

June 2, 1953

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2,640,524

APPARATUS FOR BENDING METAL RIMS AROUND CONTAINERS

Filed June 13, 1947

5 Sheets-Sheet 1

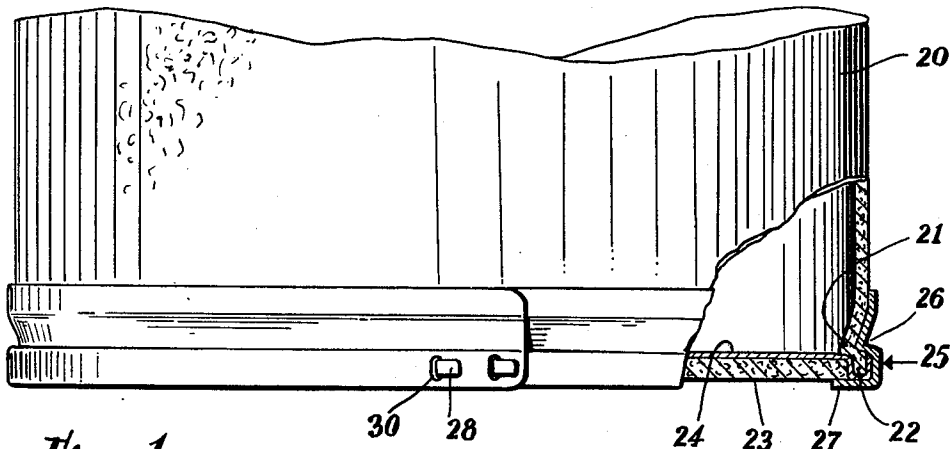


Fig. 1.

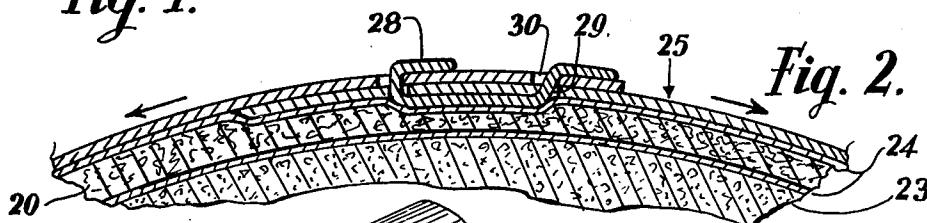


Fig. 2.

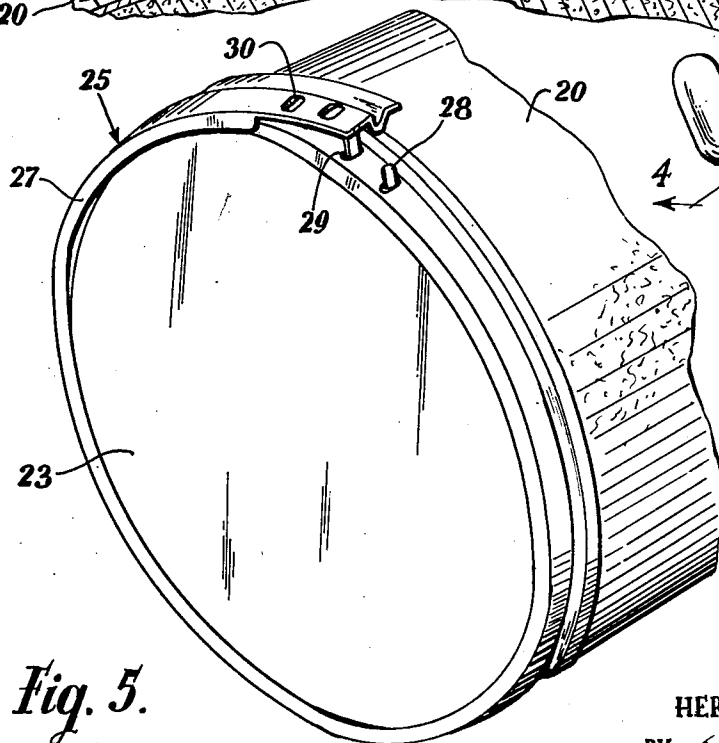


Fig. 5.

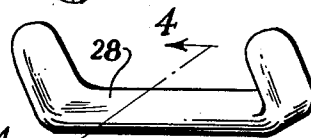


Fig. 3.



Fig. 4.

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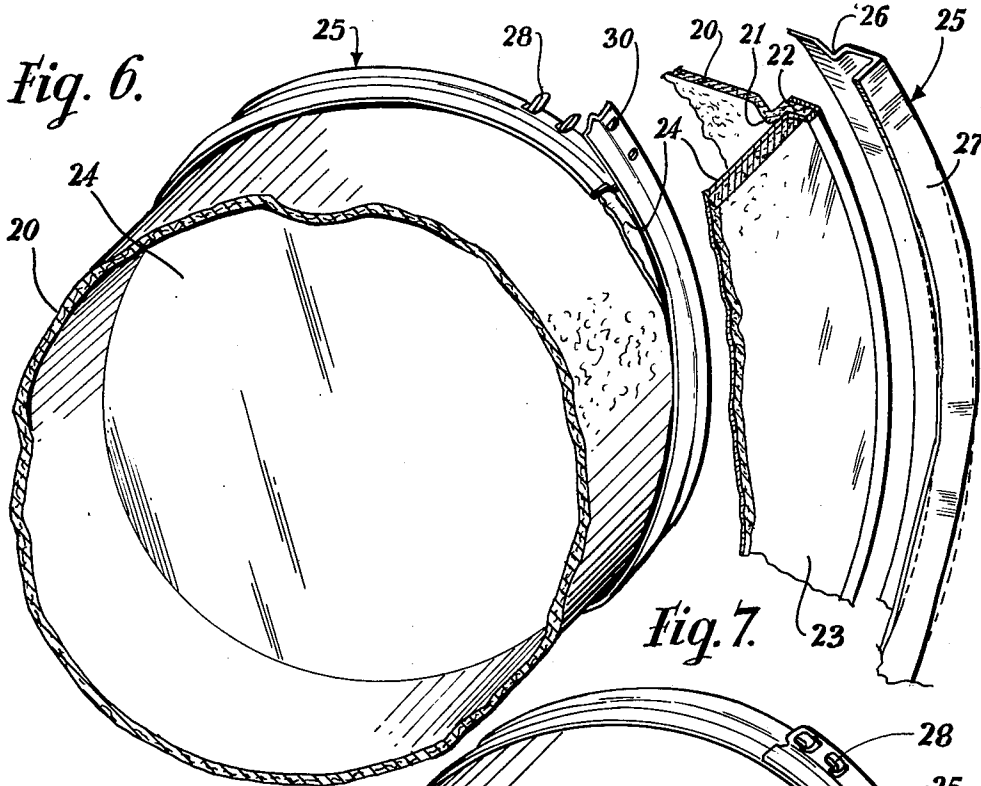
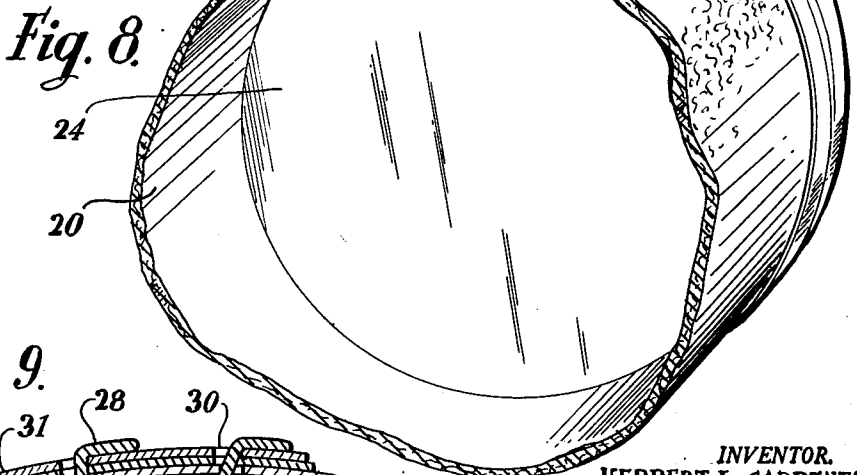
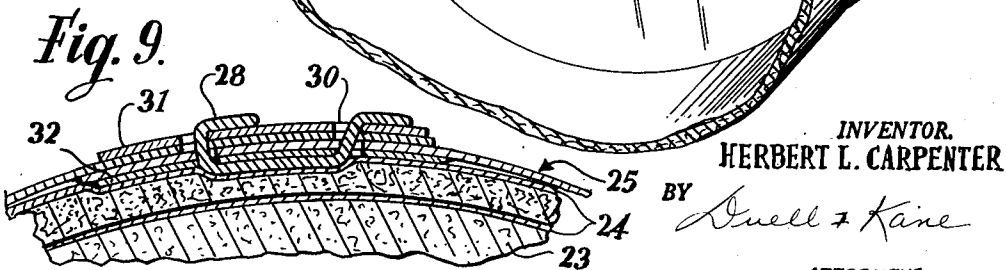
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5 Sheets-Sheet 2



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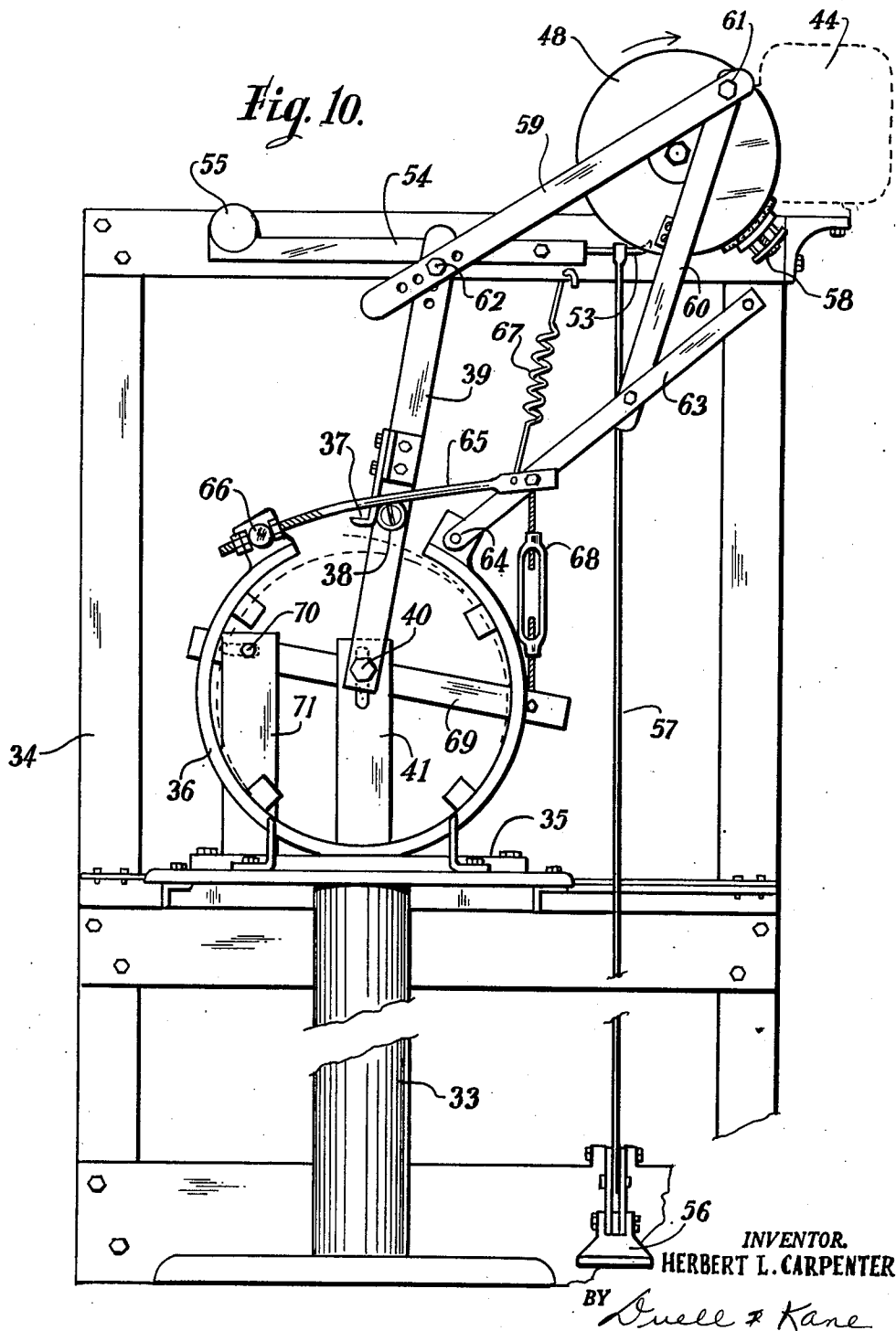
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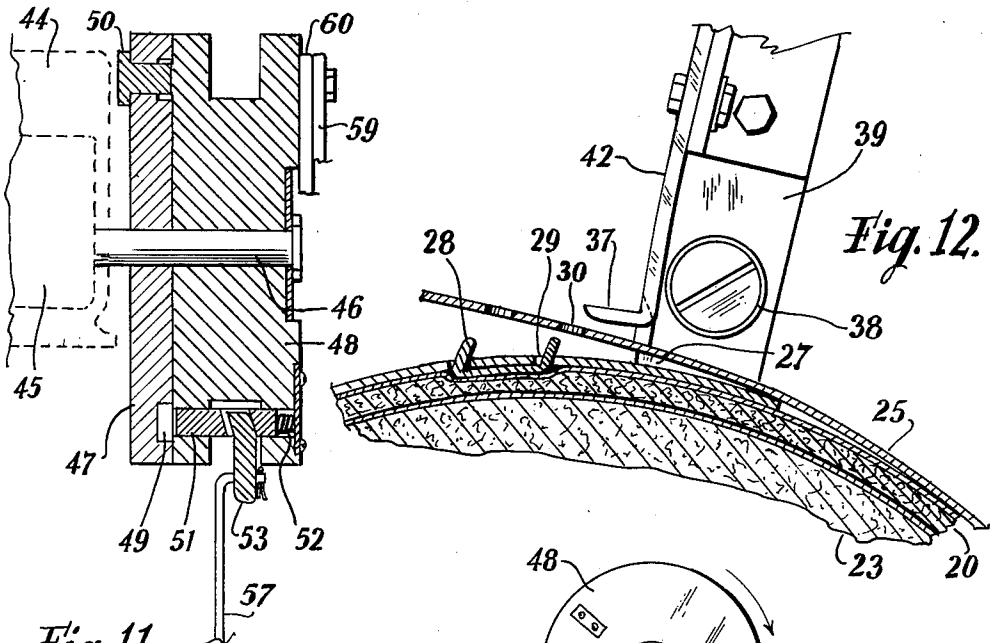


Fig. 11.

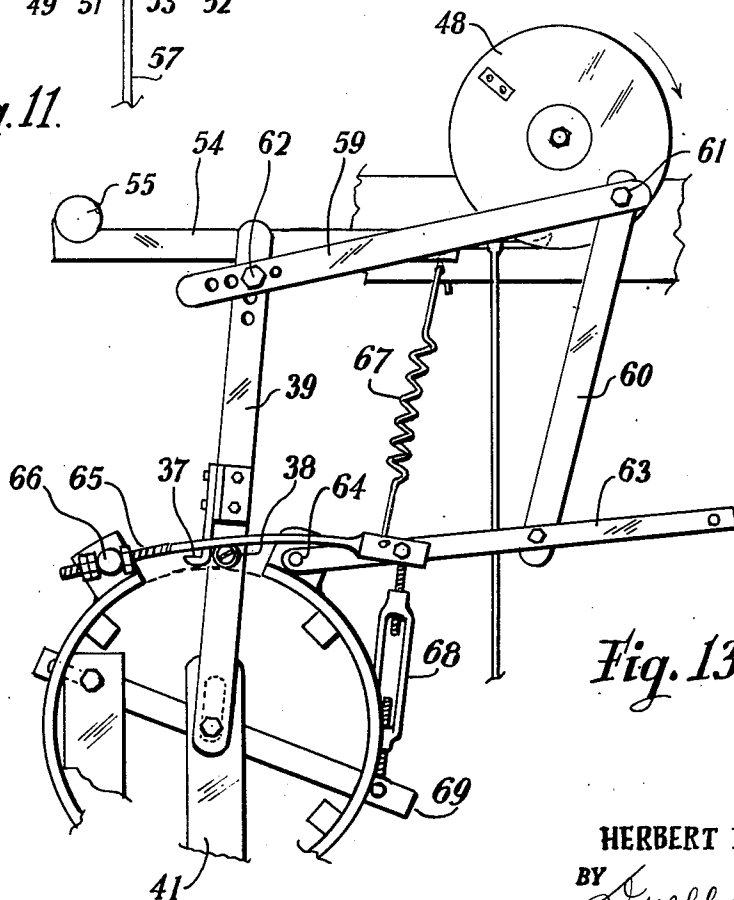


Fig. 13.

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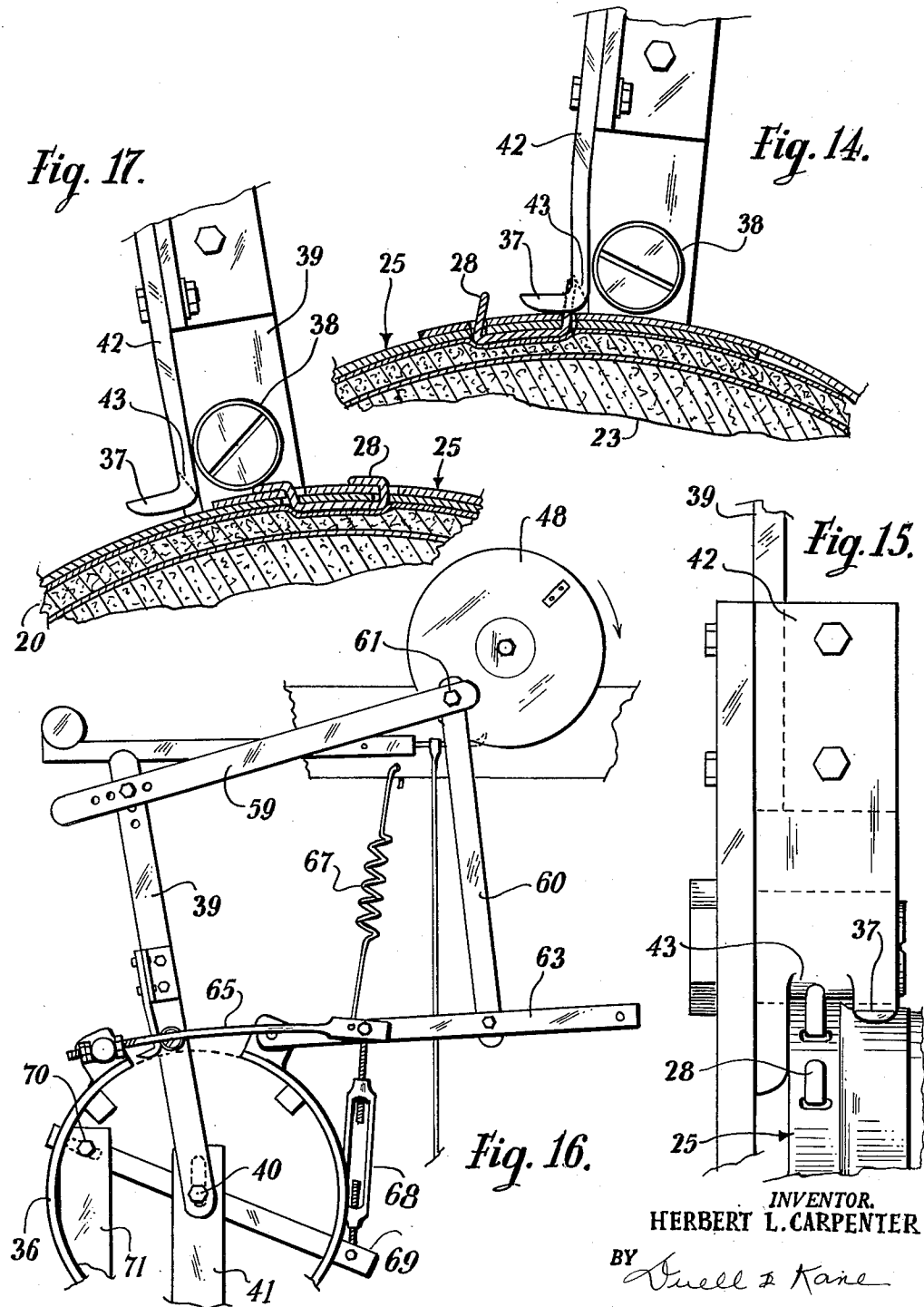
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APPARATUS FOR BENDING METAL RIMS AROUND CONTAINERS

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5 Sheets-Sheet 5



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APPARATUS FOR BENDING METAL RIMS
AROUND CONTAINERS

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Application June 13, 1947, Serial No. 754,542

2 Claims. (Cl. 153—1)

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This invention relates to an improved container particularly the closure portion thereof and to an improved method and machine for applying the closure.

It is an object of the invention to provide an improved machine whereby the closure may be applied automatically and without manual labor, the amount of time required to apply the closure is reduced and the operation of applying the closure is greatly simplified.

In many types of container, such as fibre containers, the container body is in the form of a tubular shell and a closure is permanently applied to one end of the shell. The application of this closure to the shell presents problems in that it is time consuming and frequently requires manual labor and also difficulty is encountered in obtaining sealing engagement between the closure and shell. In one type of closure a cover or head is fitted into the end of the shell and a split metal rim is fitted around the outside of the shell and provided with a flange which overlaps the head. Generally, the metal rim is fairly irregular in shape and difficulty is encountered in causing it to conform in shape with the outside of the shell. Also, difficulty is encountered in permanently securing the split metal rim in place.

It is an object of the present invention to overcome these difficulties and disadvantages and to provide an improved container closure construction and an improved method and machine for applying the closure whereby the rim is automatically caused to conform in shape with the exterior of the shell and is automatically secured in position retaining the closure in position in sealing engagement with the shell.

Other objects will be apparent from the following description of the drawings in which—

Fig. 1 is a partially fragmentary elevational view of the lower portion of a container showing a closure construction embodying my invention;

Fig. 2 is a detailed sectional view of the overlapping portions of the rim and the adjacent parts of the closure and shell;

Fig. 3 is a perspective view of a staple or fastener used in connection with my container closure construction;

Fig. 4 is a cross sectional view in the direction of the arrows on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of the lower portion of the container illustrating the manner in which the closure is assembled therewith;

Fig. 6 is a perspective view from the opposite

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angle of Fig. 5 showing the parts in process of assembly;

Fig. 7 is a detailed view of a portion of the rim and closure illustrating the typically irregular shape of the rim before application to the container;

Fig. 8 is a view similar to Fig. 6 with the closure fully applied thereto;

Fig. 9 is a detailed sectional view somewhat similar to Fig. 2 illustrating a modified rim construction;

Fig. 10 is an elevational view with portions omitted of a machine for applying the closure illustrating the machine at its initial operating position with the clamping ring in open position;

Fig. 11 is a cross sectional view of the clutch disks of the machine;

Fig. 12 is a detailed view of the pressure shoe and roller of the machine when the machine is in the initial position shown in Fig. 10;

Fig. 13 is an elevational view of the machine at a subsequent operating position when the clamping ring has been shifted to fully closed position;

Fig. 14 is a detailed view showing the location of the pressure shoe and roller when the machine is in the position shown in Fig. 13;

Fig. 15 is a front elevational view of the mechanism shown in Fig. 14 when in the same position;

Fig. 16 is an elevational view of the operating portions of the machine upon the completion of the effective operating cycle but prior to the opening of the ring;

Fig. 17 illustrates the location of the pressure shoe and roller when the machine is in the position indicated in Fig. 16.

My improved container closure construction is shown in the first 9 figures of the drawings. Referring to the first form of my invention shown in Figs. 1 to 8, the container is provided with a tubular body portion 20 made of suitable material such as convolutely wound fibre having the several layers suitably secured together by an adhesive or synthetic resin. Only the lower portion of the tubular body is shown and the lower end thereof is formed to receive a closure which is permanently secured in position. Thus, adjacent the lower end I provide an internal rib or bead 21 which provides a corresponding external groove. The form of the rib or bead may vary but I prefer to form it as shown with the lower face thereof presenting a relatively sharp shoul-

der and the upper surface tapering gradually to merge with the cylindrical wall of the main portion of the container body.

Extending beyond the rib or bead 21 is a flange 22. Fitted into the flanged end of the container body so as to rest on the bead is the closure consisting of a rigid head 23 and a flexible seal 24. The head 23 may be made of fibre or if preferred may also be made of wood, metal or other suitable material. The flexible seal 24 is preferably made of paper treated with wax, synthetic resin or the like and extends over the inner surface of the head as shown then outwardly between the head and flange of the container body and overlaps the outer surface of the container body.

The closure is held in position by means of a split lock rim 25 which surrounds the end of the container body and has a beaded portion 26 fitted into the external groove of the container. The rim also has an inwardly projecting flange 27 which overlaps the head 23 and serves to retain it in place.

The rim is caused to conform in shape with the end of the container and is fitted therearound so as to tightly embrace the container and the end of the seal with the bead 26 disposed in the groove and with the flange 27 overlapping the head. The rim is locked in this position by means of a staple 28 extending through pairs of apertures 29 and 30 formed adjacent the overlapping and underlying ends of rim 25. The staple is projected outwardly from the undersurface of the underlying rim portion and the 2 leg portions thereof are folded downwardly over the outer overlapping rim portion towards the end thereof as shown most clearly in Figs. 1, 2 and 8.

The staple used for this purpose is preferably of the type shown in Figs. 3 and 4 and is made from stock which is elliptical or oval in cross section. I have found that eliminating the sharp corners along the edges of the staple minimizes damage to the rim and also to the staple itself. There is a constant expanding force operating on the rim with the result that the two ends of the rim pull in opposite directions against the two arms of the staple. The rounded edges of the staple prevent it from cutting into and damaging the rim. In this connection I have found that it is desirable for the apertures 29 and 30 to be also formed with rounded edges as shown.

The manner in which the closure is assembled with the container is shown in Figs. 5-7. Thus, the head 23 and seal 24 are inserted in the end of the container body and the split rim is partially assembled therearound after a staple 28 has first been inserted through the apertures 29 in the underlying end portion with the angularly disposed arms slanting towards the end thereof.

The rim 25 is stamped and formed from sheet metal preferably steel and while it conforms generally in circumference with the circumference of the container it is somewhat irregular in shape and does not conform in contour with the external surface of the container. The irregularities in contour are shown most clearly in Figs. 6 and 7. In Fig. 6 it will be seen that gaps or spaces exist between portions of the rim and the container surface. In Fig. 7 the amount of departure of the rim from a true arc is indicated by showing the true arc in dotted lines.

The rim is drawn tightly around the container and caused to conform in shape and contour therewith and the apertures 30 are then brought into registry with the ends of the staple 28. The

insertion of the ends of the staple into the apertures 30 is facilitated because of the fact that the staple arms slant towards the end of the rim. The outer overlapping end portion of the rim is then brought down into contact with the underlying end portion of the rim and this action serves to further tighten the rim as the apertures are shifted downwardly towards the base of the staple. The ends of the staple are then bent over towards the outer end of the rim as shown in Figs. 1, 2 and 8.

When assembled in this fashion the locking rim is caused to fit snugly around the end of the container and conform therewith in contour and size as appears most clearly in Figs. 1, 2 and 8. The closure or head is thus held securely in position and sealing engagement is provided between the closure and container body.

When the projecting ends of staple 28 are bent over toward the end of the overlapping portion of the rim they assume generally the positions indicated in Fig. 2. The principal forces acting upon the locking rim are expanding forces acting to expand the rim. These forces act in the direction of the two arrows shown in Fig. 2 and it will be seen that the staple is arranged to withstand or resist these forces. Due to the fact that the longitudinal edges of the staple are rounded rather than sharp the edges of the staple will not cut into and damage the rim.

Under some circumstances it may be desirable to reinforce the portions of the rim through which the staple projects and an arrangement of this type is indicated in Fig. 9 in which the overlapping and underlying ends of the rim 25 are reinforced by means of the plates 31 and 32. The plate 31 reinforces the outer portion of the rim and the plate 32 reinforces the underlying end portion. The plates 31 and 32 are apertured in the same manner as the rim itself to accommodate the two arms of the staple. It will be appreciated that they may be formed integral with the rim itself by simply folding or bending portions of the rim over upon itself or they may be separate plates welded to the end portions of the rim. A rim which is reinforced in the manner shown in Fig. 9 is assembled with the container and closure in the same manner as rim in Figs. 1-8.

The assembling and closing of the rim in the manner described above may be accomplished by manual means or may be accomplished mechanically and automatically by means of mechanism such as that shown in Figs. 10-17.

The machine or mechanism illustrated in the drawings is provided with a suitable supporting base and standard 33 and framework 34. Supported on the standard and framework as on a platform 35 is an expandable and contractable slit pressure ring made of relatively stiff spring material such as spring steel. The lower portion of the ring is approximately a true arc of a circle of the approximate size of the external diameter of the container and rim which is to be assembled. The ring is open at the top as shown and the two sides thereof depart progressively to an increasing extent towards the ends thereof when the ring is in the open or expanded position shown in Fig. 10.

When the ring is in the open position shown in Fig. 10 a drum having a closure inserted in the end thereof and a rim partially assembled therearound as shown in Figs. 5 and 6, may be inserted into the expanded clamping ring with the over-

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lapping portions of the rim disposed in the open upper portion thereof as indicated in dotted lines in Fig. 10. Thereafter the two ends of the pressure ring may be drawn together. As the two ends of the ring are drawn together the container body serves as a mandrel or core and the two sides of the ring serve to wrap and press the locking rim 25 tightly around the container body working progressively from the bottom towards the two ends of the rim.

As previously stated the ring 36 is made of relatively stiff material and in this connection the material should be more stiff and rigid than the material forming the rim 25. Accordingly, as the ring is progressively tightened around the superimposed rim and container it acts somewhat in the nature of a forming die and it causes the rim to conform substantially in shape and contour with the outside of the container body.

My machine also includes a pressure shoe 37 and roller 38 which are mounted upon a lever 39 pivoted at 40 by a slotted connection, permitting limited vertical movement thereof, to an upright 41. At the initiation of the cycle of operation, when the pressure ring 36 is in open position, the pressure shoe 37 and roller 38 are disposed above and out of contact with locking rim. Simultaneously with the contraction of the ring 36 the pressure shoe and roller are shifted downwardly into contact with the overlapping end portion of rim 25 so that when the ring is contracted, as shown in Fig. 13, the roller and pressure shoe are in contact with the rim. The pressure shoe causes the overlapping end portion of the rim to lie flat against the other end portion thereof. In this connection, the clamping action of the ring, which works progressively from the central portion of the rim towards the two ends thereof, serves to shift the end portion into increasingly overlapping relationship so that the two apertures 30 in the overlapping rim portion approach a point of registry with the two apertures 29 in the underlying rim portion.

As previously pointed out, the arms or prongs of the staple 28 are disposed at an angle and the staple is inserted through the apertures 29 so that the prongs slant towards the apertures 30. As the pressure shoe 37 forces the overlapping end of the rim downwardly, the prongs of staple 28 enter the apertures 30 and continued downward pressure serves to feed the apertures 30 towards the base of the staple, further contracting the rim 25 and causing the rim to assume the position shown in Fig. 14.

Simultaneously with the shifting of the pressure shoe and roller downwardly they are shifted slightly to the left as shown in Figs. 13 and 14. When the parts are in the position shown in Figs. 13 and 14 the pressure shoe and roller are then shifted through an arc to the left to the positions shown in Figs. 16 and 17 causing the ends of the staple arms to be folded or bent downwardly thereby locking the rim in position.

The action in bending the staple arms downwardly is as follows—pressure shoe 37 is formed on the end of a bracket 42. On the lower end of bracket 42 adjacent the pressure shoe is an anvil 43 presenting an angularly disposed face and terminating a short distance above the lower portion of the pressure shoe. The anvil 43 is arranged so that the staple arms are in the path of movement thereof. The anvil is of such a height as to engage only the upper portion of the staple arms as it is shifted towards the left and it serves to tip over or incline the upper por-

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tion of the staple prongs towards the left. Thereafter the roller 38 engages the staple arms and rolls them down under pressure against the surface of the overlying rim portion as most clearly shown in Fig. 17.

After the staple arms have been rolled down against the rim the pressure ring can again be expanded and the pressure shoe and roller are raised upwardly and shifted back to the position indicated in Figs. 10 and 12. The assembled container can then be removed from the ring and another container with the closure inserted therein and with the rim partially assembled thereabout can then be inserted in the ring and the operation repeated.

The operation just described can be manually performed or can be performed automatically as, for instance, by hydraulic mechanism or by an electric motor as shown in the drawings.

In the drawings I have shown an electric motor 44 connected to a gear box 45 which in turn operates the drive shaft 46. Mounted on the drive shaft to rotate therewith is a drive wheel or disk 47. Also, supported on the drive shaft but rotatable with respect thereto is the clutch disk 48. The confronting face of the drive wheel 47 is provided with a circular groove 49 and projecting into the groove at one point is the fixed lug 50. Mounted in the clutch disk 48 is the retractable pin 51 which is normally pressed by spring 52 into the groove 49. It will be appreciated that when the lug 50 engages the pin 51 it causes clutch disk 48 to rotate with drive wheel 47.

The clutch disk may be disconnected from the drive wheel by means of the dog 53 having an inclined upper end engageable with an inclined slot formed in pin 51. The inter-engagement between the dog and slot in the pin causes it to retract the pin and release the engagement between the clutch disk and drive wheel. The dog 53 is mounted at the end of lever 54 having a weight 55 at the end thereof which serves normally to hold the dog in the path of movement of the pin so as to cause disengagement. The dog may be withdrawn from the path of movement by depressing pedal 56 which is connected by means of link 57 to the dog.

A friction drag 58 engages the periphery of clutch disk 48 so as to cause it to stop immediately when the engagement between the drive wheel and clutch disk is released.

A pair of links 59 and 60 are pivotally connected to clutch disk 48 by means of eccentric pin 61. Link 59 is connected adjacent its opposite end by pivotal connection 62 to lever 39 and link 60 is connected adjacent its opposite end to lever 63. It will be seen that the link 59 and lever 39 are preferably provided with a plurality of apertures through which the pin 62 may be selectively inserted to provide for adjustment of the apparatus for use with different size containers. The lower end of lever 63 is pivotally connected at 64 to one end of pressure ring 36. At an intermediate point lever 63 is pivoted to link 65 which in turn is adjustably connected adjacent its opposite end to the other end of ring 36 as shown at 66. Link 65 is also connected by helical spring 67 to the upper frame work of the machine, the spring serving to normally retain the parts in the position indicated in Fig. 10 with the pressure ring expanded. The intermediate portion of lever 63 also connected with an adjustable link 68 which in turn is connected at its opposite end to lever 69. At an intermediate

point the lever 69 is pivotally connected by the pin 49 to the lower end of lever 39. At the same point it has a slotted connection with the standard 41 permitting limited vertical movement. Adjacent its opposite end lever 69 has a slotted connection by means of pin 70 to upright 71 permitting limited horizontal movement of the lever.

In the normal operation of the device the motor 44 is turned on and dog 53 being disposed in the path of movement of retractable pin 51 causes the clutch disk to release its engagement from drive wheel 47 and to remain stationary. Ring 36 is then in the expanded position shown in Fig. 10 and a container having a head inserted therein and a rim partially assembled therearound and with a staple projecting through the apertures 29 in the underlying portion thereof is then inserted in the pressure ring with the ring surrounding the locking rim and with the overlapping ends of the locking rim in the position shown in dotted lines in Fig. 10.

To initiate the cycle of operation, pedal 52 is momentarily depressed so as to permit the clutch to be engaged by the drive wheel. The clutch then moves from the position shown in Fig. 10 to the position shown in Fig. 13 with link 60 pushing lever 63 downwardly. The action of lever 63 through the pivotal connection 64 with the one end of pressure ring 36 and through link 65 with the opposite end thereof causes ring to shift to contracted position. Simultaneously link 68 forces the outer end of lever 69 downwardly shifting lever 39 downwardly, so that the pressure shoe 37 and roller 38 are moved into engagement with the rim to the position shown in Figs. 13 and 14.

Thereafter clutch 48 continues to rotate towards the position indicated in Fig. 16 with the result that the effective action of link 59 is brought into operation. The link 59 during this portion of the cycle exerts a direct thrust against the upper end of lever 39 causing it to shift to the left moving the pressure shoe, anvil and roller until they assume the positions shown in Figs. 16 and 17. When in this position the staple has been bent downwardly to closed or locked position and the cycle of effective operation has been completed. Continued operation results in rotation of the clutch disk 48 in a clockwise direction back to the position shown in Fig. 10. Then, dog 53 again releases the clutch and the mechanism is halted with the pressure ring in expanded position and the pressure shoe and roller in elevated position permitting the assembled container to be withdrawn and a new partially assembled container to be inserted.

By adjusting the links 68 and 65 and adjusting the connection between link 59 and lever 39 and by replacing the clamping ring 36 with other clamping rings of different sizes it will be appreciated that the mechanism can be varied so that it can be used for assembling containers of varying sizes.

In the operation of my machine it will be seen that the locking rim 25 is first partially assembled around the end of the container in which the closure has been inserted. Prior to this, staple 28 has been inserted through the apertures 29 in the underlying end of the rim. Thereafter force or pressure is progressively exerted against the rim so as to cause it to conform in shape and contour with the outer surface of the container. This force or pressure is exerted progressively towards one or both ends of the rim so that the entire rim is caused to embrace the container and

conform in contour therewith and the apertures adjacent opposite ends are brought into approximate registry. The overlapping end is then brought downwardly into contact with the underlying end and due to the angularly disposed staple prongs, the apertures in the overlapping end readily engage the staple arms. As the overlapping end is brought down towards the base of the staple, the rim is further tightened. Finally the staple ends are bent over by first pre-setting the ends and then rolling them flat against the outer surface of the rim.

It will thus be seen that I have provided an improved machine and method whereby a closure may be applied to a container automatically. The amount of time required to apply the closure is greatly reduced and the operation of applying it is greatly simplified. It will also be seen that I have provided an improved container closure construction which is sturdy and strong, in which the closure forms sealing engagement with the container and in which the closure is firmly held in position against accidental displacement. Modifications may be made in the illustrated and described embodiment of my invention without departing from the invention as set forth in the accompanying claims.

I claim:

1. Apparatus for use in tightening and securing a split metal rim around a container after it has been loosely assembled therearound with the ends in overlapping relationship and for thereafter bringing the overlapping ends of the rim into contact and securing a metal fastening lug in position comprising: a unitary pressure ring made of relatively stiff spring metal and being split at one point in its circumference so as to have two free ends which are spaced apart so as to be expandable into a size to freely accommodate the container with the rim loosely assembled therearound and contractable to tightly embrace the container and rim; operating means for the pressure ring including a lever pivotally connected at one end adjacent one free end of the pressure ring and a link connected between the other free end of the pressure ring and an intermediate point of the lever so that pivoting of the lever in one direction causes the free ends to separate and the ring to expand and pivoting of the lever in the other direction draws the two free ends towards each other and causes the ring to contact, with a maximum amount of movement adjacent the free ends and progressively decreasing towards the diametrically opposite side thereof; and a second lever pivotally mounted adjacent said pressure ring and having a pressure shoe and a pressure roller mounted thereon at a point between the free ends of the pressure ring and being shiftable with the lever through a fixed path between the two free ends of the pressure ring, said pressure shoe being engageable with overlapped ends of the rim to press them into contact and said pressure roller being engageable with a fastening lug for securing it in position.

2. Apparatus as set forth in claim 1 in which the second lever is operatively connected to the first mentioned lever so that the pressure shoe and roller are shifted to operative position when the pressure ring is contracted and are shifted to inoperative position when the pressure ring is expanded.

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