Feb. 18, 1947. J. MARSH ET AL 2,415,896

CAP APPLYING IMPLEMENT

Filed April 3, 1944

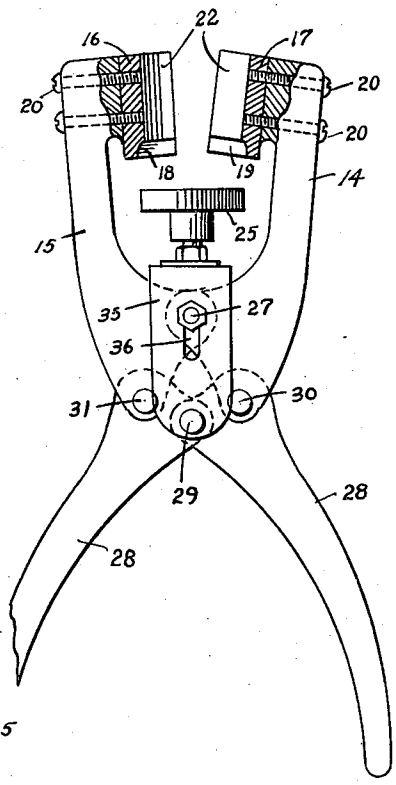


Fig. 1

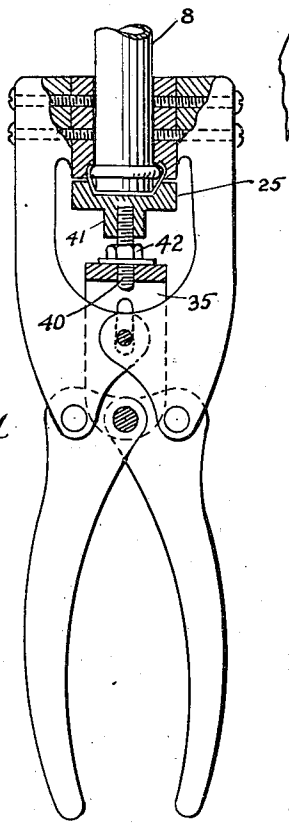


Fig. 4

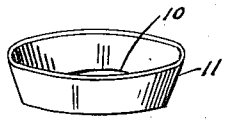


Fig. 2

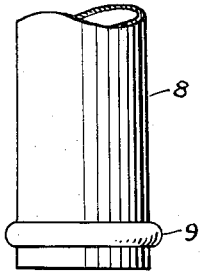


Fig. 3

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CAP APPLYING IMPLEMENT

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3 Claims. (Cl. 81—15)

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This invention relates to improvements in devices for applying caps or closures to the ends of tubes or other hollow bodies.

It is frequently necessary to close the ends of tubes or other bodies to protect the interiors or ends thereof from damage. For example, tubes that are formed for attachment to engines are usually very carefully cleaned out at the factory so that no chips, abrasive particles or other foreign materials are present in the tubes, and if these tubes are then shipped to distant places for assembly on an engine, it is, of course, necessary that the interiors be kept clean and free from foreign matter during shipment. It is also desirable to protect the outer ends which are to be secured to the engines. Such protecting means should be readily removable and readily applicable to the tubular members.

One of the objects of this invention is to provide an implement constructed to readily apply caps of thin material to the ends of tubular members. A further object is to provide an implement of this type which may be readily adapted for use in connection with tubes and tubular bodies of different sizes and shapes. A further object is to provide an implement constructed to apply a cap to the end of a tube by means of a single actuation of the implement. A further object is to provide an implement of this type having a die which may be arranged about a tubular body, and a pressure device which is formed to force the cap into engagement with the die for forming the end portion of the cap into rigid engagement with the tubular member. Other objects and advantages of this invention will appear from the following description and claims.

In the accompanying drawing:

Fig. 1 is a side elevation, partly in section, of a cap applying instrument embodying this invention, showing the same in open position ready to receive a tubular member and cap.

Fig. 2 is a perspective view of a cap to be applied to the end of a tubular member.

Fig. 3 shows, by way of example, a tubular member to the end of which a cap, such as shown in Fig. 2, may be applied.

Fig. 4 is an elevation, partly in section, of the implement shown in Fig. 1, but showing the parts thereof in the positions which they occupy at the completion of the operation of the applying of the cap to the tubular member.

Our invention may be applied to tubular bodies of any suitable or desired form, and in Figs. 3 and 4, we have shown by way of example a tube

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8 having a bead 9 formed adjacent to an end of the tube. In Figs. 2 and 4, we have shown a cap which may be applied to a tube of the type shown in Fig. 3, the cap including a substantially flat circular base or bottom 10 and a flange 11. The cap may be made of light gage soft aluminum, or of any other suitable metal or plastic material. It will be understood, however, that it was not intended to limit our invention to the particular type of tubular body and cap which are shown by way of examples in the drawing. For example, the flange 11 shown in the drawing is flared outwardly from the disk portion of the cap to fit snugly against the end of the tube and to contact with the bead 9 thereof, but with tubes not having a bead, the flange would preferably be made of substantially cylindrical form.

The implement for applying the caps to the tube includes a die preferably made in two parts which are movable toward and from each other to embrace a tube to which a cap is to be applied, and the implement also includes a pressure member formed to force the cap into engagement with the die to cause the end of the flanged portion of the cap to be formed toward and into gripping engagement with the tube. In the construction illustrated for this purpose, we have provided the implement with a pair of levers 14 and 15 having die members or jaws 16 and 17 secured thereto which have die portions 18 and 19 formed thereon. These jaws, in the construction shown, are substantially semi-cylindrical in form and may be supported by means of the levers 14 and 15 in separated or spaced positions, as shown in Fig. 1, so that a tubular member may be readily inserted between the two jaws. In order to adapt the implement for use in connection with tubes or tubular members of various sizes, the jaws or die blocks 16 and 17 are preferably removably secured to the levers 14 and 15, for example, by means of screws 20 or other fastening means so that the die blocks may be readily removed from the levers and replaced by other die blocks or jaws having die portions of smaller or larger diameter, to fit about the tubular members to be operated upon. It will be noted that the die blocks 16 and 17 have cylindrical inner faces 22 which are so formed that they do not grip the tube 8, but extend loosely about the same so as to hold the tube approximately in axial alinement with the movement of the pressure head 25.

The pressure member in the particular implement shown includes a pressure head 25 which is preferably provided in the face adjacent to the die blocks with a recess suitable for receiving the

cap. The pressure head is so mounted on the implement that it moves the cap into engagement with the die portions 18 and 19 after the jaw portions or die blocks 16 and 17 have been moved toward each other into the positions shown in Fig. 4. Consequently, as the pressure head 25 moves toward the die blocks 16 and 17, the outer portion of the flange of the cap engages the die faces 18 and 19, which extend inwardly toward the tube, and forces the flange to contract and curl inwardly toward the tube, so that it is securely formed against the tube and into engagement with the bead 9, if the tube operated upon has such a bead. The cap will, consequently, be securely held in place on the end of the tube. A similar action would result if the cap were applied to a plain tube not having the bead 9 or having a threaded end portion, in which case, the flange of the cap would be pressed into gripping engagement with the wall of the tube or with the threads formed on such wall, so that inadvertent removal of the cap from the tube would be avoided. The thin caps can readily be removed from the ends of the tubes by puncturing the flat or disk portion of the cap and tearing the material of the cap toward the periphery and through the flange portion so that the flange will be released from gripping engagement with the tube, thus enabling it to be readily removed from the tube.

In order to assemble the die blocks and the pressure head on an implement for quick and easy manipulation, we have pivoted the two levers 14 and 15 to swing about a bolt or pin 27, and these levers may be actuated for swinging about the pivot or bolt 27 in any suitable manner, for example, by means of a pair of handles or grip members 28 which are also in the form of levers, being pivotally connected to each other by means of a pin or bolt 29 and being connected to the levers 14 and 15 by means of pivots 30 and 31. The hand grip members 28, consequently, form toggle levers so that when these two members are swung toward each other from the position shown in Fig. 1, the pivot pin or bolt 29 in cooperation with the pivot members 30 and 31 causes the levers 14 and 15 to swing the die blocks 16 and 17 into engagement with each other about the tube 8, until the parts are in the position shown in Fig. 4. It will be noted that the initial swinging movement of the levers will be quite rapid and when the centers of the pivots 29, 30 and 31 are nearly in a line, no appreciable movement is imparted to the levers 14 and 15 and they are firmly held against any appreciable separation by the toggle action.

The pressure head 25 may be actuated by hand grips 28, and for this purpose, the pressure member includes a U-shaped member 35 on which the pressure head is adjustably mounted. The two legs of the U-shaped member extend along opposite faces of portions of the levers 14 and 15 and of the hand grips 28. Each leg of the U-shaped member is provided with a slot 36, through which the pivot bolt 27 extends for guiding the U-shaped member 35 in its movement and the bolt or pivot pin 29 which connects the two hand grips extends through holes in the end portions of the two legs of the U-shaped member. Consequently, as the pivot pin 29 moves upwardly from the position shown in Fig. 1, the U-shaped member will also move upwardly, being held in correct relation to the levers 14 and 15 and the die portions 18 and 19 by means of the pivot pin or bolt 27 which acts as a guide for the U-shaped member in conjunction with the slots 36.

The pressure head 25 may be removably mounted on the U-shaped member 35 in any suitable manner, and is preferably also adjustable relatively to this member toward and from the die portions 18 and 19. This may, for example, be accomplished by providing the U-shaped member 35 with a threaded hole into which one end of a screw-threaded stud or pin 40 may enter, the other end of the stud being secured to the pressure head 25. For this purpose, the pressure member 25 may be provided with a boss or projection 41 also having a threaded hole into which the other end of the stud or pin 40 may be tightly screwed. A lock nut 42 on the pin or stud 40 may be provided to prevent unscrewing of the pin or stud from the threaded hole in the U-shaped member 35. By releasing the lock nut 42 and turning the stud or pin 40, the pressure head 25 may be adjusted toward and from the die portions 18 and 19 so as to cooperate in the desired manner with these die portions to produce the desired forming or turning over of the flange of the cap.

In the use of the implement described, a tube is placed between the jaws 22. The hand grip members 28 are then brought together which results in first swinging the jaws or die blocks 16 and 17 toward each other for the two-fold purpose of locating the tubular member 8 in correct relation to the cap on the pressure head, and in the second place, of bringing the two portions or parts 18 and 19 of the die together so as to form a substantially continuous annular die portion. The caps may, of course, be applied to the tubular members without the cylindrical parts 22 of the jaws, but these parts 22 facilitate the correct positioning of the caps on the ends of the tubular members. Upon further swinging together of the hand grip parts 28, the pressure head will move the outer edge of the flange of the cap into engagement with the die portions 18 and 19, and upon further upward movement of the pressure head, the outer edge of this flange will be contracted or formed into engagement with the tubular member, thus causing the end of the flange 11 of the cap to securely and tightly grip a part of the tubular member, such for example as the bead 9, so that the cap will be securely held in place. When the ends of the tube are protected by means of caps in this manner, all dirt and foreign matter will be excluded from the interior of the tube and the caps also to a certain extent protect the ends of the tube from damage. When it is desired to remove the cap, it is merely necessary to puncture the disk portion thereof, and since the cap is preferably made of thin metal or other material, the cap then can be easily torn and as soon as the tear extends to the edge of the flange, this flange will release its gripping hold on the tube so that the cap may then be very easily removed from the tube.

The implement described is very quick in its operation and is capable of properly functioning in any position. The cap may, for example, be placed on the end of the tubular member before the implement is applied thereto and the operator preferably moves the implement toward the tube so that the cap is initially positioned with the disk portion thereof in contact with the end of the tube. When the grip members 28 are then compressed for contracting the edge of the flange of the cap, the tube may at the same time be pushed lengthwise of the die portions 18 and 19, since none of the parts of the implement grip the tube.

We claim as our invention:

1. An implement for applying flanged closure caps to the ends of tubular members, including a pair of levers pivotally connected to swing toward and from each other, die members mounted on said levers and movable toward and from the tubular member adjacent to an end thereof to form a substantially continuous die extending loosely about said tubular member and shaped to turn the flange of a closure cap toward the tubular member, a pressure member mounted to move relatively to said levers in a direction substantially lengthwise of the tubular member and having a part formed to receive a portion of a cap, and means acting on said levers to move said die members toward said tubular member and for moving said pressure member toward the end of the tubular member to press the flange of the cap against said die members after said die members have moved into their operative positions to form the end of the flange into gripping engagement with the tubular member.

2. An implement for applying flanged closure caps to the ends of tubular members, comprising a pair of levers pivotally connected to permit the outer ends thereof to move toward and from each other, die parts mounted on said ends of said levers and movable into and out of close proximity to each other about a tubular member to form an annular forming die, a pair of hand grips for swinging said levers to move said die parts toward and from each other, a pressure member slidably mounted on said levers and having a part adapted to receive a cap with the flange thereof extending toward said die, said pressure member being connected with said hand grips to bring the end of the flange into engagement with the die after the parts of the die have been moved into operative relation to said tubular member, for turning the edge of the flange of the cap inwardly toward the tubular member.

3. An implement for applying flanged closure caps to the ends of tubular members, comprising a pair of levers, a pivot member connecting said levers intermediate of the ends thereof to permit the outer ends of the levers to move toward and from each other, die parts mounted on said ends

of said levers and movable toward each other about a tubular member to form a forming die about such member, a pair of hand levers pivotally connected to said first mentioned levers, another pivot member connecting said hand levers to each other, said hand levers forming a toggle joint for moving said first mentioned levers, a pressure member including a substantially U-shaped part having a slot through which said first mentioned pivot member extends and having apertures through which said second pivot member extends, whereby said pressure member is guided by said first pivot member to move toward and from said die and is moved toward and from said die by said other pivot, and means on said pressure member for supporting a cap in position to move the flange of the cap into engagement with said die to form said flange into gripping engagement with said tubular member, the parts of the implement being so arranged that said pressure member approaches the end of its flange forming movement when said toggle joint is substantially in dead center position, so that no appreciable movement is imparted to said die parts during the final, or curl forming, thrust of said pressure member.

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