

Feb. 28, 1928.

1,660,411

A. BODOR

APPARATUS FOR MAKING PAPER BOTTLES

Original Filed June 5, 1924 6 Sheets-Sheet 1

Fig. 1

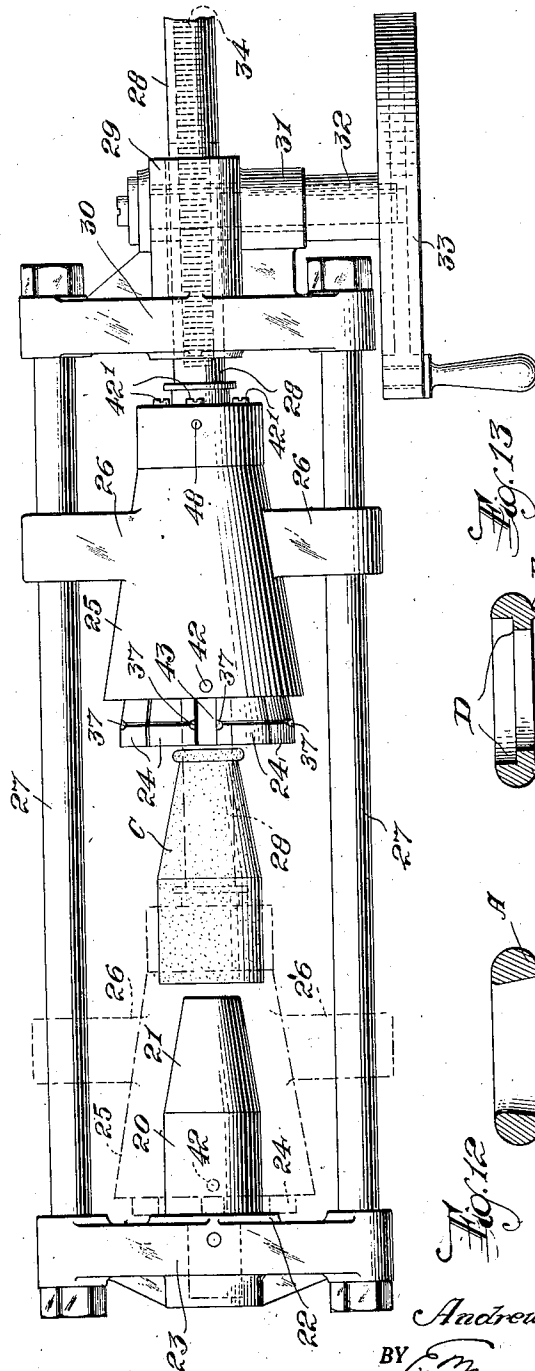


Fig. 13

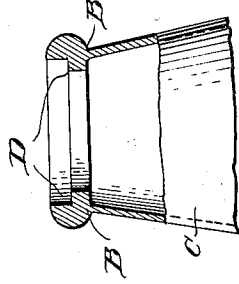
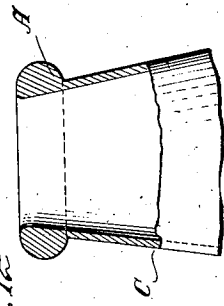


Fig. 12



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Fig. 2

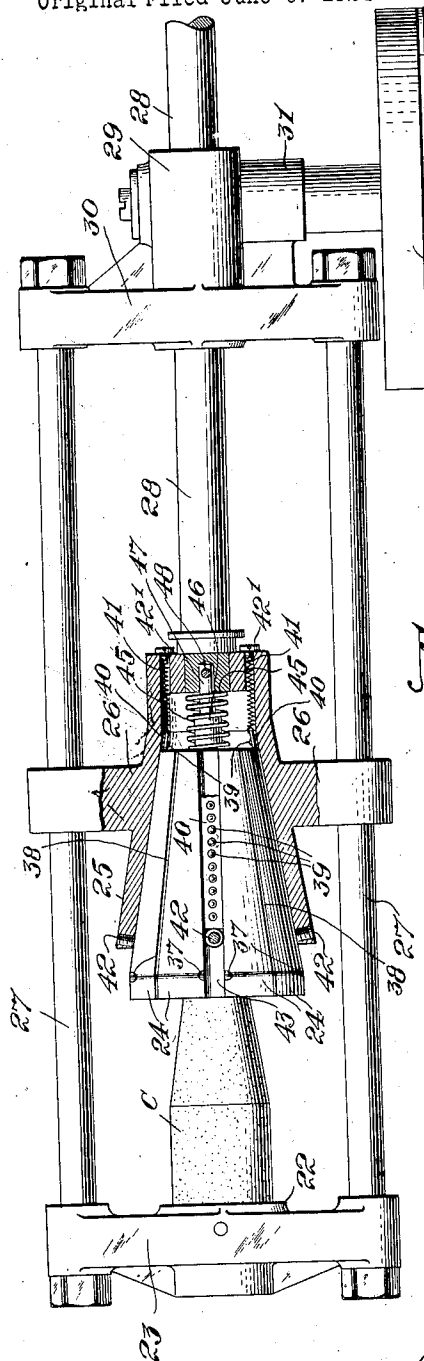
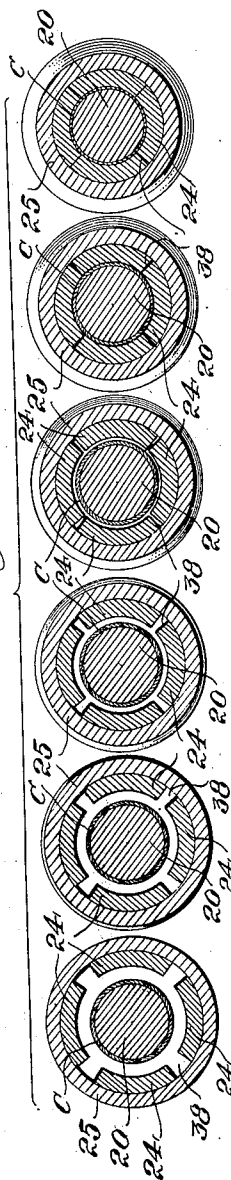


Fig. 6



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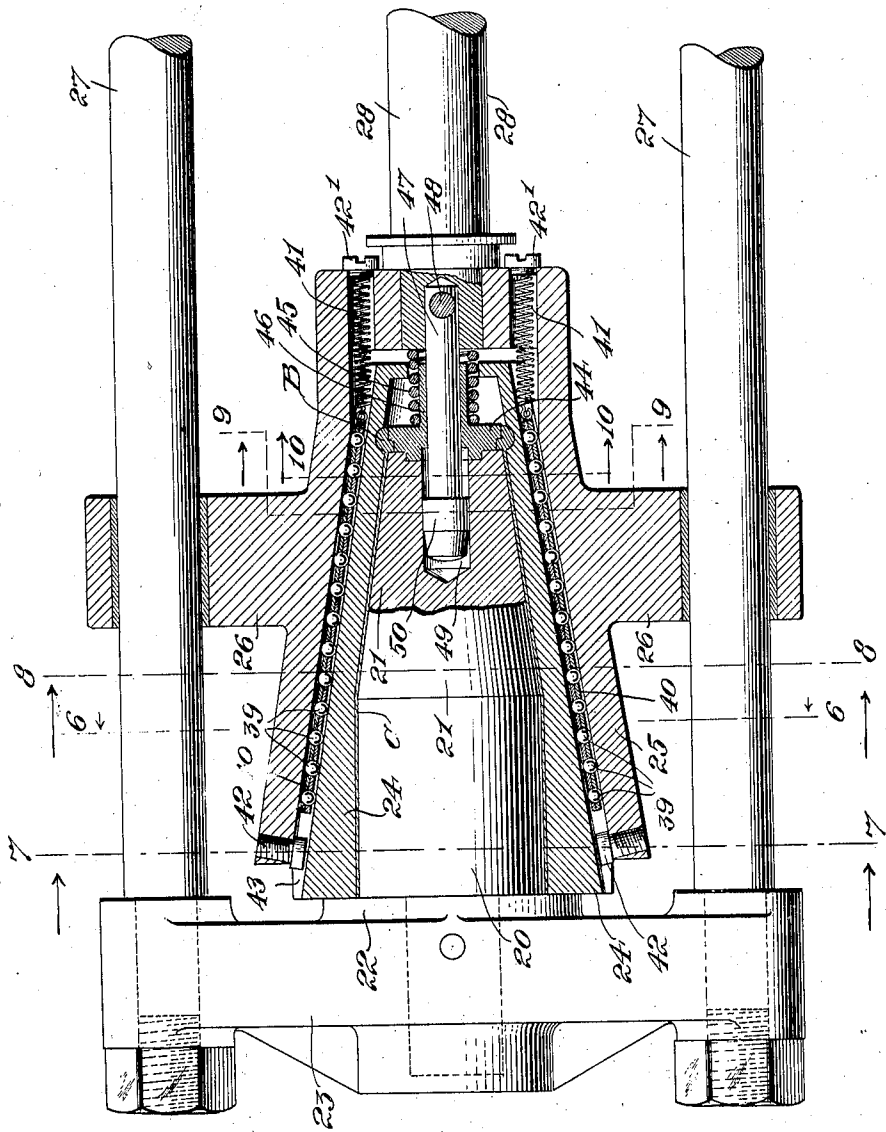


Fig. 3

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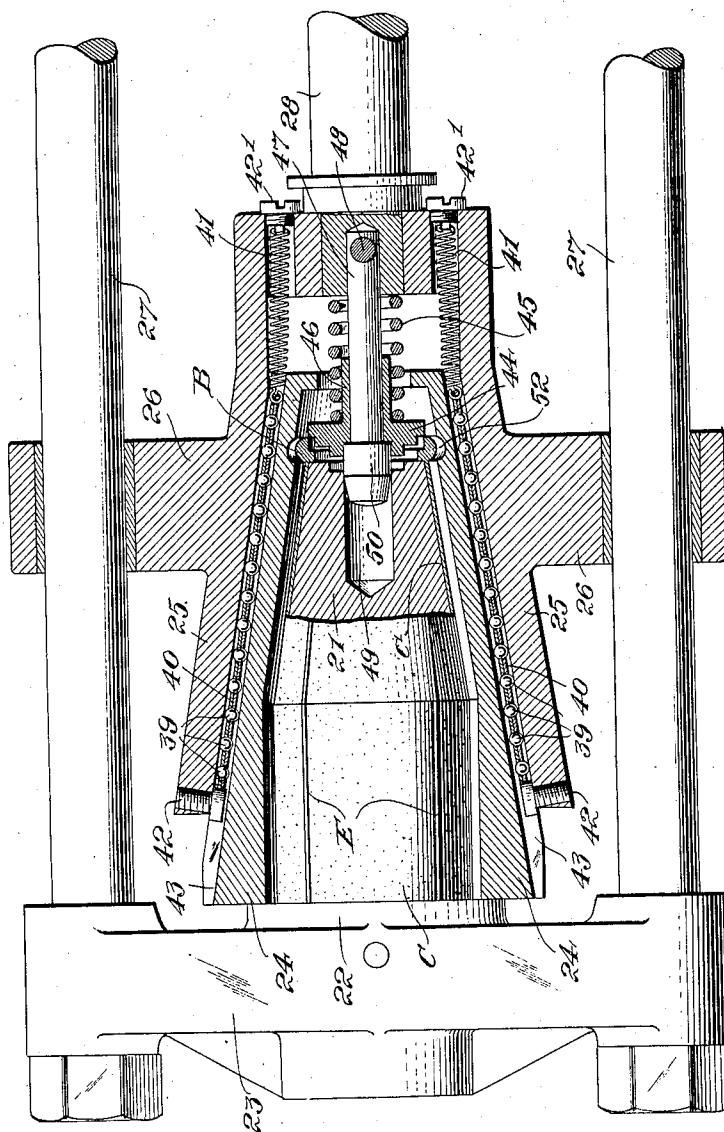


Fig. 4

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APPARATUS FOR MAKING PAPER BOTTLES

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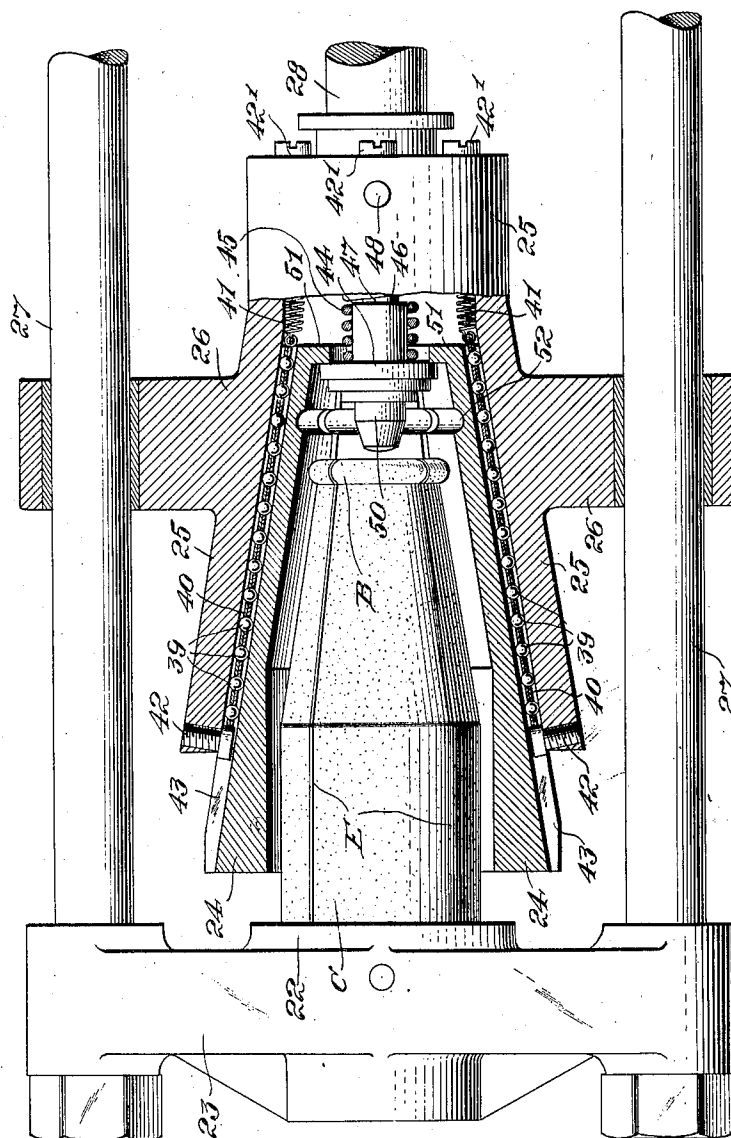


Fig. 5

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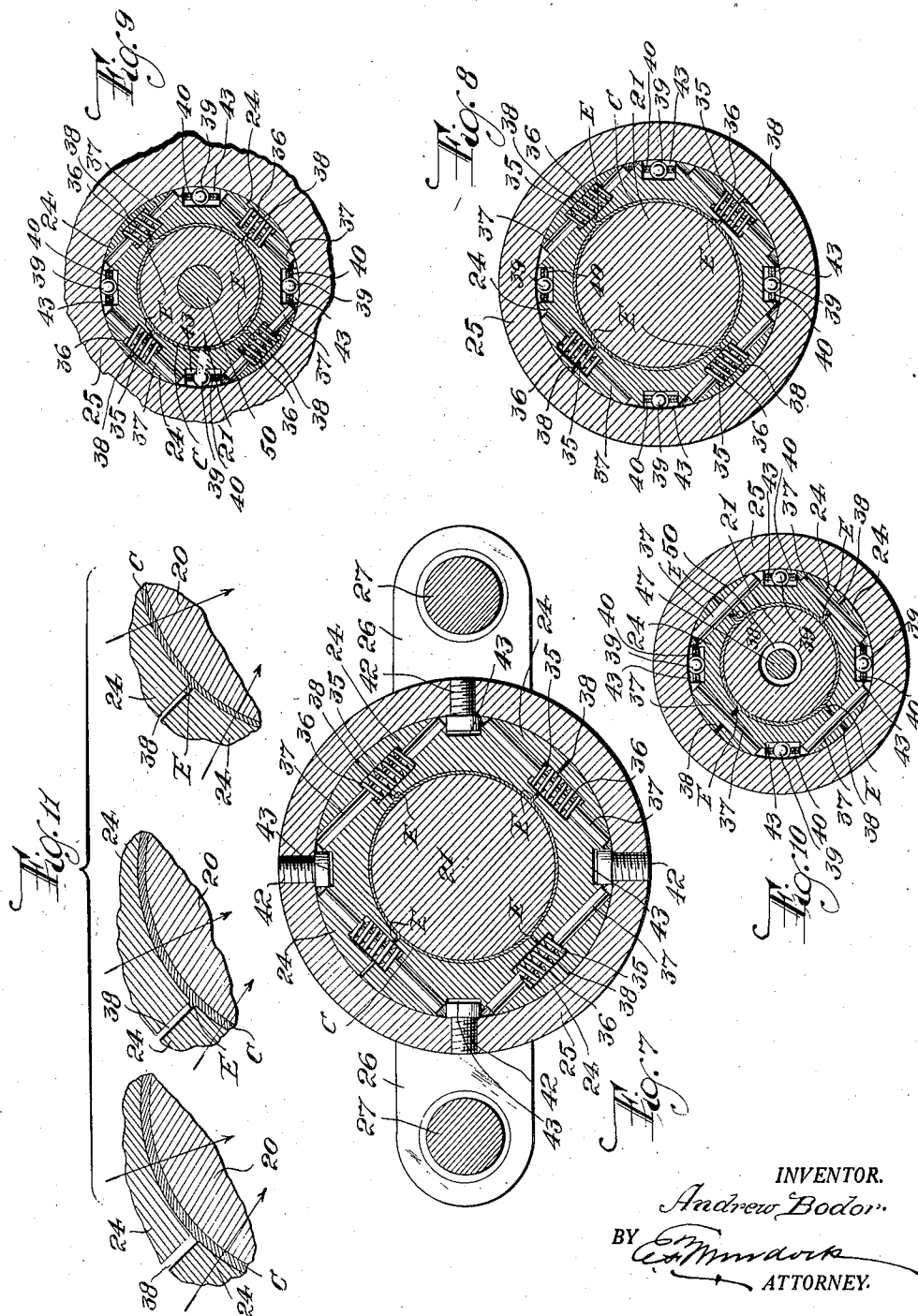
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APPARATUS FOR MAKING PAPER BOTTLES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING PAPER BOTTLES.

Application filed June 5, 1924, Serial No. 717,924. Renewed July 21, 1927.

Among the principal objects which the present invention has in view are: to solidify the body and structural features thereof, of a liquid container; to compress in rigid shape, a liquid container constructed from fibrous material; to provide a press of the character mentioned with means for laterally contracting and expanding the compression elements thereof at the end of, and beginning of the compressive period and releasing period of the operation of the apparatus; to shape and solidify the reinforcing element with which the container is provided; to provide a series of reinforcing elements for strengthening the receptacle in service; to provide an apparatus, the operations of which may be rapidly repeated; and to provide a simplified and durable construction for accomplishing the above stated purposes.

Drawings.

Figure 1 is a top plan view of an apparatus constructed and arranged in accordance with the present invention, showing the elements in their separated relation and the completed product formed thereby suspended between said elements.

Figure 2 is a similar view showing the elements in partially closed relation, and the product as disposed prior to completion, a portion of the figure being sectioned to disclose the interior construction.

Figure 3 is a fragmentary view on enlarged scale showing the machine elements in their fully closed relation with the completed product therebetween, the elements being partially cut away and sectioned to show the interior construction.

Figure 4 is a similar view showing the elements partially separated as at the beginning of the retractive movement of the press.

Figure 5 is a similar view showing the elements in their fully separated relation at a further step in the recession of the press.

Figure 6 is a series of sections, each series of sections progressively arranged from left to right to illustrate the closing action of the separable die plates incident to the movement of the die socket.

Figure 7 is a cross section of the apparatus taken on the line 7—7 in Figure 3.

Figure 8 is a cross section taken on the line 8—8 in Figure 3.

Figure 9 is a cross section taken on the line 9—9 in Figure 3.

Figure 10 is a section taken on the line 10—10 in Figure 3.

Figure 11 is a schematic view showing in detail and in section, fragments of the separable die, the shaping mandrel, and fragments of the product of the operation of the apparatus therebetween, the purpose being to show progressively the compression of the wall of the product, and the formation of vertical ribs thereon.

Figure 12 is a fragmentary view of the neck end of the container partly in section showing the condition of the lip portion of the bottle as delivered for operation by the present apparatus.

Figure 13 is a similar view showing in section the formation of the delivery end at the completion of the operation of the present apparatus.

Description.

The herein disclosed apparatus is designed chiefly to operate in conjunction with two other apparatuses, the combined results of the operation of which, is the production of a paper bottle or container constructed from laminations of sheet paper or similar material.

In the complete operation, the present apparatus performs what may be termed the second major operation, which in brief consists in molding and setting the body of the bottle after it has been partially completed by an apparatus disclosed in an application for Letters Patent filed the 31st day of May, 1924, Serial No. 716,968, for improvements in apparatus for making liquid containers from fibrous materials, to which application cross reference is here made.

The body of the container above referred to is open-ended and is provided at the one end with an annular thickened portion A, adapted to be formed into a lip or molded mouth edge B for the container as best seen in Figures 1, 2 and 3, respectively, of the drawings. The body portion of the product thus delivered by the former apparatus is wrapped and cemented relatively loosely. It is a part of the function of the present apparatus to compress the said body portion into a more solid construction, and prefer-

ably one having reinforcing members extended from the side and disposed lengthwise thereof.

Referring to the drawings the open-ended tubular body shown in Figure 1 of the drawings and there indicated by the letter C, is placed over and adjusted upon a stationary mandrel having a cylindrical portion 20 and a frusto-conical portion 21. When so adjusted, it will be found the lower edge of the body C rests upon the trued surface of an annular boss 22. The boss 22 is integral with the bed plate 23 upon which the templet is supported.

The adjustment of the body C above referred to is manually accomplished in the major part by hand. When so adjusted, a mold having contracting die members 24 is moved down over to rest upon the said body. To this end, the mold has an inwardly tapered shell 25 which is provided with pierced laterally extended guide arms 26, the passages formed therein, engaging the heavy tie rods 27 over which the said guiding arms move whenever the contracting die sections 24 are to be disposed over the container body and the mandrel on which the same is mounted.

The shell 25 and parts contained therein are further guided in their action by the plunger 28 which is mounted in the bearing formed in the boss 29. The boss 29 is set out from the cross head 30 and is integral therewith as is also a boss 31 through which extends a shaft 32 carrying a weighted fly wheel 33, and a small gear toothed pinion wheel, the teeth of which engage rack teeth formed on the underside of the plunger 28.

While I have herein disclosed the mechanism for applying power on the body C as manually operated, it will be understood that I may substitute therefor any known and suitable power-driven mechanism.

As best seen in Figures 2 to 4 inclusive, the die members 24 are normally extended beyond the shell 25 and separated from one another as indicated in Figure 6 of the drawings and at the left of the series of diagrams shown therein. The spaced relation of the die members is normally maintained by springs 35. The springs 35 are located in recesses 36 formed at intervals in the meeting edges of the die members. A series of guide pins 37 avoid any relative displacement of the members when the gaps 38 are opened. It will be understood that the relative movement of the die members, each to the other, is perpendicular to the edges of the die members and of the gaps 38 formed therebetween.

In the operation of the apparatus it will be understood that the die members 24 do not begin to contract until the extremities of said die members contact with and rest upon the surface of the annular boss 22.

It has been thought expedient to show in the drawings, as in Figure 3, the completely closed position of the apparatus and the finished product of the press as held therein. This is the position where the shell 25 has been forced to the limit of its outward power stroke. From this point the shell is retracted until in the position shown in Figure 1 of the drawings, where the clearance between the die members 24 and the mandrel end 21 is sufficient to remove the tubular body C. When closing over the die sections 24 the friction is reduced by the friction bearing balls 39, of which there are a number of series, the members of each series being held by a strap 40 in the nature of the usual race provided in ball bearings for shafts. Each strap 40 is normally held suspended by and from spiral springs 41 that are anchored to screws 42.

The straps 40 and the balls 39 mounted therein are housed in grooves 43. The grooves 43 engage the screws 42 to guide the said sections, the screws 42 being permanently mounted in the shell 25, as seen best in Figures 3 and 4 of the drawings.

It is obvious that as the tapered shell 25 is lifted from the die members 24, said members are expanded radially by the springs 35.

In Figure 3 of the drawings, the die members 24 and parts associated therewith are shown in their completely contracted position. Also the shaping die head 44 is in place with the edge B of the container forced thereagainst.

In this position it will be noted, a spring 45 is fully compressed. The spring is compressed around the neck 46 of the head 44. The head 44 and neck 46 are perforated to receive the small plunger 47 which is permanently secured to the plunger 28 to which it is securely pinned when assembled by the pin 48 which also holds the plunger 28 to the shell 25. The outward extremity of the plunger 47 is reciprocatively mounted in a socket 49.

A head 50 with which the plunger 47 is provided is shouldered to engage the head 44 when the plunger 47 is drawn outward from the socket 49 in the mandrel, whereby the head 44 is lifted or withdrawn from engagement with the edge B of the container body subsequent to the expansion of the die members 24 which have been permitted to expand by the withdrawal of the shell 25, prior to the engagement of the head 44 by the head 50.

In Figure 4 of the drawings the parts are shown in the position where the head 50 has engaged the head 44 and has withdrawn the same from engagement with the edge B. In this position it will be observed, the spring 45 is fully expanded.

It will also be observed by reference to Figure 4, that the die members 24 have ex-

panded away from the body C and from the edge B thereof.

In Figure 5 of the drawings, the die head 44 is shown as engaging the flanges 51 of the members 24 so as thereafter to move the said die members with the shell 25 when the same is retracted by the operation of the power mechanism on the plunger 28 to the position shown in Figure 1 of the drawings, leaving the tubular body C on the mandrel as shown in Figures 2, 4 and 5 of the drawings. From this position, the body C is removed manually to the position shown in Figure 1, whence it is delivered as the finished product of this apparatus.

In the operation of the apparatus herein disclosed, the shell 25 and die members 24 mounted therein and extended therefrom, as in the position seen in Figure 5, is moved over the tubular body C, which has been manually disposed on the mandrel and the sections 20 and 21 thereof. As described, the members 24 are not contracted until they are arrested by engagement with the boss 22. At this moment, the die head 44 and parts associated therewith are in the position shown in Figure 4 of the drawings.

As the movement of the shell 25 continues from this stage of the operation, the spring 45 operates to seat the head 44 upon the mandrel prior to the engagement of the edge B of the container by the annular grooved sections 52 in the die sections 24. During the remainder of the travel of the shell 25, the die head 44 remains inert while the die members 24 compress the edge B upon the edge of the said die member with the result that the rounded outer form of the edge B and the square shouldered seat D is shaped by the die head 44, and the grooves 52. It is during this portion of the movement of the shell 25 that the spring 45 yields maintaining a pressure on the die head 44 to maintain the seat thereof.

It will be noted that during the period when the shell 25 is moving relatively over the die members 24, that the balls 39 receive the direct pressure and rolling between the said shell and die members reduces or avoids any "skin friction" therebetween.

The slight travel of the balls 39 and the straps 40 in which they are mounted incident to the rolling of the said balls is compensated for or allowed by the springs 41.

When the shell 25 is retracted, the springs 41 take up or withdraw the said straps and balls to restore the same to their original or initial operating position.

The body C when placed on the mandrel prior to being treated by the present apparatus is relatively soft, and the outer surface is unbrokenly cylindrical. After the completion of treatment by this apparatus, a series of outwardly extended slightly raised ribs E are formed on the body C. The ribs

E are the result of the contraction annularly of the die members 24.

In Figure 11, there is shown schematically, fragments of the mandrel and the cylindrical portion 20 thereof, and in connection with the fragments of the mandrel are shown fragments of the die members 24, at different stages of their compression from what might be termed the initial to the final step. At the left of the said Figure 11, the view shows the die members as contacting under slight pressure with the body C. The view at the middle of the said figure, discloses the further contraction of the die members 24, and the beginning of the formation of the ribs E, also the first step in partially condensing the body C. At the right of Figure 11, the sections 24 are shown in their fully contracted position, the body C having been compressed or condensed and the ribs E fully developed.

It will be noted that the rib E has also been compressed or condensed so that when the die members 24 expand, it will be found that the body C has been hardened or rendered more rigid and that the ribs E constitute a reinforcing element thereon, at the quarter sections thereof, as will be seen by reference to Figures 7 to 10 inclusive where the body C and the ribs E are shown at different portions of the mandrel and die sections, the same being illustrated as under extreme compression.

The movement of the die members 24 in relation to the body C is illustrated in the serial views shown in Figure 6 of the drawings. It will be understood that the section plane of the cylindrical portion 20 of the mandrel and of the die members 24 is that taken on the line 6-6 in Figure 3 of the drawings, while the sections of the shell 25 are on progressive planes. In this figure it is clearly illustrated that the members 24 are closed upon the body C, and the mandrel supporting the same, as well as the manner in which the gaps 38 between the said members are progressively closed toward each other, in a manner as above set forth.

I claim:

1. An apparatus as characterized comprising a mandrel shaped in correspondence with the inside of a bottle; a die embodying a plurality of separable members resiliently united; an inwardly tapered shell conforming in shape to the exterior of said die members; and power means for forcing said shell over said die members to close the same upon each other.

2. An apparatus as characterized comprising a mandrel shaped in correspondence with the inside of a bottle; a die embodying a plurality of separable members resiliently united; an inwardly tapered shell conforming in shape to the exterior of said die members; power means for forcing said shell over

said die members to close the same upon each other; and a plurality of friction reducing devices interposed between said shell and die members for reducing the friction therebetween.

3. An apparatus as characterized comprising a mandrel shaped in correspondence with the inside of a bottle; a die embodying a plurality of separable members resiliently united; an inwardly tapered shell conforming in shape to the exterior of said die members; power means for forcing said shell over said die members to close the same upon each other; a plurality of rolled members operatively disposed between said shell and die members, said rolled members being co-operatively disposed for reducing the friction between said die members and said shell; and resilient means for moving said rolled members to the initial position thereof

when said shell is withdrawn from contactual relation to said die members.

4. An apparatus as characterized comprising a mandrel shaped in conformity to the interior of the product being manufactured by a die head cooperatively disposed with reference to said mandrel, said head being externally shaped in correspondence with the interior of the delivery end of said product; a compressible die embodying a plurality of resiliently connected members shaped in conformity with the exterior of said product when drawn together; an inwardly tapered shell encompassing said die members for moving the same toward one another, said shell supporting said head, die member, and expansible die members; and a resilient connection for said die members and said shell.

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