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Potts et al.

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[54] CONTAINER FORMING APPARATUS

[72] Inventors: **Vinson S. Potts**, Cherry Hill, N.J.;
Frederick W. Duhan, Philadelphia, Pa.

[73] Assignee: **Crown Cork & Seal Company, Inc.**,
Philadelphia, Pa.

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[51] Int. Cl. **B21d 51/26**

[58] Field of Search **113/1 E, 1 F, 15 A, 116 CC,**
113/121 A, 121 C, 7, 114; 83/923, 515, 40,
620, 559

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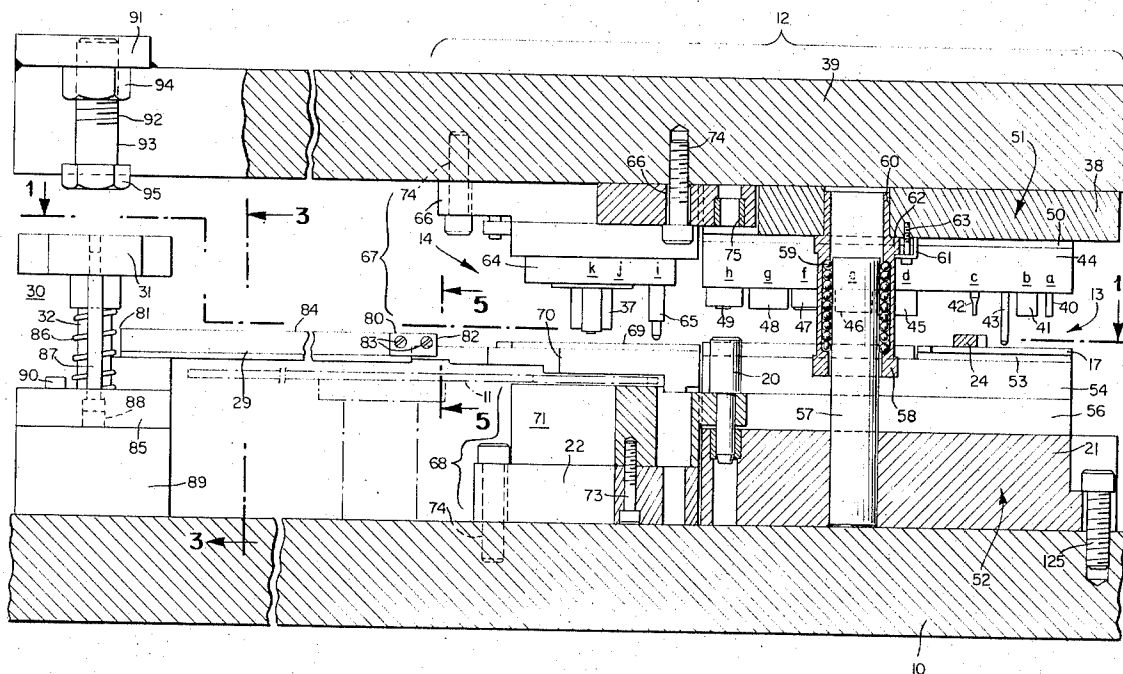
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Primary Examiner—Charles W. Lanham
Assistant Examiner—Michael J. Keenan
Attorney—Woodcock, Washburn, Kurtz &
Mackiewicz

[57] ABSTRACT

A press apparatus for forming container closures by successive operations at a plurality of stations, one of the stations including a die assembly for forming closure tabs from a continuous strip by a plurality of successive punching operations, for blanking the tabs out of the strip, and for prestaking the tabs on closure ends. A scrap chute connects the combination die assembly with a scrap chopper for severing the blanked-out portion of the strip into small pieces of readily disposable scrap.

26 Claims, 4 Drawing Figures



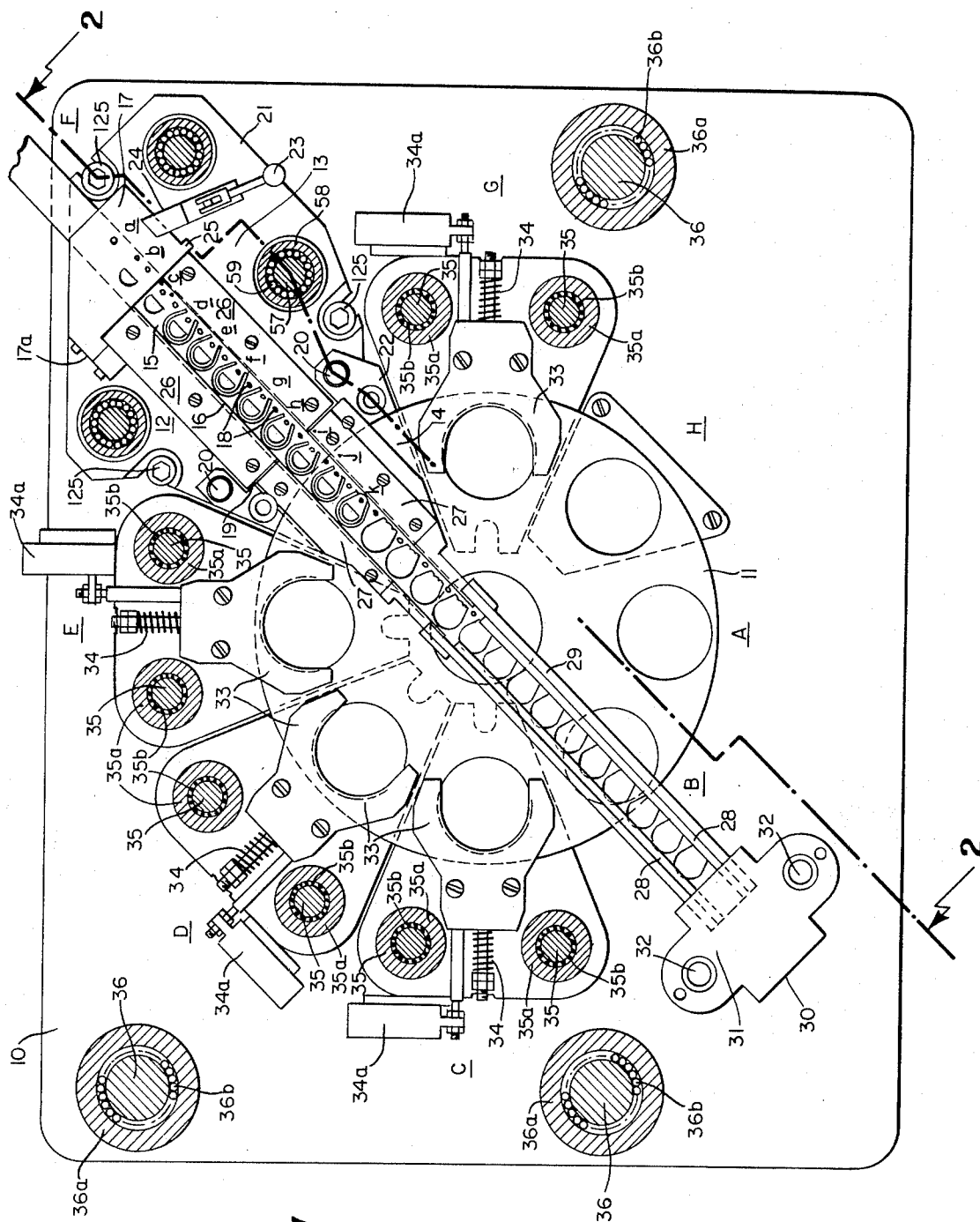


Fig. 1

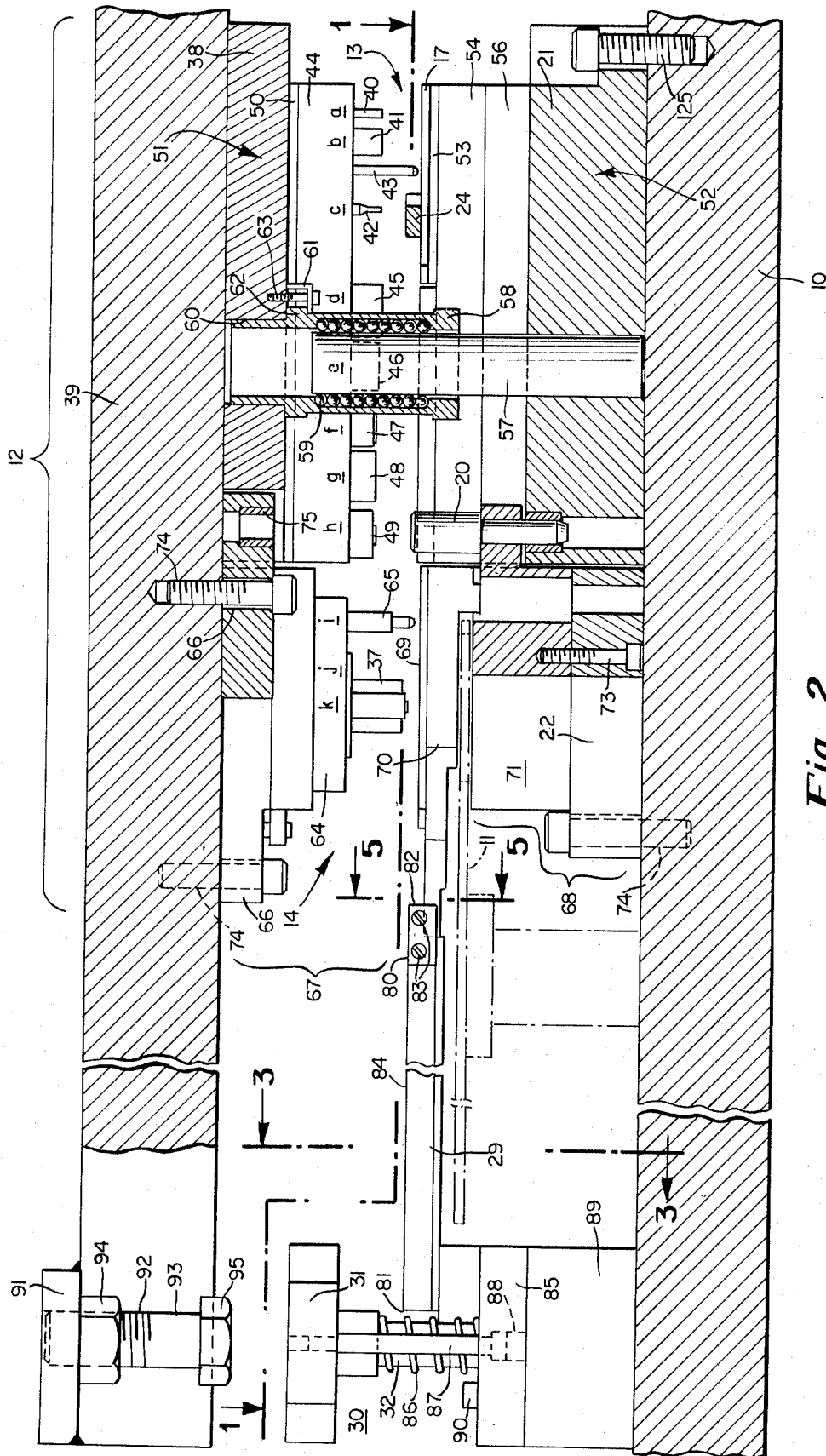


Fig. 2

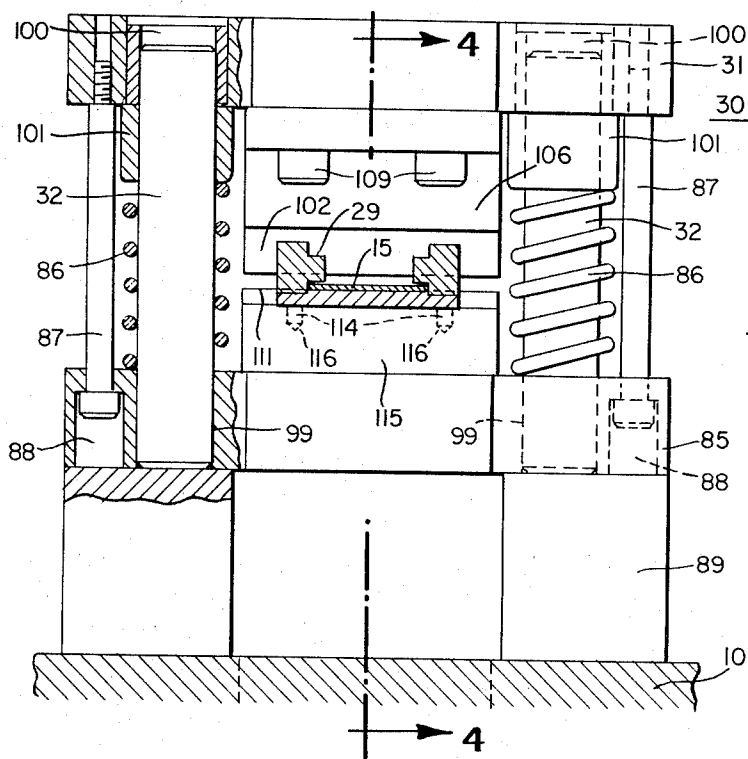


Fig. 3

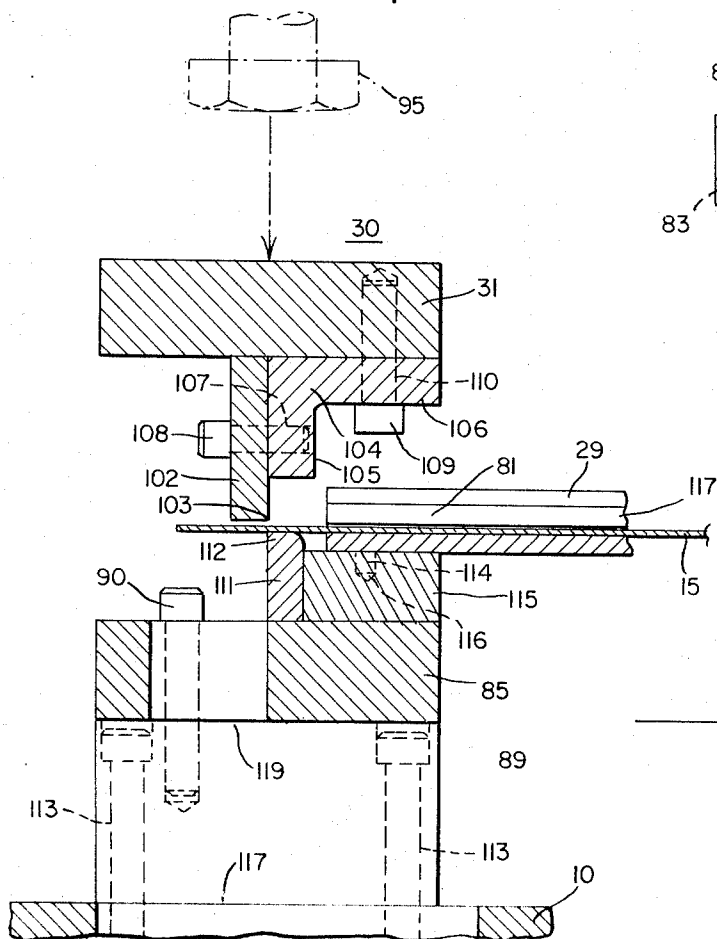


Fig. 4

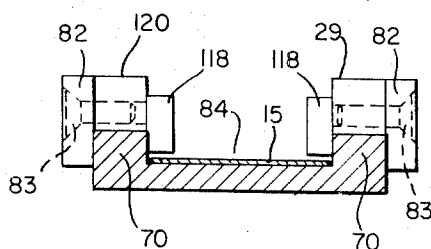


Fig. 5

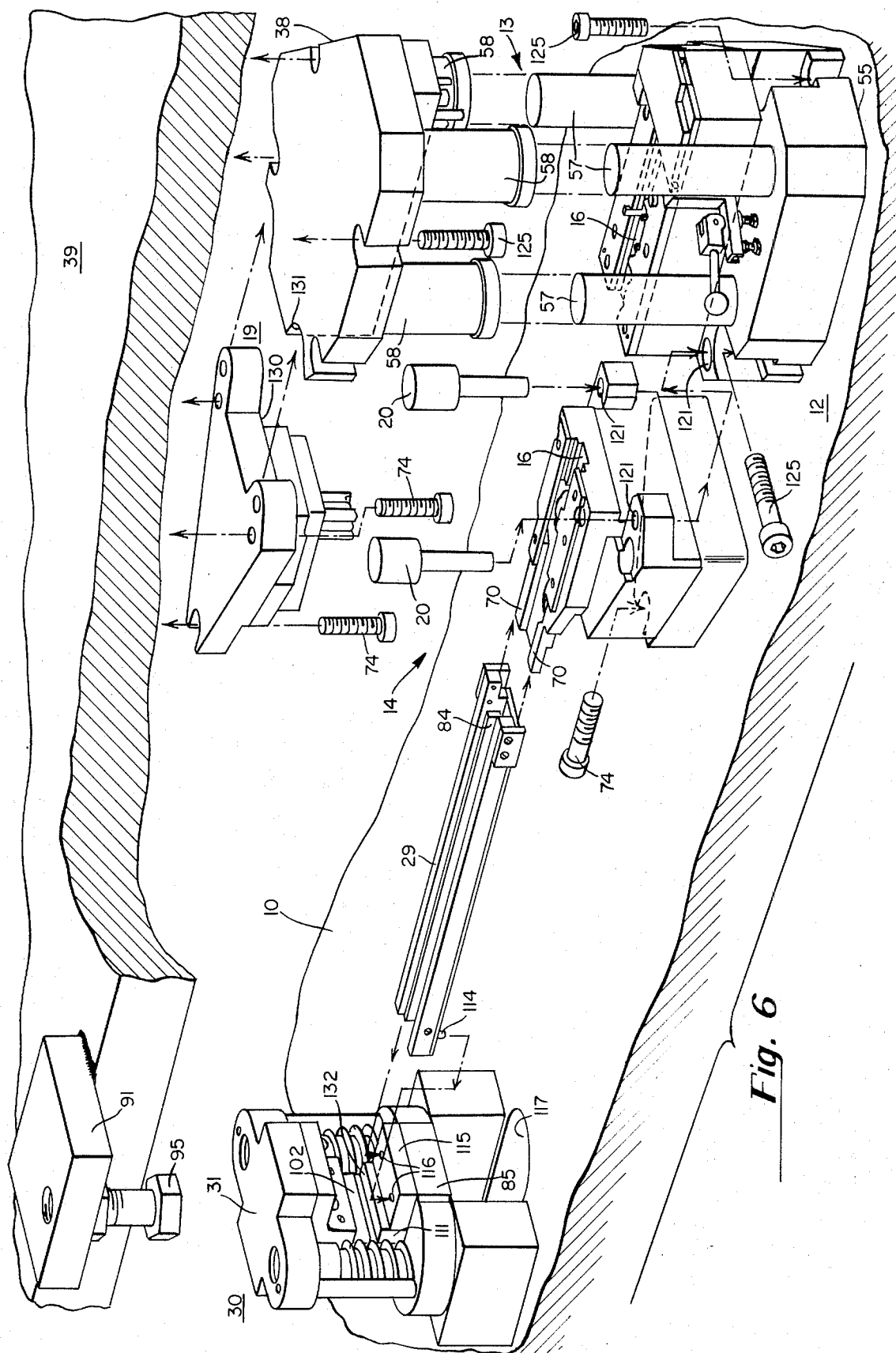


Fig. 6

CONTAINER FORMING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to apparatus for manufacturing containers, and more particularly to apparatus for manufacturing containers having tab means attached thereto.

The container industry now produces a wide variety of containers for an even wider variety of purposes. One group of containers which has become increasingly popular requires the attachment of a tab to the container in order to provide a particular function such as facilitating the opening of the container. Although the tab may serve in many applications and take on many different forms, one very popular application is in the so-called self-opening beverage container, i.e., ring-tab beer can.

Because containers of this type are for the most part intended to be disposable, it is very important to hold the cost of the containers to a fraction of the product contained therein. Consequently, it is imperative that the container manufacturing process be a low cost operation which may be achieved by high speed, automated, and efficiently utilized equipment. However, high speed, efficient utilization, and automation are not necessarily compatible in the container manufacturing apparatus.

The prior art apparatus for forming a tab-bearing container has in certain instances comprised a multi-station press for performing various operations on the container closures. A number of preliminary stations which may be linearly or arcuately arranged perform various forming operations on the closure ends alone before the tabs are joined with the ends. After the ends have passed through all of the preliminary stations, the ends reach an integrated combination die assembly having a progressive tab die section and a prestaking section. Although there are different prior art methods for forming the tabs, one very effective method involves passing a continuous strip through the integrated combination die assembly and shaping a plurality of tabs therefrom by successive operations with various dies in the progressive tab die section. Then, when the strip carrying the already formed tabs reaches the prestaking section of the integrated combination die assembly, the tabs are blanked out of the strip and prestaked on the ends. The now combined closure ends and tabs are subjected to additional forming operations at a plurality of linearly arranged or arcuately arranged final stations. When the preliminary stations as well as the final stations are arcuately arranged, all of the stations form a closed circular pattern.

When the tabs are blanked out of the continuous strip, it has generally been the practice to provide a scrap chopper which severs the blanked-out portion of the strip into small pieces of readily disposable scrap. In addition, a scrap chute is usually provided for guiding the blanked-out portion between the prestaking section and the scrap chopper.

While the prior art apparatus may generally be considered high speed and automated, it is subject to frequent breakdowns and a resultant high downtime which preclude effective utilization of the apparatus. There are at least three places in the prior art apparatus which contribute to these breakdowns.

First, the progressive tab die section will frequently become jammed and requires punch changes. But because the progressive tab die section is part of an integrated combination die assembly in the prior art, it is necessary to remove the entire combination die assembly including the prestaking section which requires rather critical alignment in the work station. Consequently, the reinsertion of the combination die assembly in such a way so as to reestablish the critical alignment of the prestaking section is time-consuming, thereby resulting in a high downtime for the apparatus.

Second, the scrap chopper utilized in some prior art apparatus includes a chopper blade attached to the ram. Since the blade must travel a considerable distance before meeting the continuous strip, there is a likelihood of misalignment which results in a likelihood of breakdowns in the apparatus.

And third, the prior art apparatus utilizing the scrap chopper in combination with a scrap chute feeds the continuous strip through a tortuous path including different levels or through different planes. This multilevel or multiplanar feed increases the likelihood of the strip becoming jammed which also results in a likelihood of breakdowns of the apparatus.

SUMMARY OF THE INVENTION

It is a general object of the invention to provide a high speed and automated means for manufacturing tab-bearing containers.

In accordance with this general object, the invention may be embodied in a press apparatus for forming container closures having tabs mounted on ends comprising a plurality of preliminary work stations for performing a plurality of sequential operations on the ends while the remainder of the plurality of work stations perform a plurality of operations on the ends and tabs.

It is a specific object of the invention to provide an apparatus which is capable of efficient utilization by minimizing breakdowns and the downtime of the apparatus.

In accordance with the specific object, the invention may be embodied in a press apparatus wherein the work station which joins the tabs to the ends comprises a combination die assembly having a separable progressive tab die section and prestaking section. The separable nature of the progressive tab die section and the prestaking section permits the progressive tab die section to be removed from the press apparatus for maintenance purposes without disturbing the critical alignment of the prestaking section.

Also in accordance with the specific object, the invention may be embodied in a press apparatus including means for chopping a continuous strip from which the tabs are blanked into small disposable scrap. The scrap chopping means includes a pair of chopping surfaces which are mounted on the bolster and are closed by the hammer-like action of the press apparatus ram striking the chopper means. By mounting both chopping surfaces on the bolster, the chopping surfaces may be separated by a distance less than the length of the ram stroke so as to minimize alignment problems associated with the chopping surfaces and thereby minimize breakdowns.

Also in accordance with the specific object, the invention may be embodied in a press apparatus includ-

ing a scrap chute for guiding the continuous strip after the tabs have been blanked therefrom between the work station which joins the tabs to the ends and the scrap chopper. The scrap chute guides the strip through a substantially uniplanar channel, thereby providing a single feed level for the strip between the combination die assembly and the scrap chopper.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a press apparatus taken along section line 1—1 of FIG. 2;

FIG. 2 is a cross-sectional view of the press apparatus taken along section line 2—2 of FIG. 1;

FIG. 3 is an elevational view of a scrap chopper in combination with a scrap chute taken along section line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view of the scrap chopper in combination with the scrap chute taken along section line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view of the scrap chute taken along section line 5—5 of FIG. 2; and

FIG. 6 is a partial, exploded perspective view of the press apparatus including a combination die assembly, the scrap chute and the scrap chopper.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The multi-station nature of a press apparatus utilized for applying ring tabs for opening purposes to beverage containers may best be understood by reference to FIG. 1. As shown, the press apparatus includes a plurality of work stations for performing a plurality of sequential operations on a container closure. In this, the preferred embodiment, these work stations are arcuately arranged between a bolster 10 and a ram not shown in FIG. 1 to form a circular path for the closures as they pass through the station.

A first station A receives tabless closure ends from conventional conveyor means well known in the art and places the ends on an intermittently rotating turntable 11 which conveys the ends to the various stations between strokes of the ram. A second station B detects the presence of the ends and may perform additional operations including spraying the ends. A third station C and a fourth station D provide initial shaping functions by extruding rivets on the ends, forming beads, and redrawing the rivets. A fifth station E scores and letters the ends.

After the ends have passed through these first five preliminary stations A—E, the ends are moved through the final stations where ring tabs are attached to the ends. The tabs are initially joined with the ends at a sixth station F which comprises a combination die assembly 12 including a progressive tab die section 13 and a prestaking section 14. Prior to the time the tabs are joined with the ends, the tabs themselves are subjected to a plurality of sequential operations provided at a plurality of positions in the progressive tab die section 13.

A seventh work station G completes the closures including combined ends and tabs by forming rivet heads and doming the ends. An eighth station H detects the proper joining of the tabs with the ends and then discharges the completed closures to conventional conveyor means leading away from the press apparatus.

Having now generally described the plurality of successive operations performed by the plurality of preliminary stations A—E and final work stations F—H, the fifth station which comprises the combination die assembly 12 including the progressive tab die section 13 and the prestaking section 14 will now be described in detail. In accordance with the specific object of the invention, the combination die assembly provides for the separability of the progressive tab die section 13 from the prestaking section 14 so as to permit removal of the progressive tab die section 13 from the press apparatus for purposes of repair or maintenance while not moving the prestaking section 14 and disturbing its critical alignment.

A continuous strip 15 of lightweight flexible material is fed into a substantially uniplanar feed channel 16 in the progressive tab die section 13 by conventional strip feeding means well known in the art. Although most of the feed channel 16 is exposed in FIG. 1, a portion of the channel 16 is covered by a stripper plate 17 which serves to hold the strip down along with plates 26 as the punches of the progressive tab die section 13 are moved upwardly subsequent to the punching operations. When the strip enters the feed channel 16, it is a solid strip except for a series of pilot holes 18 adjacent one edge which are utilized to control the intermittent advancement of the strip 15 through the feed channel 16.

The first operation performed in the progressive tab die section 13 is indentation and is accomplished by passing a punch through the stripper plate 17 at a first position *a*. A single indentation is provided between each of the pilot holes in this manner. The second operation, that of piercing out a semicircular section above the indentation, is also accomplished by means of a punch passing through the stripper plate at a second position *b*.

When the strip first enters the exposed portion of the feed channel 16, it is immediately subjected to the third operation, that of piercing of a small hole at the center of the indentation at a third position *c*. Subsequently, the strip is subjected to additional operations at the fourth through eighth positions *d*, *e*, *f*, *g* and *h* in the progressive tab die section 13 including U-down, preform, precurl, curl and form respectively. At the conclusion of the form operation, the strip 15 passes into the prestaking section 14 by crossing an interface 19 which separates the progressive tab die section 13 from the prestaking section 14.

The interface 19 is maintained in part by locator pins 20 which are inserted through alignable apertures in the lower die shoes 21 and 22 of the progressive tab die and prestaking sections 13 and 14 respectively. When the locator pins 20 are removed along with screws 125 which secure the upper die shoe and lower die shoe 21 of the progressive tab die section 13 to the bolster 10, the progressive tab die section 13 is ready for removal from the press apparatus without disturbing the prestaking section 14.

In order to permit access to the strip 15 along its entirety within progressive tab die section 13, the stripper plate 17 is hinged on one side 17a. When a handle 23 on a clamp 24 is rotated, the clamp will release the stripper plate 17 to permit an upward pivoting away from the channel 16. A projection 25 is provided on the

stripper plate 17 which may be grasped between the fingers, thereby permitting the plate to be pivoted upwardly more easily.

As the strip 15 proceeds into the prestaking section 14, it is met by a pilot punch at position *i* which engages each pilot hole. After passing through an intermediate position *j*, the strip moves on to the prestaking position *k*. At the position *k*, a blanking and prestake tool carried by the ram descends upon the strip to blank the tabs from the strip 15, forces the tabs into contact with the ends so that the rivets at the ends extend through the pierced holes in the tabs, and slightly peens the rivet to hold the tabs in place on the ends. The blanked-out portion of the strip 15 then continues through subsequent positions in the prestaking section 14. While advancing through the prestaking section 14, the strip passes between guide means 27.

As the blanked-out strip continues to advance after leaving the prestaking section 14, the strip is guided across the arcuately arranged work stations by guide means in the form of a scrap chute 29. After the strip 15 has advanced across the scrap chute 29, it reaches means for chopping the strip into small disposable scrap. The means comprises a chopper assembly 30 including an upper scrap chopper blade holder 31 which will reciprocally move along guide posts 32.

The apparatus at the other work stations, stations A-E, and G-H, is substantially conventional and well known in the art. For example, the first station A is coupled to a means for conveying ends thereto such as is well known in the art. The second station B includes an end detector and means for spraying the ends which are also well known in the art. The third through fifth stations C-E, as well as the seventh station G, include substantially conventional end-locating rings 33 which are held in place by spring bias means 34 and operatively connected to micro-switch jam detection means 34a. In addition, each of these stations includes conventional guide posts 35 which mate with conventional guide sleeves 35a with bearings 35b interposed therebetween. The eighth station H includes a conventional detector means for detecting the presence of properly combined tabs and ends and conventional means for discharging the combined tabs and ends representing a completed closure.

All of the operations performed at the various arcuately arranged work stations, as well as the operations performed at the various positions assumed by the strip in the combination die assembly 12 and at the chopper assembly 30, are performed simultaneously on the various ends and various segments of the strip. These operations are performed as a ram, not shown in FIG. 1, descends toward the bolster 10 guided by guide posts 36 mating with guide sleeves 36a having bearings 36b interposed therebetween. The various operations performed by the descent or stroke of a ram 39 may be more fully understood by reference to FIG. 2.

As shown in FIG. 2, the combination die assembly 12 comprises a plurality of punches and forming dies located at various positions *a-k* in both the progressive tab die section 13 and the prestaking section 14. Referring first to the progressive tab die section 13, a punch 40 for performing indentation of the strip 15, a punch 41 for piercing the semicircular portion out of the strip, a punch 42 for piercing a hole in the indentation, and a

pilot punch 43 are secured to a punch retainer block 44. A U-down die 45, a performing die 46, a precurling die 47, a curling die 48, and a forming die 49 are also secured to the punch retainer block 44.

An upper die shoe 38 and a backup plate 50 sandwiched between the upper die shoe 38 and the punch retainer block 44 completes an upper die assembly 51 of the progressive tab die section 13. A lower die assembly 52 of the progressive tab die section 13 includes the stripper plate 17 which is held against spacer plates 53 by the clamp 24. Subjacent the spacer plates 53 and the guide plates 26 is a die block 54 on which the tabs are formed. A lower die shoe 21 and a lower chase 56 sandwiched between the die block 54 and the lower die shoe 21 complete the lower die assembly 52.

Both the upper and lower die assemblies 51 and 52 of the progressive tab die section 13 are secured to the ram 39 and the bolster 10 respectively by the plurality of screws 125 inserted through apertures in the upper and lower die shoes 38 and 21. The appropriate alignment between the upper die assembly 51 and the lower die assembly 52, and hence the punches and dies of the punch retainer 44 and the dies at the die block 54, is achieved by the guide posts 57 mating with the guide sleeve 58 having bearings 59 interposed therebetween. In order to retain the sleeve within an aperture 60 in the upper die shoe 38, a sleeve retainer bracket 61 bears upon a flange 62 of the sleeve 58 and is fastened to the upper die shoe 38 by a screw 63.

The prestaking section 14 also includes a punch retainer block 64. A first punch 65 located at the position *i* is a pilot punch which engages the pilot holes of the strip 15 to assure proper advancement of the strip 15 through the feed channel 16. The second punch is a prestaking and blanking tool 37 which, as discussed previously, both blanks the tabs from the strip 15 and peens the rivets of the ends over the pierced holes in the tabs. The punch retainer block 64 including the punches along with an upper die shoe 66 completes an upper die assembly 67 of the prestaking section 14.

A lower die assembly 68 includes the guide means 27 for the feed channel 16 comprising guide plates 69 and guide rails 70. The plates 69 and the rails 70 are cantilevered over a lift ring retainer 71 in the lower die assembly 68 to permit the turntable 11 to convey the ends to a position beneath the feed channel 16. The lift ring retainer 71 is secured to a lower die shoe 22 by a plurality of screws 73 to form part thereof and complete the lower die assembly 68 of the prestaking section 14. Both upper and lower die assemblies 67 and 68 are secured to the ram 39 and the bolster 10 respectively by screws 74 inserted through apertures in the upper and lower die shoes 66 and 22. Bushings 75 are provided to receive guide pins not shown which facilitate setting up the prestaking section 14.

Also in accordance with the specific object of the invention, the scrap chute 29 having one end 80 connected to the feed channel rails 70 of the prestaking section 14 and another end 81 connected to the chopper assembly 30 is substantially uniplanar so as to provide a single feed level between the combination die assembly 12 and the chopper assembly 30. Thus, the scrap chute bridges various work stations and the intermittently rotating turntable 11 but does so without forcing the strip 15 to move through a tortuous path.

As may be seen, the end 80 of the scrap chute 29 which is connected to the rails 70 of the prestaking section 14 includes guide plates 82 which are fastened to the rails of the scrap chute by suitable means such as screws 83 and overlap with the rails 70 to assure alignment of the feed channel 16 in the combination die assembly 12 and a similar feed channel 84 in the scrap chute 29.

In further accordance with the specific object of the invention, the blanked-out portion of the strip 15 is guided between upper and lower chopper means of the chopper assembly 30, both upper and lower chopper means being mounted on the bolster and separated by a relatively small distance when in the open position as compared with the full stroke of the ram. The chopper assembly 30 includes the upper scrap chopper blade holder 31 which is spring-biased above a lower scrap chopper blade holder 85 by compression springs 86 carried by the guide posts 32. The maximum ascent of the upper scrap chopper blade holder 31 is limited at the lower scrap chopper blade holder 85 by a shoulder screw 87 inserted through a countersunk hole 88 in the lower scrap chopper blade holder 85 and threadedly engaging the upper scrap chopper blade holder 31. In order to maintain the feed level of the chopper assembly 30 substantially identical to the uniplanar feed level of the scrap chute 29 and the uniplanar feed level of the combination die assembly 12, the lower scrap chopper die holder 85 is spaced above the bolster 10 by spacer blocks 89 and secured thereto by a screw 90.

The chopper assembly 30 also includes a hammer arrangement including a cantilevered reference block 91 supporting a bolt 92 by means of threads 93 and a nut 94 and having a head 95 which serves as a hammer striking the upper scrap chopper blade holder 31. With each descent of the ram 39, the head 95 will strike the upper scrap chopper blade holder 31 as an anvil to close the gap between the upper and lower scrap chopper means.

In order to more fully appreciate the interaction of the upper and lower scrap chopper means of the chopper assembly 30, reference is now made to FIGS. 3 and 4. The guide posts 32 connect the upper and lower chopper means in fixed vertical alignment while permitting the upper scrap chopper blade holder 31 to reciprocate vertically with respect to the lower scrap chopper blade holder 85. The upper scrap chopper blade holder 31 includes holes 100 and sleeves 101 to provide an elongated guiding surface which bears upon the guide posts 32 and the lower scrap chopper blade holder 85 includes holes 99 in which the ends of the guide posts 32 are inserted. As explained previously, the shoulder screws 87 maintain the springs 86 surrounding the guide posts 32 in a constant state of compression by limiting the maximum distance separating the upper scrap chopper blade holder 31 from the lower scrap chopper blade holder 85.

An upper scrap chopper means or blade 102 is actually a block rather than a knife comprising a cutting portion 103 having two sides forming a right angle rather than an acute angle. In order to maintain the upper blade in a proper cutting position, a chopper blade support 104 is provided which includes first and second mutually perpendicular legs 105 and 106. The first leg 105 includes an aperture 107 which threadedly engages screws 102 passing through the blade 102. The

second leg 106 is secured to the upper scrap chopper blade holder 31 by screw 109 inserted through an aperture 110 in the leg 106.

The lower chopper means or blade 111 mounted beside a blade support 115 has a cutting portion 112 having two sides forming a right angle. However, the lower chopper blade 111 is offset from the upper chopper blade 102 so as to allow the upper chopper blade 102 to overlap with the lower chopper blade 111 on the downward stroke of the ram 39. As may be seen from FIGS. 3 and 4, which represent the maximum separation of the upper and lower chopper means, the upper scrap chopper blade 102 and the lower scrap chopper blade 111 are never separated by more than a fraction of an inch even when the ram has ascended. Thus, the alignment problems associated with overlapping cutting surfaces is minimized since the overall travel distance of the blades 102 and 111 is minimized.

After the strip 15 is severed by the downward stroke of the upper blade 102, the severed segment of scrap will pass through a disposal opening 119 in the lower scrap chopper blade holder 85 to the area between the two spacer blocks 89. Suitable means may be provided for carrying the scrap away from this area including a disposal aperture 117 in the bolster 10 itself. The lower chopper blade holder is secured to the spacer blocks 89 by the screws 90 and the spacer blocks 89 are in turn secured to the bolster 10 by screws 113.

In still further accordance with the specific object of the invention, the scrap chute 29 is readily separable from the chopper assembly 30. In this regard, the end 81 of the scrap chute 29 which is connected to the chopper assembly 30 includes two locating pins 114 which are dropped in locating apertures 116 in the blade support 115. When maintenance requires access to the work stations, which are bridged by the scrap chute 29, the scrap chute 29 can be easily lifted off the blade support 115.

The easy removal of the scrap chute 29 is also true with respect to the end 80 connected to the rails of the prestaking section 14. As shown in FIG. 5, the scrap chute includes support projections 120 which overlie the rails 70 of the prestaking section 14. The support projections 120 along with the guide plates 82 which overlap with the rails 70 for a short distance provide support and alignment for the scrap chute with the feed channel 16 of the combination die assembly 12 while not restricting the removal of the scrap chute 29 from the press apparatus. Strips 118 are provided to hold the strip 15 down in the channel 84.

The various aspects of the invention which lead to the overall objective of the efficient utilization by way of minimizing breakdowns in both number and duration are graphically presented in FIG. 6. For example, the ease with which the combination die assembly 12 may be disassembled into the separable prestaking section 14 and progressive tab die section 13 is illustrated. Once the screws 125 securing the upper die shoe 38 and the lower die shoe 21 to the ram 39 and the bolster respectively are removed and the two locator pins 20 inserted through apertures 121 in the lower die shoes 21 and 22 of both the prestaking section 14 and the progressive tab die section 13 are removed, the progressive tab die section 13 may be slid back away from the prestaking section 14. Of course, reinsertion

of the progressive tab die section 13 back into the press apparatus is also easily accomplished and further facilitated by mating contoured surfaces 130 and 131 on the upper and lower die shoes of the prestaking section 14 and the progressive tab die section 13 respectively which form the interface 19. Thus, as the progressive tab die section is brought into proximity with the prestaking die section, these contoured surfaces 130 and 131 will mate to facilitate the proper interfacing of the two sections.

The objective of minimizing breakdowns in both number and duration is also illustrated by the exploded view of the scrap chute 29. The scrap chute 29 as shown includes the uniplanar feed channel 84 at the same feed level as the uniplanar feed channel 16 of the combination die assembly 12 as well as the upper surface 132 of the lower scrap chopper blade 111. Thus, the possibility of the blanked-out portion of the strip 15 becoming jammed by being forced through a tortuous path is eliminated. Furthermore, it will be noted that the end 80 of the scrap chute 29 is readily connected to and disconnected from the prestaking section 14 since it merely rests on the rails 70 of the feed channel 16. Similarly, the other end 81 of the scrap chute 29 is readily connected to and disconnected from the chopper assembly 30 since the scrap chute merely rests upon the lower scrap chopper blade support 115 but is nevertheless restricted from lateral movement by the locating pins 114 inserted in the locating apertures 116.

It may also be seen that the separation between the upper scrap chopper blade 102 and the lower scrap chopper blade 111 will remain relatively small even when the ram 39 is exploded to an elevated position shown.

Although the invention is particularly useful in a press apparatus for manufacturing ring tab or self-opening beverage containers, it is understood that the invention may also be utilized in a press apparatus for manufacturing other containers. Thus, the tab which is joined with the closure end might be utilized to perform a function other than facilitation of container opening and the container itself might take on different shapes for different purposes.

Furthermore, while a particularly advantageous embodiment of the invention has been chosen for illustrative purposes, it will be understood that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A press apparatus for forming container closures having closure tabs secured to closure ends including a plurality of work stations for performing a plurality of sequential operations on a container closure, the improvement residing in the work station which joins the tabs to the ends, said work station comprising a combination die assembly including:

a progressive tab die section for forming the tabs by a plurality of successive operations and including an upper progressive tab die shoe, and

a prestaking die section for joining the tabs with the ends and including an upper prestaking die shoe separate from said upper progressive tab die shoe, said progressive tab die section being removable from said work station and separable from said

prestaking die section without substantially disturbing the alignment of said prestaking die section in said work station.

2. The improved press apparatus of claim 1 wherein said progressive tab die section includes a lower progressive tab die shoe and said prestaking die section includes a lower prestaking die shoe.

3. The improved press apparatus of claim 2 further comprising locating pins which interconnect said prestaking die section and said progressive tab die section by insertion of said locating pins through aligned apertures in each said lower die shoe.

4. The improved press apparatus of claim 3 wherein said upper die shoes have contoured surfaces forming a mating interface.

5. The press apparatus for forming container closures including joining closure ends with closure tabs blanked from a continuous strip, said apparatus comprising:

a ram,
a bolster,

means for conveying said closure ends along a path between said ram and said bolster, and

a plurality of stations positioned along said path for forming a plurality of successive operations on said closure ends on successive the prestaking of said ram, one of said stations including a combination die assembly having two separable mating sections including a progressive tab die section for forming tabs in a continuous strip by a plurality of successive operations and including an upper die shoe removably secured to said ram and a prestaking die section for blanking the tabs from the continuous strip and joining the tabs with the respective ends and including an upper die shoe removably secured to said ram, said progressive tab die section being separable from said prestaking die section and removable from said work station without substantially disturbing the prestaking die section alignment in said work station.

6. The press apparatus of claim 5 wherein said path for conveying said closure ends through said plurality of stations is substantially arcuate.

7. The press apparatus of claim 6 wherein said prestaking die section and said progressive tab die section include lower die shoes respectively removably secured to said bolster.

8. The press apparatus of claim 7 wherein said combination die assembly includes locating pins which interconnect said lower die shoes by insertion of said locating pins through aligned apertures in said lower die shoes.

9. The improved press apparatus of claim 8 wherein said upper die shoes have contoured surfaces forming a mating interface.

10. The press apparatus of claim 6 including a scrap chopper aligned with said prestaking die section for receiving a blanked-out portion of said continuous strip and chopping said blanked-out portion into small readily disposable scrap.

11. The press apparatus of claim 10 wherein said scrap chopper includes lower chopper means fixedly mounted on said bolster, upper chopper means movably mounted on said bolster, and hammer means mounted on said ram, said hammer means striking said

upper chopper means with each stroke of the ram to thereby force said upper chopper means to descend and close with said lower chopper means so as to sever said blanked-out portion of said continuous strip.

12. The press apparatus of claim 11 wherein said scrap chopper includes spring-biased guide means connecting said upper chopper means with said lower chopper means, said spring-biased guide means forcing said upper chopper means to separate from said lower chopper means as the ram ascends.

13. The press apparatus of claim 12 wherein said upper chopper means includes an upper chopper blade and said lower chopper means includes a lower chopper blade, said upper chopper blade and said lower chopper blade being offset to permit overlapping therebetween as the upper chopper means descends.

14. The press apparatus of claim 13 further comprising a scrap chute interposed between said prestaking die section and said scrap chopper, said scrap chute including a feed channel for guiding said blanked-out portion of said continuous strip.

15. The press apparatus of claim 14 wherein said combination die assembly comprises a substantially uniplanar feed channel for guiding the continuous strip through said progressive tab die section and said prestaking die section, said feed channel being substantially coplanar with said feed channel of said scrap chute and the upper surface of said lower chopper blade.

16. A press apparatus for forming container closures including joining closure ends with closure tabs blanked out of a continuous strip, said apparatus comprising:

a ram,
a bolster,

means for conveying said closure ends along a circular path between said ram and said bolster,

a plurality of stations positioned along said path for performing a plurality of successive operations on said closure ends on successive strokes of said ram, one of said stations including a combination die assembly having a progressive tab die section for forming tabs in the continuous strip by a plurality of successive operations and a prestaking die section for blanking out the tabs from said continuous strip and joining the tabs with the respective ends, said prestaking die section and said progressive tab die section including upper mutually separable die assemblies detachably mounted on said ram and lower mutually separable die assemblies detachably mounted on said bolster so as to permit removal of said progressive tab die section from said one station without substantially disturbing the position of said prestaking die section in said one station, said combination die assembly having a substantially uniplanar feed channel extending therethrough,

a scrap chopper aligned with said uniplanar feed channel to receive a blanked-out portion of a continuous strip, said scrap chopper including chopper means for severing said blanked-out portion in a plane substantially coplanar with said feed channel, and

a scrap chute means interposed between said feed channel and said scrap chopper and extending

across said circular path, said scrap chute means including a feed channel substantially coplanar with said feed channel of said combination die assembly.

17. The press apparatus of claim 16 wherein said scrap chopper includes lower chopper means fixedly mounted on said bolster, upper chopper means movably mounted on said bolster, and hammer means mounted on said ram, said hammer means striking said upper chopper means with successive strokes of the ram to thereby force said upper chopper means to descend and close with said lower chopper means so as to sever said blanked-out portion of said continuous strip into small disposable scrap.

18. The improved press apparatus of claim 5 including means for interconnecting said prestaking tab die section and said progressive tab die section.

19. The improved press apparatus of claim 18 wherein said interconnecting means comprises locating pins inserted through aligned apertures in said progressive tab die section and said prestaking die section.

20. The improved press apparatus of claim 5 wherein said progressive tab die section includes a series of punches and a punch retainer supported by and spaced from said ram by said upper die shoe of said progressive tab die section.

21. The improved press apparatus of claim 20 wherein prestaking die section includes a prestaking die and a die retainer secured to and spaced from said ram by said upper die shoe of said prestaking die section.

22. The improved press apparatus of claim 21 wherein said progressive tab die section includes guide posts extending between said upper die shoe and said lower die assembly of said progressive tab die.

23. The press apparatus for forming container closures having closure tabs secured to closure ends including a plurality of work stations for performing a plurality of sequential operations on a container closure, the improvement residing in the work station which joins the tabs to the ends, said work station comprising a die assembly including:

a progressive tab die section for forming the tabs by a plurality of successive operations,

a prestaking die section for joining the tabs with the ends, said prestaking section being separable from said progressive die section, and

locating pins for interconnecting said progressive tab die section and said prestaking section by insertion through mutually aligned apertures of each said section.

24. The improved press apparatus of claim 23 wherein said progressive tab die section and said prestaking section which include an upper die assembly and a lower die assembly.

25. The improved press apparatus of claim 24 wherein each said lower die assembly includes a lower die shoe, said apertures being located in each said lower die shoe.

26. The improved press apparatus of claim 24 wherein each said upper die assembly includes an upper die shoe, said upper die shoes having contoured surfaces forming a mating interface between said progressive tab die section and said prestaking section.

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