May 1, 1945. J. W. SHERA 2,375,141

CAP APPLYING MECHANISM

Filed May 16, 1944 2 Sheets-Sheet 1

Fig. 1.

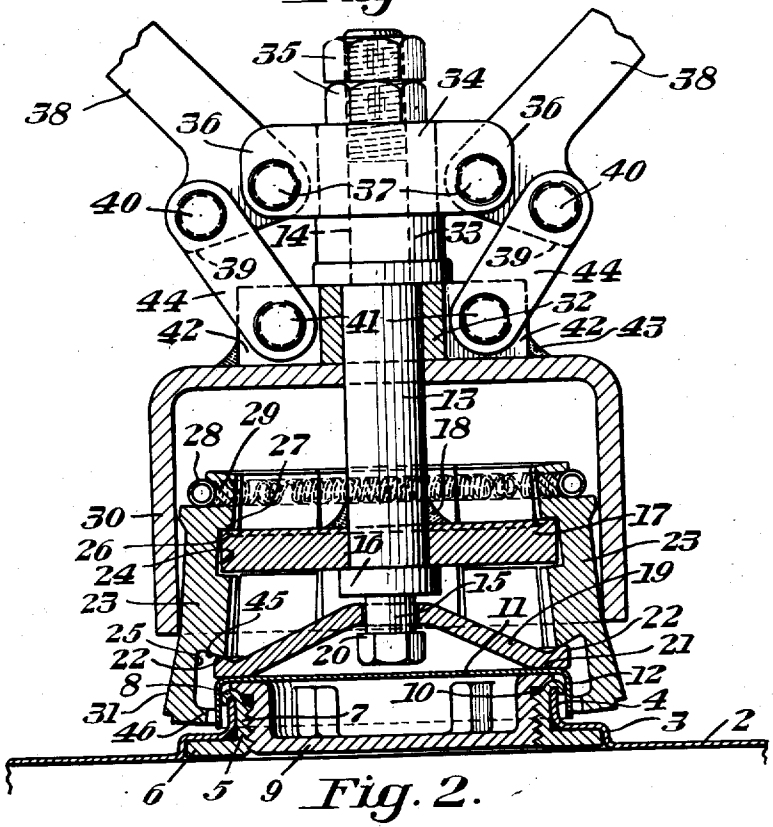
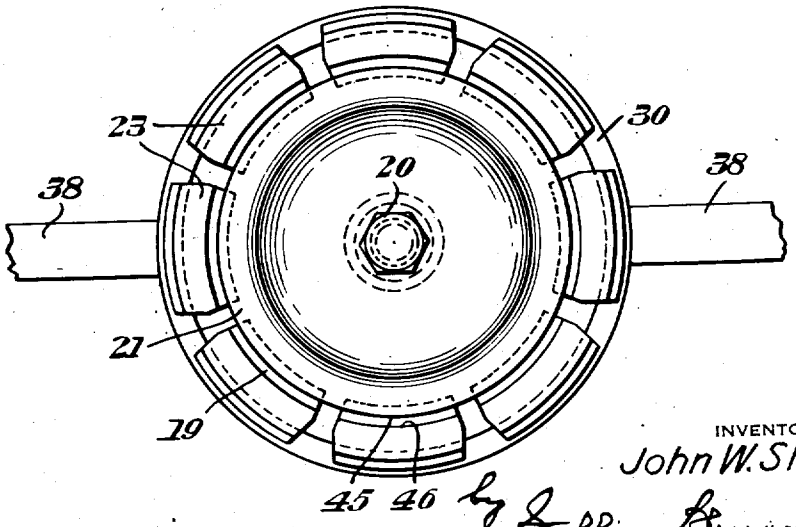


Fig. 2.



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Fig. 3.

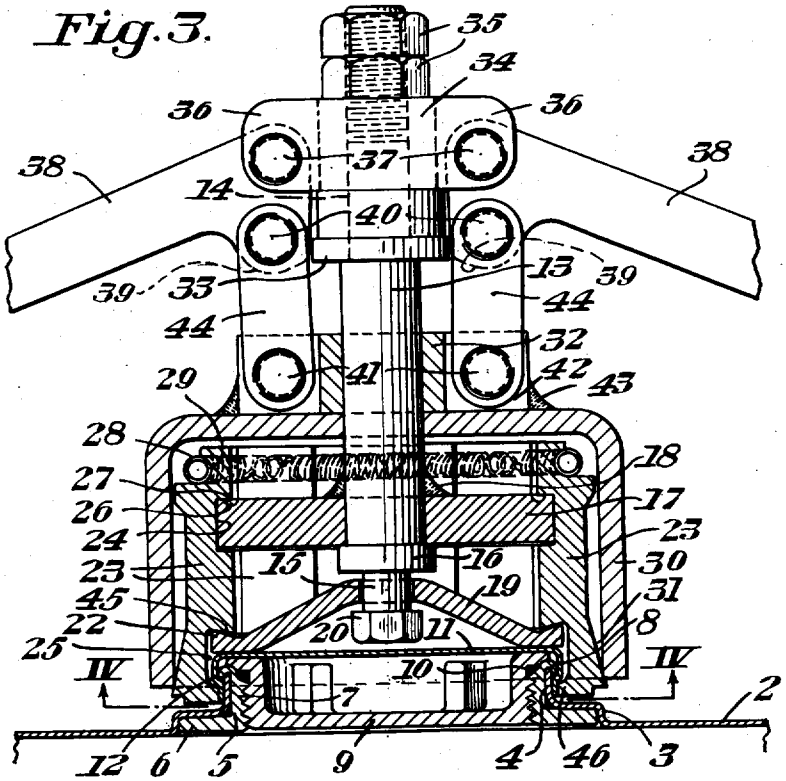


Fig. 4.

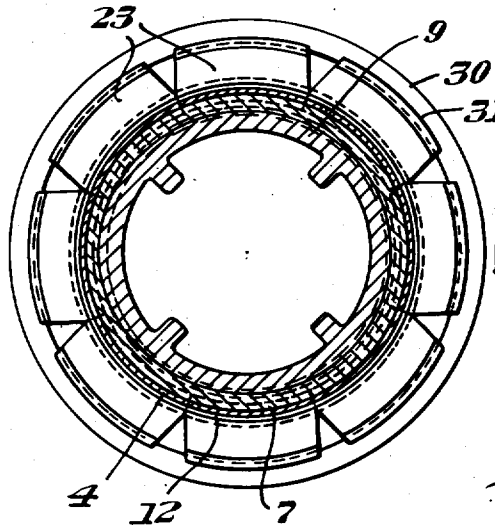
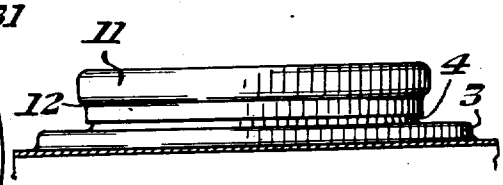


Fig. 5.



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Patented May 1, 1945 2,375,141

UNITED STATES PATENT OFFICE

2,375,141

CAP APPLYING MECHANISM

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Application May 16, 1944, Serial No. 535,830

8 Claims. (Cl. 226—86)

This invention relates to cap applying mechanism. It has to do primarily with mechanism for applying flanged caps to necked containers. It is customary to position a flanged cap over a container neck and to crimp the cap flange inwardly beneath a radial bead on the neck to hold the cap in place.

Flanged caps are commonly applied to necked metal drums in the manner above referred to and various cap applying mechanisms have been proposed for crimping the flanges of the caps. Such mechanisms have not been in all respects fully satisfactory, either being unduly complex or requiring considerable accurate machining or being found wanting in use either because of failure to uniformly properly apply the caps or because of difficulty of manipulation or both. I have solved the problems which have existed incident to the provision of a fully satisfactory cap applying mechanism for applying flanged caps to necked containers, and while my invention is of broad application I have chosen to describe it as embodied in cap applying mechanism for applying metal caps to metal drums such as relatively large and heavy steel shipping and storage drums.

I provide a cap applying mechanism which is of relatively simple and inexpensive construction, does not require a great deal of accurate machining, is uniformly effective and reliable in operation and is not difficult to operate. The parts are so related that in operation of the mechanism binding of parts against one another is minimized with the result that less work is required to accomplish the cap applying or crimping function than with similar mechanisms heretofore used. This advantage is particularly important in hand operated cap applying tools and for this reason I have shown in the drawings a tool intended to be hand manipulated for applying caps to steel drums.

I provide cap applying mechanism comprising a support, jaw members mounted on the support, a cap seating member adapted to bear against the top of the cap, the jaw members having portions bearing against the cap seating member to press it against the cap when the jaw members are operated, and means for operating the jaw members to deform inwardly the cap flange. Preferably the cap seating member is loosely carried by the support so as to be movable axially relatively thereto and desirably also movable rotatively or tiltably or both. While the cap seating member may be entirely separate from the support it is convenient to have it connected with the support so that the entire mechanism is handleable as a unit, but, as above indicated, there should be flexibility in operation brought about by a loose connection between the cap seating member and the support if the cap seating member is carried by the support.

Preferably the jaw members constitute the sole means bearing against the cap seating member to press it against the cap when the jaw members are operated. Furthermore, the jaw members preferably move bodily generally axially during operation of the mechanism and desirably they are so related to the support that the unit comprising the support, the jaw members and the means for operating the jaw members to deform inwardly the cap flange moves axially toward the container and relatively to the cap seating member during the cap applying operation. This may be brought about by providing the jaw members and the cap seating member with cooperating surfaces inclined generally toward the axis of the mechanism and toward the cap being applied, the jaw members and cap seating member being in contact at said surfaces, through which the jaw members press the cap seating member against the cap and the jaw members are guided for bodily generally axial movement during operation of the mechanism. Desirably the jaw members have surfaces inclined generaly toward the axis of the mechanism and toward the cap being applied, which surfaces bear against the cap seating member to press it against the cap when the jaw members are operated and guide the jaw members for generally axial bodily movement relatively to the cap seating member upon operation of the jaw members.

The jaw members desirably have recesses therein receiving a portion of the carrier whereby the jaw members are carried by the carrier. The recesses in the jaw members are preferably generally radial and the carrier may conveniently be to all intents and purposes an integral part of the support which projects generally radially into the recesses in the jaw members. Also the support desirably is provided with a generally axial depression and the jaw members are preferably carried by the support and embrace the edge thereof and have fulcrum portions adapted to enter the depression, means being provided for rocking the jaw members about the fulcrum portions to deform inwardly the cap flange. The depression serves as an oil receptacle and to a considerable extent retains oil which lubricates the

fulcrums of the jaw members, thus facilitating operation of the mechanism and reducing wear and squeaking of the parts.

The jaw members desirably have generally radial recesses the upper surfaces of which engage the cap seating member so that the cap seating member positions the jaw members in the axial direction during operation of the mechanism. The jaw members have cap flange engaging and deforming portions below said recesses. This provision minimizes the amount of accurate machining which has to be done in order to obtain satisfactory results. The cap seating member should be of reasonably accurate thickness and the recesses in the jaw members should be of reasonably accurate breadth generally axially of the tool. The remaining parts do not require accurate machining as is necessary in mechanisms for the same purpose heretofore proposed.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention, in which

Figure 1 is a central vertical cross-sectional view through cap applying mechanism shown in place with respect to a steel drum ready to crimp the flange of a cap about the drum neck;

Figure 2 is a bottom plan view of the cap applying mechanism shown in Figure 1;

Figure 3 is a view similar to Figure 1 but showing the mechanism in its operated position with the cap flange crimped about the drum neck;

Figure 4 is a transverse cross-sectional view taken on the line IV—IV of Figure 3; and

Figure 5 is a fragmentary elevational view of the drum after the cap has been applied.

Referring now more particularly to the drawings, there is shown a steel drum which may be of any known or preferred structure. The drum shown is designated generally by reference numeral 2 and is formed with an outturned stepped neck having a base portion 3 of relatively great diameter and a terminal portion 4 of relatively small diameter. Applied to the container neck is a steel bushing 5 known in the art as a "flange" and which comprises a base portion 6 from which extends a neck portion 7 whose extremity 8 is turned outwardly and downwardly over the edge of the drum neck. The flange 5 is internally threaded and receives an externally threaded plug 9 which is screwed thereinto to seal the drum, a sealing gasket 10 being provided between the flange and plug. The outturned extremity 8 of the neck portion 7 of the flange 5 forms in effect a radial bead on the drum neck. A sheet metal cap 11 having a downturned flange or skirt 12 is applied over the neck and is adapted to have its flange 12 deformed or crimped inwardly about the drum neck and beneath the bead provided by the portion 8. In Figure 1 the cap 11 is shown as laid over the drum neck ready to be applied by having its flange deformed or crimped inwardly about the neck beneath the bead.

The cap applying mechanism comprises a support in the form of a stem 13 having a reduced upper extremity 14 and a reduced lower extremity 15 with a portion 16 of increased diameter between the body of the stem and the reduced lower extremity 15. A jaw member carrier 17 in the form of a metal disk having a central perforation for receiving the stem 13 is disposed about the stem and lies against the upper surface of the portion 16 thereof and is welded to the stem at 18 so as to form a permanent integral part of the support.

I provide a cap seating member 19 adapted during operation of the mechanism to seat upon the cap 11 and press the cap down against the drum neck. The cap seating member 19 is in the form of a dished disk having a central perforation of substantially greater diameter than the diameter of the reduced lower extremity 15 of the support, the member 19 being applied to the support as shown in Figures 1 and 3 and maintained in place by a nut 20 threaded onto the lower end of the stem. The member 19 is loosely carried by the support and, as shown in the drawings, is movable axially relatively thereto, is also movable thereto rotatively and tiltably. During operation of the mechanism the support and all the mechanism carried thereby may move relatively to the member 19 until the parts assume proper cooperative position, as will be explained.

The cap seating member 19 has a flat lower annular face 21 for seating against the cap and has adjacent its edge at its upper face an annular upward rounded projection 22 for a purpose presently to be described.

I provide a plurality of jaw members 23, the number being optional, but there being a sufficient number to substantially completely encircle the cap as shown in Figure 4. In the form of structure shown in the drawings eight jaw members are provided. Each of the jaw members has two generally radial recesses, an upper recess 24 and a lower recess 25. The upper recess 24 receives the edge of the jaw member carrier or disk 17, the depth of the recess axially of the tool being slightly greater than the thickness of the disk 17 to prevent binding and to allow pivotal or rocking movement of the jaw member about its fulcrum which is the upper surface of the recess 24 which rests upon the disk 17. In the upper surface of the disk 17 is an annular groove or axial depression 26 into which the corners 27 at the inner extremities of the upper faces of the recesses 24 of the jaw members may project. The groove 26 serves to collect oil and to facilitate operation of the mechanism as well as reduce wear and squeaking of the jaws.

The jaws are normally urged to inoperative position as shown in Figure 1 by a coil spring or series of coil springs 28 surrounding the upper ends of the jaw members above the disk 17 and received in an annular radial depression 29 in the jaw members collectively. The jaw members are adapted to be moved inwardly by a sleeve 30 which is movable axially of the mechanism from an upper or relatively inoperative position as shown in Figure 1 to a lower or fully operative position as shown in Figure 3. The sleeve 30 bears against the outer surfaces of the jaw members 23, which outer surfaces are tapered downwardly and outwardly at 31 to provide for ready operation of the jaw members by the sleeve 30. The sleeve 30 has a reduced upper extremity 32 slidably embracing the stem 13. Upward movement of the sleeve is limited by a collar 33 surrounding the reduced upper extremity 14 of the stem and upon which bears a second collar 34, the two collars 33 and 34 being maintained in position by nuts 35 threaded onto the upper end of the stem. The collars 33 and 34 are maintained against axial movement relatively to the stem by the nuts 35, but they are rotatable there-

on, thus facilitating freedom of movement of the parts in operation of the mechanism.

The collar 34 has opposed ears 36 to which are pivoted at 37 operating levers 38 having elongated handles adapted to be grasped by the hands of an operator. Each of the levers 38 has a lateral projection 39 so that it functions as a bell crank lever. Pivoted at 40 to each of the projections 39 and at 41 to an ear 42 welded at 43 to the sleeve 30 is a link 44. By operation of the handles about the axis 37 the links 44 are moved from the inclined position shown in Figure 1 to the vertical position shown in Figure 3, resulting in downward movement of the sleeve 30 and inward rocking of the jaw members 23.

The lower radial recess 25 of each of the jaw members 23 has its upper end defined by a surface 45 which is inclined generally toward the axis of the stem and toward the cap 11, i. e., inwardly and downwardly, which surface engages the projection 22 of the cap seating member 19. Below the recesses 25 the jaw members 23 have cap flange engaging and deforming portions 46.

When a cap is to be applied to a drum the cap is laid over the drum flange in the position in which the cap 11 is shown in Figure 1. Then the operator grasps the cap applying mechanism, which in the form shown is a hand tool, by the two handles and with the handles in their uppermost position as shown in Figure 1 applies the tool to the cap so that the cap seating member 19 seats on the cap with the jaw members 23 in their outward or inoperative positions as shown in Figure 1. It is to be noted that in all relative positions of the parts when the cap applying member 19 is resting on the cap 11 and downward pressure is exerted on the support 13 either manually or through the action of gravity the inclined surfaces 45 of the jaw members engage the projection 22 of the cap applying member. Indeed it is only through the surfaces 45 that the cap seating member is pressed downwardly against the cap during operation of the mechanism, as the member 19 is loosely carried by the stem 13 as above explained and as shown in the drawings.

When the cap applying mechanism has been positioned as above explained and as shown in Figure 1 the operator then moves the two handles downwardly to bring the parts into the position shown in Figure 3. The sleeve 30 moves downwardly and cams inwardly the lower ends of the jaw members 23 against the action of the spring 28. The cap flange engaging and deforming portions 46 of the jaw members 23 engage and deform inwardly the flange 12 of the cap 11 as shown in Figure 3. As the jaw members 23 rock inwardly the inclined surfaces 45 ride on the annular projection 22 of the cap seating member 19, this resulting in slight but nevertheless substantial downward or bodily axial movement of the jaw members as the cap flange is being crimped. Since the jaw members are mounted on the support comprising the stem 13 and the disk 17 that support also partakes of bodily axial movement to the same extent as do the jaw members 23. The result is an exceptionally free and easy operation of the cap applying mechanism which requires a minimum of effort, is free from binding and results in long life of the mechanism.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A cap applying mechanism comprising a support, jaw mounted on the support, a cap seating member adapted to bear against the top of the cap and loosely carried by the support so as to be moved axially relatively thereto and means for operating the jaw members to deform inwardly the cap flange, the jaw members having portions bearing against the cap seating member to press it against the cap when the jaw members are operated, the jaw members constituting the sole means bearing against the cap seating member to press it against the cap when the jaw members are operated, the support and jaw members being so constructed and arranged relatively to the cap seating member that they move axially relatively to the cap seating member upon operation of the jaw members.

2. Cap applying mechanism comprising a support, jaw members mounted on the support, a cap seating member adapted to bear against the top of the cap, the jaw members having surfaces inclined generally toward the axis of the mechanism and toward the cap being applied, which surfaces bear against the cap seating member to press it against the cap when the jaw members are operated, and means for operating the jaw members to deform inwardly the cap flange.

3. Cap applying mechanism comprising a support, jaw members mounted on the support, a cap seating member adapted to bear against the top of the cap and loosely carried by the support so as to be movable axially relatively thereto and means for operating the jaw members to deform inwardly the cap flange, the jaw members having surfaces inclined generally toward the axis of the mechanism and toward the cap being applied, which surfaces bear against the cap seating member to press it against the cap and to guide the jaw members for generally axial bodily movement relatively to the cap seating member upon operation of the jaw members.

4. Cap applying mechanism comprising a support, a jaw member carrier mounted on the support, jaw members each having a recess therein receiving a portion of the carrier whereby the jaw members are carried by the carrier, a cap seating member adapted to bear against the top of the cap, the jaw members having portions bearing against the cap seating member to press it against the cap when the jaw members are operated, and means for operating the jaw members to deform inwardly the cap flange.

5. Cap applying mechanism comprising a support, a cap seating member adapted to bear against the top of the cap, jaw members each having two generally radial recesses the upper surface of one of which rests on the support and the upper surface of the other of which engages the cap seating member so that the cap seating member positions the jaw members in the axial direction during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

6. Cap applying mechanism comprising a support, jaw members carried by the support, a cap seating member adapted to bear against the top of the cap and loosely carried by the support so as to be movable axially relatively thereto, the jaw members having generally radial recesses the upper surfaces of which engage the cap seating member so that the cap seating member positions the jaw members in the axial

direction during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

7. Cap applying mechanism comprising a support, jaw members carried by the support, a cap seating member adapted to bear against the top of the cap, the jaw members having generally radial recesses the upper surfaces of which engage the cap seating member and are inclined generally toward the axis of the mechanism and toward the cap being applied so that the cap seating member positions the jaw members in the axial direction and the jaw members move bodily generally axially during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

8. Cap applying mechanism comprising a support having a generally radially projecting jaw member carrying portion, a cap seating member adapted to bear against the top of the cap and loosely carried by the support so as to be movable axially relatively thereto, jaw members each having two generally radial recesses therein the upper one of which receives said portion of the support whereby the jaw members are carried by the support and the upper surface of the other of which recesses engages the cap seating member and is inclined generally toward the axis of the mechanism and toward the cap being applied so that the cap seating member positions the jaw members in the axial direction and the jaw members move bodily generally axially during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

JOHN W. SHERA.

CERTIFICATE OF CORRECTION.

Patent No. 2,375,141. May 1, 1945.

JOHN W. SHERA.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 2, for "A cap" read --Cap--; line 3, after "jaw" insert the word --members--; line 6, for "moved" read --movable--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of October, A. D. 1945.

Leslie Frazer

(Seal) First Assistant Commissioner of Patents.

direction during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

7. Cap applying mechanism comprising a support, jaw members carried by the support, a cap seating member adapted to bear against the top of the cap, the jaw members having generally radial recesses the upper surfaces of which engage the cap seating member and are inclined generally toward the axis of the mechanism and toward the cap being applied so that the cap seating member positions the jaw members in the axial direction and the jaw members move bodily generally axially during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

8. Cap applying mechanism comprising a support having a generally radially projecting jaw member carrying portion, a cap seating member adapted to bear against the top of the cap and loosely carried by the support so as to be movable axially relatively thereto, jaw members each having two generally radial recesses therein the upper one of which receives said portion of the support whereby the jaw members are carried by the support and the upper surface of the other of which recesses engages the cap seating member and is inclined generally toward the axis of the mechanism and toward the cap being applied so that the cap seating member positions the jaw members in the axial direction and the jaw members move bodily generally axially during operation of the mechanism, the jaw members having cap flange engaging and deforming portions below said recesses, and means for operating the jaw members to deform inwardly the cap flange.

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