrying arms, the construction being such that the jaw actuating arms 17 control yieldingly the movement of the jaws 15 towards and from each other.

In accordance with the present invention the jaws 15 are to be held normally in spread or open position and while any convenient means may be employed for this purpose, a spring 21 surrounds the upper end portions of the actuating member 17 and normally holds the jaws in separated relation.

Each of the jaw actuating members 17 is provided with an extending arm 22 carrying a roller 23 which, as will later appear, may be engaged by cams mounted on an actuator.

The actuator 24 is constituted as a plunger having longitudinal movement within the jaw carrier 11, as indicated in Fig. 8.

The actuator 24 is provided with two cam portions, the lower one 25 of which is of less rise than the upper one 26, and between the two cams is a depression 27. It will be observed from Fig. 8 that longitudinal movement of the actuator 24 from the normal position shown in said figure will first cause the lower cam portion 25 to act upon the rollers 23 of the jaw actuating members and cause the jaws to engage and preliminarily fold the skirt of a skirted bottle cap placed upon the top opening of a milk bottle or other receptacle, as *a*.

On further longitudinal movement of the actuator 24 the rollers 23 will engage the recess 27 and thereby be moved from the position indicated in Fig. 9, where the preliminary folds have been formed, into the position of Fig. 10 where the jaws 15 are spread apart under the tension of the spring and the preliminary folds 28 are freed while still extending in a circumferential direction about the top of the bottle or receptacle *a*.

In accordance with the present invention the preliminary folds 28 and the non-resilient metallic wire which is permanently secured to the skirt of the cap are laid in sealing relation with the top of the bottle or receptacle and to this end the jaw carrier 11 has imparted to it a rotative movement sufficient to bring the inner face of the jaws into position opposite the preliminary folds 28 as indicated in Fig. 10.

On further continued movement of the actuator 24 the large upper cam 26 will act upon the rollers 23 and impart to the jaws a sealing movement to force the preliminary folds 28 into close contact with the exterior surface of the bottle or container, as indicated in Fig. 11. The movement of the actuator 24 and the rotative movement imparted to the jaw carrier may be accomplished through any usual form of mechanism either manually or power operated, but as shown in the present instance of the invention, the head 3 surmounting the fixed standard 2 has pivoted thereto at 29 a hand lever 30 which normally is held in the position indicated in Fig. 1 by a spring 31 or its equivalent.

The cylinder 4 has a vertically extending slot 32 at its opposite sides through which extend the pins 33 which have their inner ends secured to bosses 34 formed on the actuator. Connecting the lever 30 with the pins 33 are the links 35, the construction being such that on manipulation of the lever 30 the actuator 24 will be moved longitudinally.

As hereinbefore noted, the jaw carrier 11 is to be given a rotative movement when the jaws 15 have been spread apart or separated from the skirt of the cap after the formation of the preliminary folds and in accordance with the present invention this is accomplished by one or both pins 33 which extend through vertically disposed cam slots 36 which have a straight upper portion 37, an inclined or cam portion 38 and a straight portion 39, as indicated more clearly in Fig. 3. The construction is such that when the lever 30 is operated and causes the pins 33 to carry the actuator 24 downwardly, such pins 33 ride along the straight portion 37 of the cam slot in the jaw carrier 11 while the actuator 24 moves the smaller cam 25 downwardly to separate the upper portion of the jaw actuators 17. On further movement of the lever 30 the cam 25 will pass below the rollers 23 of the jaw actuators 17, whereupon the spring 21 will cause the jaws to separate while the rollers 23 are in the recessed portion 27 of the actuator and thus the jaws will be separated, as indicated in Fig. 10. As the pins 33 move downwardly in the cam slot 36 of the jaw carrier they will engage the inclined portion 38 of the cam slot and cause the jaw carrier to turn through an appropriate angle while the jaws themselves are released from the skirt of the cap, as indicated in Fig. 10.

On further movement of the actuator 24 the larger cam 26 will engage the rollers 23 and cause the jaws to again close upon the preliminary folds of the skirt and force the skirt inwardly into sealing contact with the exterior of the bottle or receptacle, as indicated in Fig. 11. On reverse movement of the actuator 24 the parts will again assume their normal position, as indicated in Figs. 3 and 8. Preliminary to the action of the jaws upon the skirt of the cap it is desirable that the bottle or receptacle with the skirted cap *b* laid on, as indicated in Fig. 2, be not only held in proper operative position relative to the jaws, but that any slight displacement of the bottle or receptacle on its support shall be corrected, and to this end the present invention provides a centering member 40 having a recessed end face 41 and adapted to engage the top portion of the skirted cap with the result that upon downward force being applied to the centering member 40 any slight displacement of the bottle or receptacle on its support will be corrected and the cap held securely upon and over the mouth or opening of the bottle or receptacle.

The centering member 40 is carried on a stem 42 which extends longitudinally through an opening in the actuator 24, as indicated more clearly in Fig. 8, and the top portion of the stem 42 is yieldingly associated with the closure 43. Such yielding support may be variously contrived but in the present instance of the invention a spring 44 is interposed between the nut 45 on the upper

end of the stem 42 and the closure 43, see Fig. 8.

The stem 42 is surrounded by a spring 46, Fig. 8, the upper portion of which rests against the under surface of the boss 47 and the lower portion of which rests upon a shoulder 48 of the stem, the result being that as the actuator 24 is moved longitudinally, as hereinbefore described, the spring 46 will be placed under tension, thereby effecting movement of the centering member 40 into yielding contact with the skirted cap, as indicated in Fig. 2. There is only a slight movement of the centering member 40 owing to the limited play afforded by the upper end of the stem and its association with the closure 43.

The upper end portion of the actuator 24 is enlarged in the form of a piston 49, Fig. 8, and secured thereto are the guide rods 50 which pass through openings in the closure 43, the result being that the closure 43 is held from rotative movement.

Since the jaw carrier 11 is to have a rotative movement sufficient to correlate the jaws with respect to the preliminary folds 28, as hereinbefore described, the closure 43 has the downwardly extending flanges 51 thereof embracing the upper end of the jaw carrier 11 which latter is free to turn within the confines of the flanges 51.

From the construction thus far described it will be apparent that when a bottle or receptacle is placed on its support and the actuator 24 is moved longitudinally, the centering member 40 will first engage the top of the skirted cap, as indicated in Fig. 2, and by virtue of the recess 41 and its curved walls about the recess and the cooperating lip of the bottle or receptacle will cause the latter to be properly located on its support and the cap will be held in position. On further longitudinal movement of the actuator 24 the lower cam or cams 25 will act to cause the jaws 15 to approach each other and engage the skirt of the cap to thereby form the preliminary folds 28. Upon further longitudinal movement of the actuator 24 the recessed portion 27 on the actuator will be presented to the rollers 23 of the jaw actuating arm 17 with the result that the jaws will separate substantially into the position of Fig. 10 and while in such separated relation from the skirt of the cap the cam 36 and pins 33 will cooperate to turn the jaw carrier 11 through the desired angle and on further longitudinal movement of the actuator the skirt sealing cam 26 will act upon the jaw actuating arms 17 and cause the jaws to forcefully move the preliminary folds 28 into sealing engagement with the exterior of the bottle or receptacle. On reverse movement of the actuator 24 the pins 33 will rise in the cam slot 36 until they reach the upper portion thereof at 52, Fig. 3, whereupon the jaw carrier 11 will be given a reverse rotative movement sufficient to locate the pins 33 in the position shown in Fig. 3 ready for the next cycle of operations.

The machine for applying skirted caps to receptacles or bottles as hereinbefore described, is mounted upon a stand comprising the base portion 1 and the fixed upright stud 2, as hereinbefore stated, and so it is necessary in this type of construction to place the receptacles or bottles *a* on a support in operative relation to the capping machine. It may happen at times that the user of the capping machine may desire to carry it from place to place and apply skirted caps to the bottles or receptacles as they stand upon the floor or other support, and a convenient modification of the invention is therefore shown by Fig. 14 which differs from the preferred form of the invention as hereinbefore described in the omission of the supporting cylinder 4 and the application of handles direct to the actuator.

Having reference more particularly to Fig. 14 it will be noted that the cylinder 4 is omitted and that the jaw carrier 11 has the cam portions 361, which correspond in general shape and contour with the cam 36, as indicated in Fig. 3. Two hand holds or grips 53 are provided for operating the actuator 24 and such hand holds or grips pass through the cam slots 361 and are secured to the actuator 24, the construction being such that the entire apparatus may be transported by hand and when placed upon a skirted bottle cap, a downward movement of the hand grips 53 will cause the actuator to first form the preliminary folds, then permit the jaws to separate as in Fig. 10 and while so separated the jaw carrier 11 will be given a rotative movement in all respects similar to that already described with reference to the preferred form of the invention. Upon further movement of the actuator 24, Fig. 14, the upper or larger cam 26 will come into action and cause the preliminary folds to be laid closely about the receptacle or bottle substantially in the position as indicated in Fig. 11.

In both the preferred and modified form of the invention the jaws 15 are similarly constructed that is, the inner face 54 of each jaw extends in an arcuate curve circumferentially of the receptacle or bottle. As the jaws come into close sealing contact, one with the other, it is desirable that there shall not be any crimp or corrugation formed in the skirt of the cap and to this end each of the jaws 15 has its inner surface chamfered off, as at 55, so that when the jaws are acting upon the preliminary folds to permanently seal the skirted cap upon the receptacle or bottle they may overlap, as indicated in Fig. 11, and the chamfered off portion 55 of each jaw will obviate the formation of any crease or corrugation in the skirt and cause the latter to lay in sealing contact with the exterior surface of the receptacle or bottle.

What is claimed is:—

1. A machine for applying skirted caps to receptacles including a centering member to engage the top of a skirted cap on a receptacle, a folding jaw carrier, a series of folding jaws mounted on the carrier, an actuator for the jaws having two operating cam portions to act successively upon the jaws, one of which causes the jaws to form preliminary folds in the skirt of a cap, and the other of which causes the jaws to lay the preliminary folds of the skirt in sealing engagement with the exterior of the receptacle, and means for moving the actuator in a single direction to cause the jaw operating cam portions to act successively upon the jaws.

2. A machine for applying skirted caps to receptacles including a centering member, a folding jaw carrier, a series of folding jaws mounted on the carrier, an actuator for the jaws having two separate jaw operating cam portions, one of which causes the jaws to bend the skirt into preliminary folds and the other of which causes the jaws to lay the preliminary folds of the skirt in sealing engagement with the exterior of the receptacle, and means for moving the actuator to cause the centering member to engage the top of the skirted cap, and upon further movement in the same direction to cause the two jaw operating cam portions to act successively upon

the jaws to successively fold and seal the skirt of the cap.

3. A machine for applying skirted caps to receptacles including a support for the receptacle, a folding jaw carrier mounted for limited rotative movement, a series of folding jaws pivotally mounted on the carrier, an actuator for the jaws having two jaw operating cam portions, one of which causes the jaws to form preliminary folds in the skirt of the cap, and the other of which causes the jaws to lay the preliminary folds in sealing engagement with the exterior of the receptacle, and means for moving the actuator in one direction to, first, form preliminary folds in the skirt, second, to release the jaws from the preliminary folds in the skirt and turn the jaws into a new position about the skirt of the cap, and third, lay the preliminary folds of the skirt in sealing engagement with the exterior of the receptacle.

4. A machine for applying skirted caps to receptacles including a support for the receptacle, a folding jaw carrier mounted for limited rotative movement, a series of folding jaws pivotally mounted on the carrier, an actuator for the jaws having two jaw operating cam portions, one of which causes the jaws to form folds in the skirt of the cap, and the other of which causes the jaws to lay the folds in sealing engagement with the exterior of the receptacle, and means for moving the actuator to, first, form folds in the skirt, second, to release the jaws from the folds in the skirt and turn the jaws into a new position about the skirt of the cap, and third, lay the folds of the skirt in sealing engagement with the exterior of the receptacle.

5. A machine for applying skirted caps to receptacle including a folding jaw carrier constituted as a tubular member having a longitudinally extending cam, a series of folding jaws mounted on the carrier, a folding jaw actuator constituted as a plunger mounted for longitudinal movement relative to the jaw carrier and having two jaw operating cam portions at different points in its length, means for moving the plunger longitudinally and having a part engaged with the cam on the folding jaw carrier so that in a single cycle of the machine operation the jaws will be actuated to form folds in the skirt of the cap, then be released from the skirt and the jaw carrier be turned and then the jaws be actuated to lay the folds of the skirt in sealing contact with the exterior of the receptacle.

6. A machine for applying to containers skirted caps having a non-resilient metallic member permanently secured to the skirt, comprising, a support for a receptacle having a skirted cap loosely placed thereon, a jaw carrier mounted for limited rotative movement, a series of jaws mounted on the jaw carrier, a jaw actuator constituted as a plunger having a cam portion for causing the jaws to form folds in the skirt, a depressed portion for releasing the jaws from the folds in the skirt, and a second cam portion for causing the jaws to lay the folds of the skirt in sealing engagement with the container on a single operation of the actuator, and means for turning the jaw carrier between the successive operations of the two cam portions on the actuator.

7. A machine for applying to containers skirted caps having a non-resilient metallic member permanently secured to the skirt, comprising, a support for a receptacle having a skirted cap loosely placed thereon, a jaw carrier mounted for limited rotative movement, a series of jaws mounted on the jaw carrier, a jaw actuator constituted as a plunger having a cam portion for causing the jaws to form folds in the skirt, a depressed portion for releasing the jaws from the folds in the skirt, and a second cam portion for causing the jaws to lay the folds of the skirt in sealing engagement with the container on a single operation of the actuator, a yieldable centering member operatively engaged with the top of the cap on movement of the jaw actuator, and means for turning the jaw carrier between the successive operations of the two cam portions on the actuator.

8. A machine for applying skirted caps to containers, including a support, a tubular guide secured to the support and provided with a longitudinal slot, a jaw carrier within the tubular guide and formed with a cam on its wall, a series of jaws pivotally mounted on the jaw carrier, a jaw actuator within the jaw carrier and constituted as a plunger having two jaw operating cams at different points in its length, and an operating member for the jaw actuator having a part working in the longitudinal slot of the support and engaging the cam of the jaw carrier to cause rotative movement of the jaw carrier between the successive actions of the two jaw operating cams.

9. A machine for applying skirted caps to receptacles including a folding jaw carrier, a series of jaws mounted on the carrier, an actuator for the jaws having a cam portion to form preliminary folds in the skirt as the actuator is moved longitudinally, a recessed portion to permit the jaws to separate on further longitudinal movement of the actuator after the formation of the preliminary folds, and a larger cam portion for sealing the preliminary folds upon the receptacle upon further longitudinal movement of the actuator, means for moving the actuator longitudinally, and a cam for turning the jaw carrier through said means as the latter is operated when the jaws are separated.

10. A machine for applying skirted caps to receptacles including a jaw carrier mounted for rotative movement, a series of jaws mounted on the carrier, an actuator mounted for longitudinal movement relative to the jaw carrier and having two cam portions at different points in its length and a recess between said cam portions, means for moving the actuator longitudinally and having a part to rotate the jaw carrier to, first, form preliminary folds in the skirt of the cap, second, to release the jaws from the skirt and turn the jaw carrier, and, third, to seal the preliminary folds of the skirt against the receptacle.

11. A machine for applying skirted caps to receptacles including a jaw carrier, a series of jaws mounted on the carrier, yielding means normally acting to hold the jaws in separated relation, an actuator having a relatively small cam portion and another larger cam portion, and means for moving the actuator longitudinally to cause the jaws to act successively to form preliminary folds in the skirt of the cap and thereafter to seal the skirt against the receptacle during longitudinal movement of the actuator.

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