

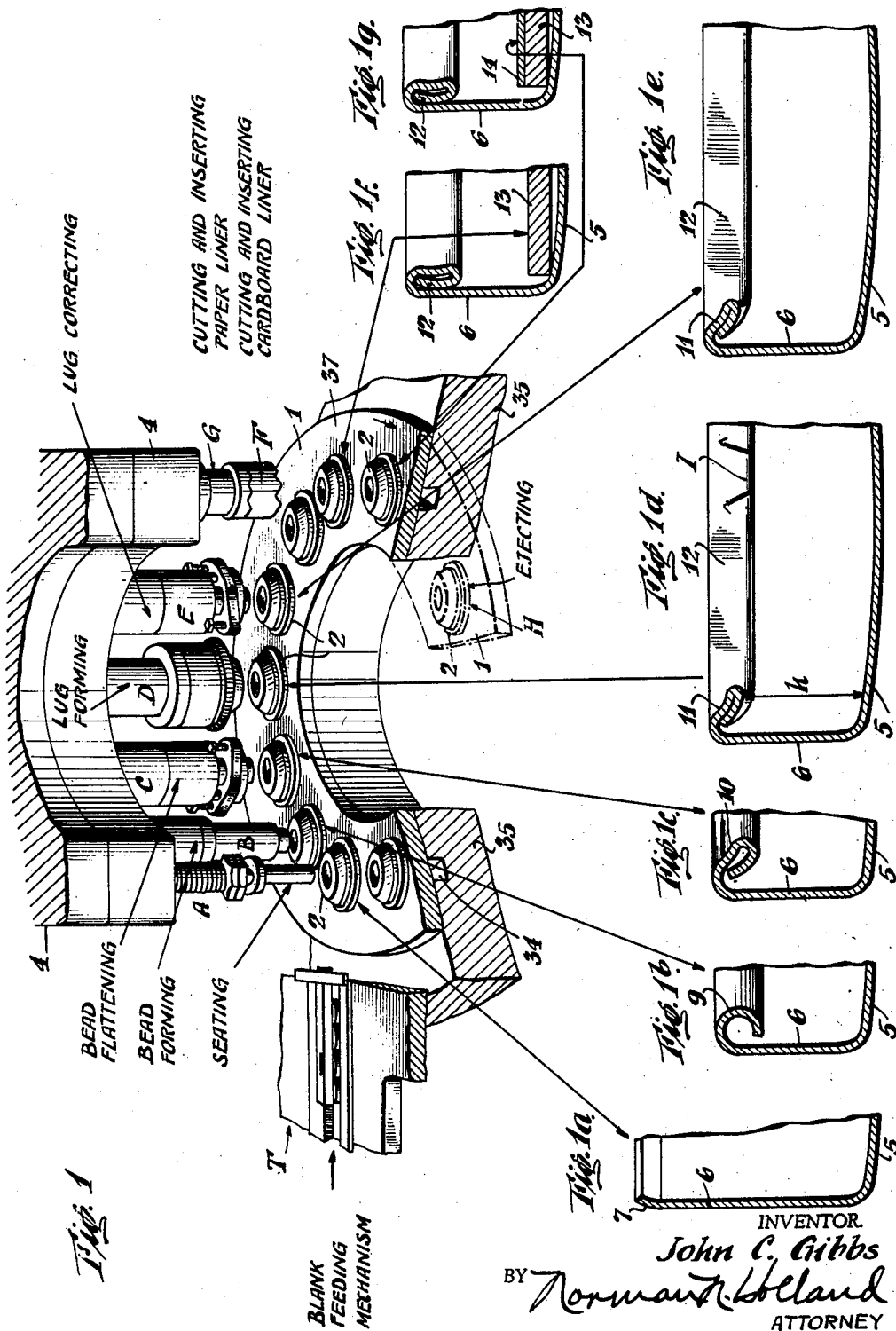
Feb. 29, 1944.

J. C. GIBBS

2,343,006

MACHINE FOR MAKING CLOSURE CAPS

Original Filed Oct. 12, 1937 3 Sheets-Sheet 1



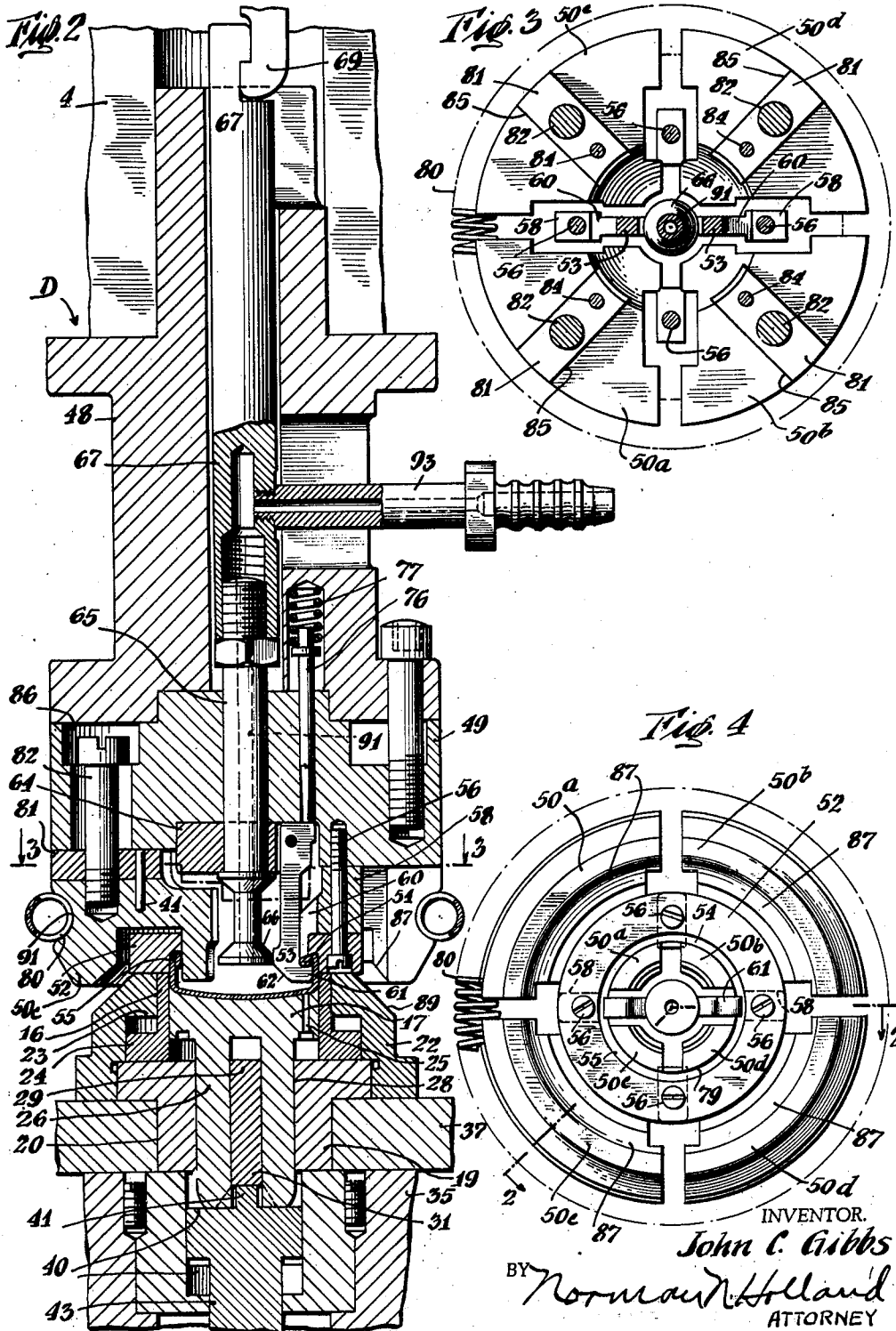
Feb. 29, 1944.

J. C. GIBBS

2,343,006

MACHINE FOR MAKING CLOSURE CAPS

Original Filed Oct. 12, 1937 3 Sheets-Sheet 2



Feb. 29, 1944.

J. C. GIBBS

2,343,006

MACHINE FOR MAKING CLOSURE CAPS

Original Filed Oct. 12, 1937 3 Sheets-Sheet 3

Fig. 6

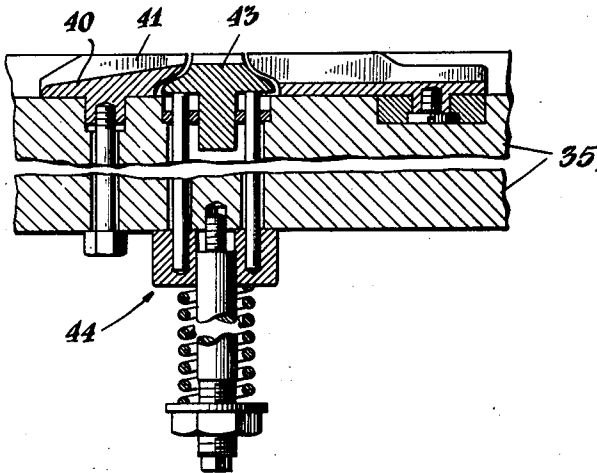


Fig. 5

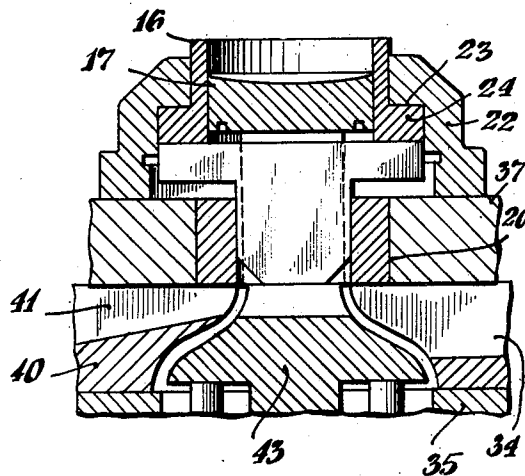
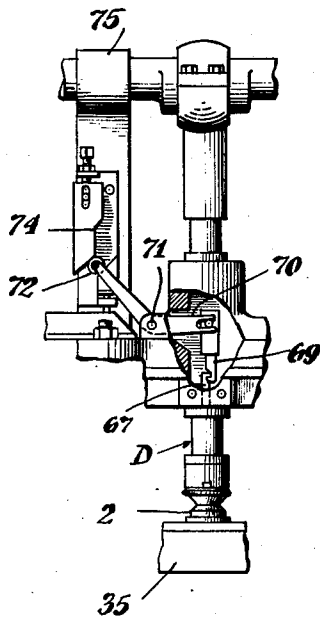


Fig. 7



INVENTOR.
John C. Gibbs
BY *Norman A. Holland*
ATTORNEY

UNITED STATES PATENT OFFICE

2,343,006

MACHINE FOR MAKING CLOSURE CAPS

John C. Gibbs, South Gate, Calif., assignor, by direct and mesne assignments, to Anchor Hocking Glass Corporation, Lancaster, Ohio, a corporation of Delaware

Original application October 12, 1937, Serial No. 168,536, now Patent No. 2,282,959, dated May 12, 1942. Divided and this application October 7, 1941, Serial No. 413,928

16 Claims. (Cl. 153—34)

The parent application, Serial No. 168,536, filed October 12, 1937, now Patent No. 2,282,959, of which the present application is a division, is directed to a machine for making intumed edge closure caps at a relatively high rate of speed. The closure caps so manufactured are provided with container engaging lugs formed from an intumed edge or bead.

The present application relates to subject matter of the device or apparatus for forming container engaging lugs from the intumed edge or bead required to be divided from the parent application.

An object of the present invention is to provide an improved machine for making closure caps having container engaging lugs.

Another object of the present invention is to provide a new and improved device for making closure caps having container engaging means formed from an intumed edge.

Another object of the present invention is to provide a machine for manufacturing closure caps adapted to form a substantially smooth, flattened, intumed bead at the lower part of the skirt of the cap having concealed lugs at spaced intervals.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein

Fig. 1 is a diagrammatic perspective view of an intermittently rotatable table and a press carrying a series of tools for progressively forming suitable blanks into closure caps;

Fig. 1a is a fragmentary sectional view of a blank adapted to be fabricated into a closure cap;

Fig. 1b is a fragmentary sectional view showing the blank after a bead has been formed in the skirt thereof;

Fig. 1c is a fragmentary sectional view showing the blank after the bead has been flattened;

Fig. 1d is a fragmentary sectional view showing the blank after lugs or container engaging projections have been formed from the bead to provide a closure cap;

Fig. 1e is a fragmentary sectional view show-

ing the cap after the position of the lugs has been gauged or corrected;

Fig. 1f is a fragmentary sectional view showing the cap having a cardboard liner or the like inserted therein;

Fig. 1g is a fragmentary sectional view showing the cap having a sealing liner or the like inserted as a resistant sealing disc extending over the cardboard liner therein;

Fig. 2 is an enlarged sectional view taken along the line 2—2 of Fig. 4 illustrating a device for forming container engaging lugs in the bead of a closure cap;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a bottom view of the device illustrated in Fig. 2;

Fig. 5 is a sectional view illustrating the construction of a socket or die;

Fig. 6 is a sectional view of a cam for raising the socket of Fig. 2 while a closure cap blank is having lugs formed therein; and

Fig. 7 is a fragmentary view illustrating a mechanism for actuating the device of Fig. 2.

Referring again to the drawings and more particularly to Fig. 1 thereof there is shown a machine comprising a rotatable table or dial 1 having spaced sockets, dies or matrices 2 positioned at intervals thereon. Intermittent rotation of the table 1 in a horizontal plane correspondingly moves the sockets 2 carried thereby. The sockets are adapted to receive closure cap blanks (Fig. 1a) and to present them to a series of tools (A to G), carried by a reciprocable head 4, for forming the blanks into finished closure caps of the intumed edge type having spaced, inwardly projecting container engaging means or lugs formed from the intumed edge or bead.

The blanks fed to the machine are cup-shaped with a cover portion 5 and depending skirt 6. The free edge 7 of the skirt 6 is preferably inclined inwardly (Fig. 1a) to facilitate curling of the lower edge of the skirt inwardly into a bead. The sockets 2 first move successively substantially into line with a blank feeding mechanism T, from which blanks are fed to the individual sockets 2 so that their covers 5 rest against bottoms of the sockets and their free edges 7 face upwardly. A seating plunger A then moves downwardly to seat a blank firmly against the bottom of a socket in position to be acted upon by tools for performing subsequent operations on the blank. The next rotary step or movement of the table 1 positions the socket and blank of Fig. 1a beneath a bead forming tool

B which curls the free edge of the blank into a bead 9 of substantially circular cross section (Fig. 1b). At the next succeeding station a bead flattening member C compresses the circular bead 9 together and inclines it inwardly (Fig. 1c). The bead flattening tool C also preferably forms a slight annular depression 10 in the flattened bead to facilitate forming of container engaging lugs at the next station. The lug forming tool D at the next station forms container engaging means or lugs 11 from the flattened bead and folds portions of the bead 12, located intermediate the lugs, outwardly against skirt 6 of the closure cap (Fig. 1d); the present application is directed more particularly to features of the machine with the lug forming tool D. At the next succeeding station, a tool E engages the lugs and adjusts their position with respect to the cover part (Fig. 1e). The tool E also flattens the intermediate bead portions 12 to eliminate irregularities I (Fig. 1d) and makes the skirt uniformly circular. The cap is then delivered to a tool F adapted to cut a cardboard liner 13 or the like (Fig. 1f) and insert it in the cap and is thereafter delivered to a similar liner cutting tool G adapted to insert an oil paper sealing liner 14 or the like (Fig. 1g). The completed caps may be removed from the table by a suitable ejecting device at H and thereafter cleaned, counted and packed for shipment.

The sockets or dies (Fig. 5) for receiving the blanks preferably comprise a slidable sleeve member 16 adapted to form the side wall of the socket, a member 17 slidable with respect to the sleeve member 16 adapted to form the bottom of the socket, a bushing member 19 seated in an aperture 20 of the table adapted to support the side and bottom members 16 and 17, and a casing member 22 secured to the bushing member 19 having an inwardly extending flange 23 at its upper end adapted to cooperate with a flange 24 on the sleeve member 16 to limit upward movement of the members 16 and 17 within the casing member 22. To prevent the formation of air pockets in the sockets when the blanks are inserted tending to unseat the blanks, the bottom members may be provided with one or more venting apertures 25.

Preferably, the bottom member 17 has a slotted or bifurcated downwardly depending portion 26 adapted to extend through an aperture 28 in the bushing member 19 to permit the bottom member 17 to be raised by a cam device or the like. The outer sleeve member 16 may be raised independently of the bottom member by a radially extending member 29 mounted in the slotted portion of the bottom member 17 having a depending portion 31 adapted to engage a cam surface or the like.

In order to raise the outer sleeve 16 and bottom members 17 of the sockets while certain steps are performed by the tools of the press, a cam track or the like is provided in a groove 34 in the bed-plate 35 beneath the intermittently rotated annular dial member 37. The cam track preferably comprises a cam portion 40 (Fig. 6) for engaging the depending portion 26 of the bottom member 17 to raise the bottom member 17 at the lug forming station, so that the edge of the skirt of the blank may be engaged by the lug forming tool.

The sleeve members 16 of the sockets may be raised upwardly or resiliently supported independently of the bottom members 17 at the lug forming stations by a cam portion 41 projecting upwardly at the middle of the cam portion 40.

The cam portion 41 is adapted to engage the depending portion 31 of a sleeve operating member 29 and to extend into the slotted depending portions 26 of the bottom member 17. In this manner, the cam portions 40 and 41 cooperate with the depending portions 26 and 31 in engagement therewith, and prevent the bottom members and sleeve from turning with respect to the socket casing 22. Preferably, the cam portion 41 fitting into the slotted depending portions 26 extends from the lug forming station to the lug correcting station so that the blank cannot rotate in the socket while transferred from one station to the other. Consequently, the lugs formed from the bead of the blank are properly positioned with respect to the lug correcting tools and the blank need not be oriented before the lug correcting tools are applied. The bottom and sleeve members of the socket may be supported in raised position by an anvil member 43 which is a continuation of the cam portions 40 and 41. This anvil member is mounted on an adjustable resilient device 44 adapted to yield when the cam is forced downwardly by the lug forming device to prevent the tools from applying excessive forces or distorting the blank.

Any suitable number of sockets may be utilized depending upon the diameter of the annular member and the size of the caps to be formed and, if desired, the sockets may be attached in a manner to permit them to be interchanged for sockets adapted to accommodate other size blanks.

The device D for forming container engaging lugs or projections 11 is illustrated more particularly in Figs. 2, 3 and 4. This device is mounted on the press head 4 and comprises a mounting sleeve 48 having a collar member 49 attached thereto for supporting jaw members 50a, 50b 50c and 50d adapted to flatten the bead outwardly against the interior of the skirt of the blank, an annular member 52 for engaging the exterior of the skirt of the blank while the jaw members are effective, and expansible fingers 53 for engaging portions of the bead and forming lugs therefrom. This device is adapted to form any desired number of lugs, for example, two, three, four or six, but for illustrative purposes is shown herein adapted to form two diametrically opposite lugs.

The annular member 52 preferably has a downwardly facing groove 54 at the inner periphery thereof and a substantially vertical inner wall portion 55 adapted to engage the rounded lower edge and the exterior of the skirt, respectively, to maintain the circular contour of the skirt during the flattening of the bead and to prevent the edge of the skirt from being distorted. The annular member may be secured to the mounting collar by suitable screws or bolts 56 and may be spaced therefrom by members 58 having downwardly projecting portions 60 provided with a shaping surface adapted to engage the upwardly facing surface of the bead 9 and cooperate with the fingers 53 to shape the lugs 11. When the press head 4 with the lug forming tool D is lowered, the annular member engages the sleeve member 16 of the socket which has been elevated by the cam portion 41 and cooperates therewith to encase the skirt of the cap and prevent distortion thereof during the formation of the lugs. The spring mounting 44 (Fig. 6) permits downward movement of the sleeve 16 when engaged by the downwardly moving annular member.

The lug forming fingers 53 preferably have a hook-shaped portion 61 adapted to extend out-

wardly beneath the closed head and fold the bead against the depending portions 60 and have cam portions 62 at the inner radial side thereof. The fingers are pivotally mounted at the upper ends thereof on a collar 64 extending about a rod 65 slidably mounted in the mounting sleeve 43 and collar 49 and are adapted to be expanded by a cam member 66, secured to the lower end of the rod, which engages the cam surfaces 62 of the fingers upon upward movement of the rods. The rod preferably is threaded to a shaft 67 extending through the mounting sleeve 43 and preferably is adapted to be adjusted with respect to the fingers to determine the amount of outward movement of the fingers when engaged by the cam.

The shaft 67 may be raised and lowered in any suitable manner during the operation of the press, but preferably is engaged by a connecting link 69 or the like pivoted to one end of a bell crank 70 pivotally mounted on the press head at 71 (Fig. 7). The other end of the bell crank carries a roller 72 adapted to engage a cam 74 mounted on one of the press head supporting columns 75. When the press head is lowered, the cam 74 is operative to move the rod downwardly with the press head so that the cam member 66 is out of engagement with the cam portions 62 of the expansible fingers. Upon further downward movement after the hook-shaped portions 61 of the lug forming fingers have been inserted into the blank, the cam 74 is effective to raise the shaft 67 and rod to cause the cam member 66 to move the fingers radially outwardly and engage portions of the bead. Further upward movement of the rod 65 causes upward movement of the collar 64 carrying the fingers so that the hook-shaped portions 61 of the fingers fold the bead against the depending portions 60 to shape the lugs. When the press head is raised, the cam member 66 moves out of engagement with the cam surfaces on the fingers and suitable plungers 76 or the like urged downwardly by springs 77 move the fingers inwardly so that they may be retracted without raising or otherwise moving the blank.

Preferably, four bead flattening jaws 50 are provided (Fig. 4) which may be in the form of expansible segments and each of the jaws has an arcuate surface 79 for engaging the portions 12 of the bead intermediate the lugs to flatten them against the skirt of the blank (Fig. 2 left side). The jaws are slidably mounted above the annular member 52 and are normally held in a collapsed position by a suitable spring member 80 or the like extending about the exterior thereof. The jaws 50 are slidably mounted with respect to the supporting collar 49 by securing them to key members 81 by suitable bolts 82 and pins 84 or the like. The key members are slidably seated in slots or recesses 35 to permit inward and outward movement of the jaws. Preferably, the bolt members extend upwardly into an enlarged recess 81 provided in the collar 49 and are slidable therein.

The bead flattening jaws or segments 50 are expanded by suitable tapered or cam-shaped surfaces 87 at the lower end thereof which engage a corresponding surface 89 on the socket casing members 22 so that the key members 81 move outwardly in the slots 35 and the arcuate portions 79 of the segments flatten the bead 9 of the blank against the skirt. While the jaws are being expanded, the sleeve member 16 of the socket cooperates with the annular member 52 to form a

cylindrical casing about the skirt of the cap. When the press is raised and the surfaces 87 and 89 are out of engagement, the segments are moved inwardly by an annular spring 80 encircling the segments and retained by suitable grooves 90 formed in the segments. Portions of the flattened bead 12 (Fig. 1c) are supported by expansible fingers 53 adapted to shape the lugs, and suitable jaws 50a, 50b, 50c and 50d cooperate with an annular member 52 to fold portions of the bead intermediate the lugs against the inner wall of the skirt.

In order to prevent the blank from being removed from or shifted in the socket when the lug forming device is raised upwardly, suitable means are provided for stripping the blank from the lug forming portions 60 and 61 and for holding the blank downwardly in the socket. Such means may comprise a conduit 91 extending through the rod 65 and cam member 66 and a tube 93 adapted to be connected to means for periodically supplying compressed air. It will be understood that mechanical means such as a resiliently mounted plunger, could also be utilized for this purpose.

The blank, after being subjected to the foregoing operations, is now in the form of a closure cap. The caps may thereafter be delivered by the dial table to a device for correcting or gauging the position of the lugs and removing irregularities in the lower edge of the skirt. Thereafter the cap is transferred to liner cutting and inserting devices F and G, and then to an ejecting means H. The caps may then be cleaned, counted and packed for shipment.

If the blank feeding device fails to deliver a blank to a socket, the machine will not be damaged, because the tools on the press head merely operate idly in the empty socket.

The details of the mechanism for intermittently rotating the table 1, and for reciprocating the forming tools carried by the head 4 are not a part of the present application and are not described herein.

It will be seen that the present invention provides a new and improved means for forming container engaging lugs in closure caps. The lugs are formed from an intumed bead of a closure blank to give lug and skirt portions of multiple thicknesses of metal. The lug forming tool and socket members may be readily interchanged for tools and sockets adapted to form and hold different sizes of closure blanks. Also, the tools may be adapted to form a different number of container engaging lugs.

As various other changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a device of the class described, the combination of means for supporting a blank having an intumed bead in the skirt thereof, means for engaging portions of the bead at spaced intervals and for collapsing the bead in a vertical direction at said portions to form container engaging lugs from the bead, and radially expansible means for folding the bead outwardly against the inner wall of the skirt at portions intermediate the lugs.

2. In a device of the class described, the combination of means for supporting a blank having an intumed bead in the skirt thereof, means for

engaging portions of the bead at spaced intervals and for collapsing the bead to increase the distance that it projects inwardly from the skirt at said portions to form container engaging lugs from the bead, means movable radially outwardly for folding the bead outwardly against the inner wall of the skirt at portions intermediate the lugs to decrease the distance that it extends inwardly from the skirt of the cap at said intermediate portions, and means extending about the exterior of said skirt for minimizing deformation thereof during said outward folding of the bead.

3. In a device of the class described, the combination of means for supporting a blank having an inturned bead formed in the skirt thereof, means for folding the formed bead together in a substantially horizontal direction at spaced intervals to form container engaging lugs from the bead, and expansible means for folding the bead outwardly against the inner wall of the skirt at portions intermediate the lugs.

4. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, downwardly extending members adapted to engage the upper part of the bead at spaced intervals, members for supporting the underside of the bead and cooperating with said downwardly extending members to form container engaging lugs, and expansible members intermediate said lug forming members and intermediate said downwardly extending members for folding and flattening the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs.

5. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, downwardly extending members adapted to engage the upper part of the bead at spaced intervals, pivotally mounted members for supporting the underside of the bead adjacent said downwardly extending members and cooperating with said downwardly extending members to form container engaging lugs, means for moving said pivotally mounted members outwardly beneath the underside of the bead, and members movable laterally intermediate said lug forming members for folding and flattening the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs.

6. In a device for the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, downwardly extending members adapted to engage the upper part of the bead at spaced intervals, pivotally mounted members having cam surfaces thereon and adapted to support the underside of the bead adjacent said downwardly extending members and cooperating with said downwardly extending members to form container engaging lugs, and a member having a cam surface thereon for cooperating with the cam surfaces on said downwardly extending members and adapted to pass between said downwardly extending members and engage the inner sides thereof to force them outwardly beneath the underside of the bead, and laterally expansible members intermediate said lug forming members for folding and flattening the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs.

7. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, downwardly

extending members adapted to engage the upper part of the bead at spaced intervals, members for supporting the underside of the bead and cooperating with said downwardly extending members to form container engaging lugs, reciprocable means adapted to intermittently pass between and move outwardly said members for supporting the underside of the bead, cam means for raising said reciprocable means to force said supporting means outwardly, and members intermediate said lug forming members for folding and flattening the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs.

8. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, projections adapted to engage the upper part of the bead at spaced intervals, members having portions extending beneath the bead and cooperating with said projections to form container engaging lugs in the bead, expansible members intermediate said members forming the lugs for folding the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs, resilient means for normally collapsing said expansible members, and cam means for moving said expansible members outwardly to fold the bead against the skirt.

9. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, projections adapted to engage the upper part of the bead at spaced intervals, pivotally mounted members having portions adapted to extend beneath the bead and cooperating with said projections to form container engaging lugs in the bead, resilient means for moving the portions of said pivotally mounted members from beneath the bead, expansible members intermediate said members forming the lugs for folding the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs, resilient means for normally collapsing said expansible members, and cam means for moving said expansible members outwardly to fold the bead against the skirt.

10. In a device of the class described, the combination of means for supporting a blank having an inturned bead in the skirt thereof, means for engaging the upper part of the bead, pivotally mounted members for engaging the underside of the bead and for cooperating with said second means to compress the bead to form container engaging lugs in the bead, expansible members for folding the bead outwardly against the inner wall of the skirt intermediate the lugs, means for normally holding said pivotally mounted members inwardly with respect to the skirt of the cap, and means passing between said pivoted members for moving said pivotally mounted members outwardly in effective position to cooperate with the projecting members and form the lugs.

11. In a machine of the class described, the combination of a table having sockets for receiving blanks provided with an inturned bead in the skirt thereof, means adapted to engage the upper part of the formed bead, members for engaging the underside of the formed bead and for cooperating with said means to form container engaging lugs in the bead, and expansible members for folding the bead outwardly against the inner wall of the skirt intermediate the lugs.

12. In a machine of the class described, the combination of a table having socket members for receiving blanks provided with an inturned bead in the skirt thereof, each of said socket

members having a cam surface thereon, projecting members adapted to engage the upper part of the bead at spaced intervals, members cooperating with said projecting members for forming container engaging lugs in the bead, expansible members intermediate said members forming the lugs for folding the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs, and cam surfaces on said expansible members adapted to cooperate with the cam surface on a socket member for moving said expansible members outwardly to fold the bead against the skirt.

13. In a machine of the class described, the combination of a table, sockets on said table for supporting blanks having an inturned bead in the skirt thereof, projections adapted to engage the upper part of the bead at spaced intervals, members adapted to engage the lower part of the bead at said spaced intervals for cooperating with said projections for forming container engaging lugs in the bead, and expansible members intermediate said lug forming members for flattening the bead outwardly against the inner wall of the skirt at intervals intermediate the lugs.

14. In a device of the class described, the combination of a member for supporting a closure cap blank having an inturned bead in the skirt thereof, means extending about said supporting member adapted to minimize deformation of the skirt of a closure blank adjacent the cover portion thereof during the formation of lugs in said closure blank, means adapted to extend about the free end of the skirt of said closure blank for minimizing deformation of the free end of said skirt during the formation of lugs in the closure blank, pivoted members for engaging portions of the bead at spaced intervals to form container engaging lugs from the bead, a member having a conical surface adapted to pass between said pivoted members to force them outwardly and under the bead of the cap, and radially expansible means for collapsing the bead outwardly against the skirt of the cap at portions intermediate the lugs.

15. In a device of the class described, the combination of means for supporting a cup-shaped

sheet metal blank having an inturned bead formed in the skirt thereof, a reciprocating device, a plurality of members pivoted to said reciprocating device having parts adapted to extend into said blank and under the bead thereof, a member having a conical surface adapted to pass between said pivoted members and movable relative to said pivoted members and to said reciprocable device, said conical surface being adapted to engage and expand outwardly the parts of said pivoted members in the closure cap when said conical surface is moved relative to the pivoted members, and means on said reciprocating device adapted to engage the bead of the closure above the parts of said pivoted member to compress said bead and form lugs therein, expansible members mounted on said reciprocating device adapted to extend into said blank intermediate said pivoted members and means for expanding said expansible members outwardly to compress the bead intermediate the lugs against the skirt of the blank.

16. In a device of the class described, the combination of means for supporting a sheet metal flanged blank having an inturned bead formed at the upper edge of the flange, an operating device for supporting parts effective upon said blank, a plurality of members pivoted to said device with their free ends adapted to extend into said blank and adapted to be forced outwardly to form supports under spaced portions of the bead, a member having a cam surface movable with respect to said pivoted members and with respect to said operating device adapted to pass between the free ends of said pivoted members and to force them outwardly under the bead of the closure, means for engaging the portions of the bead above the free ends of said pivoted members to compress the bead in a vertical direction, expansible members secured to said operating device having parts adapted to extend into the blank intermediate said pivoted members, and means for expanding said expansible members outwardly to compress the portions of the bead of the blank outwardly against the flange thereof intermediate the lugs thereof.

JOHN C. GIBBS.