

March 14, 1961

A. W. KINNEY
LID CAPPING DEVICE

2,974,459

Filed June 9, 1959

2 Sheets-Sheet 1

Fig. 1.

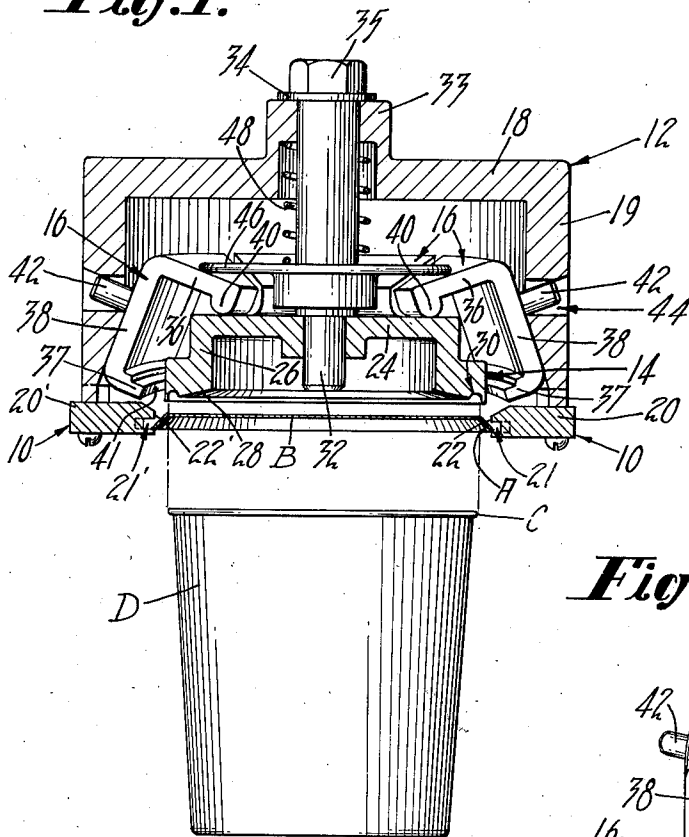


Fig. 2.

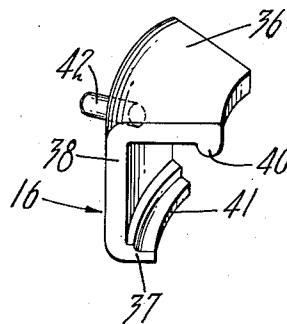
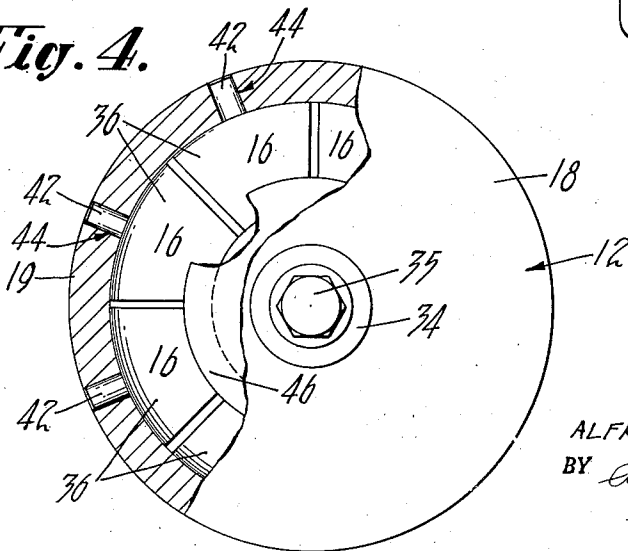


Fig. 4.



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Fig. 3

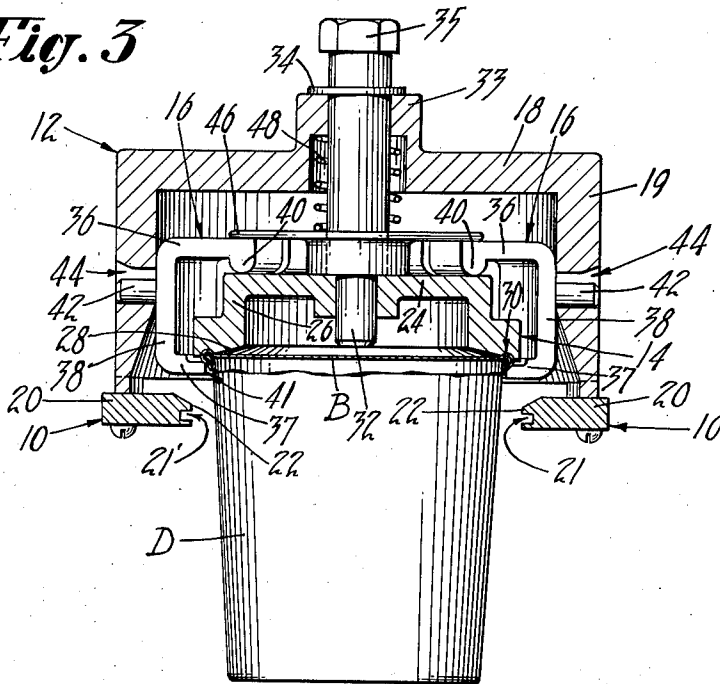
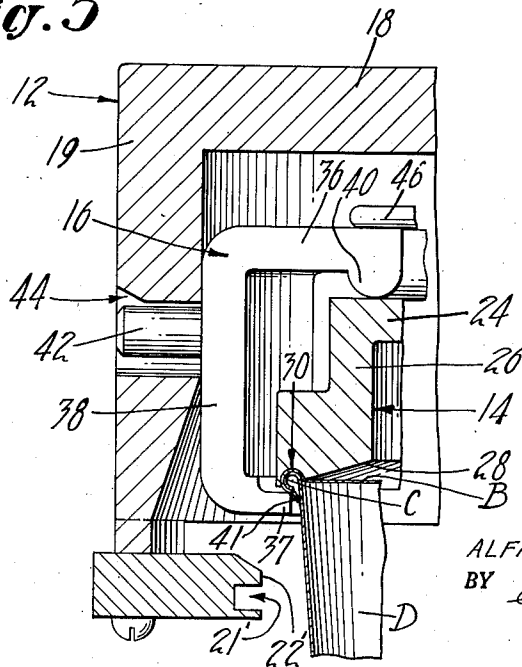


Fig. 5



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LID CAPPING DEVICE

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6 Claims. (Cl. 53—342)

The present invention pertains to a device for applying deformable lids to paper containers and in particular pertains to a device for crimping the marginal edge of a deformable lid around a peripheral bead on a paper container such as a paper cup to secure the lid to the container.

Lid capping devices of the general type disclosed and claimed herein are well known in the art, for example, those shown in U.S. Patents Nos. 2,826,026, 2,835,093 and 2,830,419. However, one deficiency existing in these prior art capping devices is that no provision is made for the prevention of vertical crushing of the containers by excessive vertical pressure. It is a fact that on occasion containers, in all other respects perfect containers, are turned out which are of a length beyond the prescribed tolerances. If no provision is made to compensate for this abnormal length in an automatic capping device, the capping mechanism which is set for shorter containers crushes these abnormally long containers, making them unmarketable and causing loss of any contents packed therein.

With a hand capping device, the vertical pressure exerted is at the discretion of the user and therefore subject to human error. If too great a pressure is exerted, vertical crushing and spoilage of the container results with consequent wastage of its contents.

It is therefore an object of the instant invention to provide a relatively simple and inexpensive device for capping paper containers, which device has incorporated therein provision to prevent vertical crushing of the containers due to excessive capping pressure.

Still another object is to provide a device of the character described which, when operating automatically will compensate for abnormally long containers and thereby prevent the crushing thereof.

A further object is to provide a device of the character described which, when hand operated, will automatically compensate for excessive hand pressure and thereby prevent vertical crushing of the container.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings, Fig. 1 is a side elevational view in section showing the relationship of the parts of the capping device, the lid and paper container at the beginning of a capping stroke. Fig. 2 is a perspective view of one of the crimping jaws used in the device. Fig. 3 is a side elevational view in section showing the relationship of the parts of the device, lid and container, at the end of a capping stroke. Fig. 4 is a plan view partly in section and with parts broken away, of the device shown in Fig. 3. Fig. 5 is a fragmentary, enlarged, side elevational view in section, showing the relationship of the parts of the device when acting on an abnormally long container.

The function of the device of the instant invention is

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to crimp the peripheral margin A of a lid B made from some deformable material such as thin gauge sheet aluminum around the peripheral bead C of a paper container or cup D, thereby firmly securing the lid B to the container D.

In the operation of the device, the cup D and capping device with the lid B carried on a lid retainer 10 are moved vertically relative to one another, either by the capping device moving downwardly onto the cup D or the cup D moving up into a housing 12 of the capping device by some suitable means not shown. Upon such relative vertical movement, the cup D first engages the lid B and then the loosely assembled cup and lid are brought into engagement with a curling member 14. Upon continued relative vertical movement, the peripheral margin A is forced around the bead C, whereupon a plurality of jaw members 16 rock inwardly to wipe or crimp the free edge of the peripheral margin under the bead C. Thereafter, the cup D with the lid B firmly attached thereto is withdrawn from the device for subsequent use, whereupon the parts of the device automatically return to starting position. The capping device may be either hand operated whereby it would be forced downwardly onto a lid and cup; or it could be attached to and/or be part of an automatic machine whereby the cup and lid would be forced up into the device.

The housing 12 is generally cylindrical in shape, having its upper end closed by means of end wall 18, a side wall 19 integral with the end wall 18 and being open at its lower end to receive a lid and container to be joined. The lid retaining member 10 is removably secured by any suitable means to the lower free end of the body side wall 19. The lid retaining member 10 comprises a pair of straight, flat rails, 20, 20', each having a groove 21, 21', at its inwardly disposed face 22, 22'. The faces 22, 22' are spaced apart a distance slightly less than the diameter of the lid B to be retained, whereby the peripheral margin A may extend into the groove 21, 21' and be retained therein, thereby supporting the entire lid B.

Immediately above and spaced radially inwardly of the retaining member 10 is the curling member 14. As shown in the drawing, the curling member 14 is substantially in the shape of an inverted cup, having an upper end 24 and side wall 26 which terminates in a downwardly directed face 28. The face 28 has, adjacent its junction with the side wall 26, an annular, arcuate groove 30. Upon relative upward vertical movement of the loosely assembled lid B of cup D as mentioned hereinbefore, the arcuate groove 30 presses into and curls the peripheral margin A around and in tight engagement with the upper portion of the bead C.

The curling member 14 is fixedly mounted in the center of its end 24 on the lower end of a shank or post 32. The upper end of post 32 is slidably mounted in a boss 33 in the center of the housing end 18. The post 32 is retained on the boss 33 by means of a washer 34 and nut 35. This slidable attachment of post 32 with the housing 12 and its fixed attachment to curling member 14 permits relative vertical motion between the housing 12 and curling member 14.

Mounted circumferentially around the curling member 14 are the crimping jaws 16. In the device illustrated there are 8 crimping jaws. Each crimping jaw 16 comprises an upper arm 36, a lower arm 37, each being roughly segmental in shape, and an arcuate connecting web 38 therebetween. The upper arm 36 terminates in a rounded node 40 in engagement with and adapted to rock upon the upper bearing surface of the end wall 24 of curling member 14. The inner end of the lower arm 37 terminates in an arcuate crimping face 41 adapted to engage the peripheral margin of the lid B and crimp it under the bead C. Extending radially

outwardly from and integral with the connecting web 38 is a pin 42 pivotally mounted in an elongated aperture or slot 44 in the side wall 19 of the housing 12. The dimensions of slot 44 are such that the pin 42 is restricted against any sidewise or circumferential motion but is permitted pivotal and vertical straight line movement. The inside surface of the housing side wall 19 below the apertures 44 is flared outwardly to provide a space into which the portions of the jaws 16 below the pins 42 can retract to clear the curling member 14 when curling member 14 is in the depressed or at-rest position. Above the lowermost edges of the apertures 44, the inside surface of the housing side wall 19 is vertical. The vertical portion of the side wall 19 acts as a stop against which the web portion 38 of the jaws 16 abut to limit inward oscillation of the lower arm 37 and thereby prevent circumferential crushing of the container being capped. The vertical portion of the side wall 19 also acts as a bearing surface on which the abutting web portions 38 of the jaws 16 slide vertically relative to the side wall 19.

A pressure plate 46 slidably mounted on the post 32 above the curling member 14 engages against the top surface of the arms 36. The pressure plate 46 is forced in a downward direction and into engagement with the arms 36 by means of a compression spring 48 surrounding the post 32 between the pressure plate 46 and the boss 33. The spring pressure transferred to the pressure plate 46 keeps the nodes 49 of the arms 36 in rocking engagement with the upper bearing surface of the end wall 24, thereby retaining the jaws 16 within the device. When no cup and lid are being acted upon, the pressure of the spring 48 maintains the elements of the device in their retracted or at-rest position, as shown in Fig. 1.

Upon insertion of a loosely assembled cup and lid into the device and downward movement of the housing 12 relative to the cup and lid, the curling head 14 and the post 32 move upwardly relative to the housing 12, and the pins 42 begin to pivot about the inner, lower edge of the slots 44 thereby oscillating the jaw members 16 and their lower arms 37 towards and into engagement with the peripheral margin A. As the relative movements of the aforementioned parts continues, the crimping face 41 forces the free edge of the peripheral margin A underneath and into locking engagement with the bead C.

When the vertical pressure is such that relative vertical movement between the cup D and the housing 12 continues after the parts of the device have assumed the positions shown in Fig. 3, such as due to excessive hand pressure in a hand operated device or the insertion of an abnormally long cup in a machine operated device, vertical crushing of the cup would result were it not for the elongated configuration of the slots 44. By virtue of this elongated configuration of the slots 44, the jaws 16 and curling member 14 maintain their position relative to each other and to the cup and lid as the housing 12 moves downwardly relative to these elements so that these elements assume the position shown in Fig. 5. In other words, a margin of safety equal to the length of the slots 44 is provided to prevent cup crushing.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A capping device for securing a lid to a paper container having a peripheral bead surrounding its open end by crimping the marginal edge of said lid around said

bead, said device comprising housing means having a side wall with a plurality of vertically elongated apertures therein, lid retaining means secured to said housing means, lid curling means mounted within said housing for engaging the peripheral margin of said lid and curling it around said container bead, connecting means joining said curling means and housing means for reciprocating movement relative to one another, jaw means pivotally connected to said housing means to engage said lid margin after its engagement by said lid curling means to crimp said margin under said bead, said jaw means being in engagement with said lid curling means and being actuated by the reciprocating motion of said curling means and housing means relative to one another, and a pin integral with each of said jaw means loosely mounted within each of said apertures whereby said lid curling means, said connecting means and said jaw means reciprocate together relative to said housing to compensate automatically for excessive capping pressure and prevent crushing of said container during a capping operation.

2. A capping device for securing a lid or cap to a paper container having a peripheral bead surrounding its open end by crimping the marginal edge of said lid around said bead, said device comprising a vertically extending cylindrical housing closed at its upper end and open at its lower end to receive a container to be capped, the side wall of said cylindrical housing having a plurality of evenly spaced vertically elongated apertures therein, lid retaining means secured to the lowermost edge of the side wall of said cylindrical housing, lid curling means mounted inside said housing with an annularly extending arcuate groove in the lowermost face thereof for engaging the peripheral margin of said lid and forcing it around said container bead, a vertical post connecting said housing and said lid curling means for reciprocating movement relative to one another, a plurality of jaws mounted circumferentially around said in engagement with said lid curling means for oscillating motion toward and away from said lid curling means upon said reciprocation of said curling means and adapted to engage said lid margin after its engagement by said lid curling means to crimp said margin under said bead, and a pin integral with each of said jaws and extending radially outwardly therefrom, said pin pivotally mounted within said aperture whereby said jaws are actuated by the relative reciprocating movement of said housing and said lid curling means, said aperture having a larger vertical dimension than said pin whereby said lid curling means, said post and said jaws are permitted to reciprocate in unison relative to said housing to compensate automatically for excessive capping pressure and prevent crushing of said container during a capping operation.

3. The device set forth in claim 2 wherein the portion of the inside surface of said housing side wall below said apertures flares outwardly providing a space into which the lower portion of said jaws are disposed when said device is inactive.

4. A capping device for securing a lid to a paper container having a peripheral bead surrounding its open end by crimping the marginal edge of said lid around said bead, said device comprising a cylindrical housing open at its lower end and closed at its upper end, a grooved lid retaining flange removably secured to the free peripheral edge of the side wall of said housing, a vertical shank slidably mounted adjacent its upper end in the center of the end wall of said housing with its lower end extending towards the open end of said housing and adapted for reciprocating movement relative to said housing, a curling head fixedly mounted at its center on the lower end of said shank, said head comprising a horizontal bearing member and an annular arcuate curling groove in the lowermost face thereof for engaging said lid margin and curling it around said bead upon vertical movement of said container relative

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to said housing, a plurality of jaws mounted circumferentially around said curling head between said annular skirt and lid engaging member and adapted for rocking motion around a pivot toward and away from said curling head upon relative reciprocating movement between said housing and said shank, each of said jaws having a radially inwardly extending upper and lower arm and an arcuate web connecting said arms, said upper arm terminating in a rounded node in engagement with said bearing member of said head for rocking motion thereon, said lower arm terminating in an arcuate lid engaging edge engageable with said lid marginal edge to crimp said edge around said bead upon inward oscillation of said lower arm, a pressure plate slidably mounted on said shank above said curling head and bearing against the upper surface of each of said upper arms of said jaws to maintain said nodes in engagement with said head bearing member, a compression spring surrounding said shank between said end wall of said housing and said pressure plate to force said pressure plate in a downward direction against said jaw upper arms, and a pin extending radially outwardly from the web of each of said jaws and engaged in a corresponding aperture in said side wall of said housing to retain said jaws within said housing and to provide a pivot upon which said jaws rock, said aperture having the same transverse dimension as said pin but being elongated in

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a vertical direction whereby said pin has limited vertical and oscillatory movement but is restricted from any transverse movement within said aperture whereby said jaws, curling head, pressure plate and shank have limited upward vertical movement relative to said housing under the action of excessive capping pressure without further inward oscillation of said jaw lower arm, thereby preventing vertical and circumferential crushing of said container.

5. The device set forth in claim 4 wherein the portion of the inside surface of said housing side wall above said apertures is vertical and acts as a stop against which the web portion of said jaws abuts to limit inward oscillation of the lower arm of said jaws.

6. The device set forth in claim 5 wherein said web portion of said jaws abuts against and slides vertically upwardly relative to said vertical surface of said housing side wall when compensating for said excessive capping pressure.

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