April 27, 1948. B. BOGOSLOWSKY 2,440,391

APPARATUS FOR SHAPING TUBULAR BLANKS

Filed Dec. 8, 1944 2 Sheets-Sheet 1

Fig. 1.

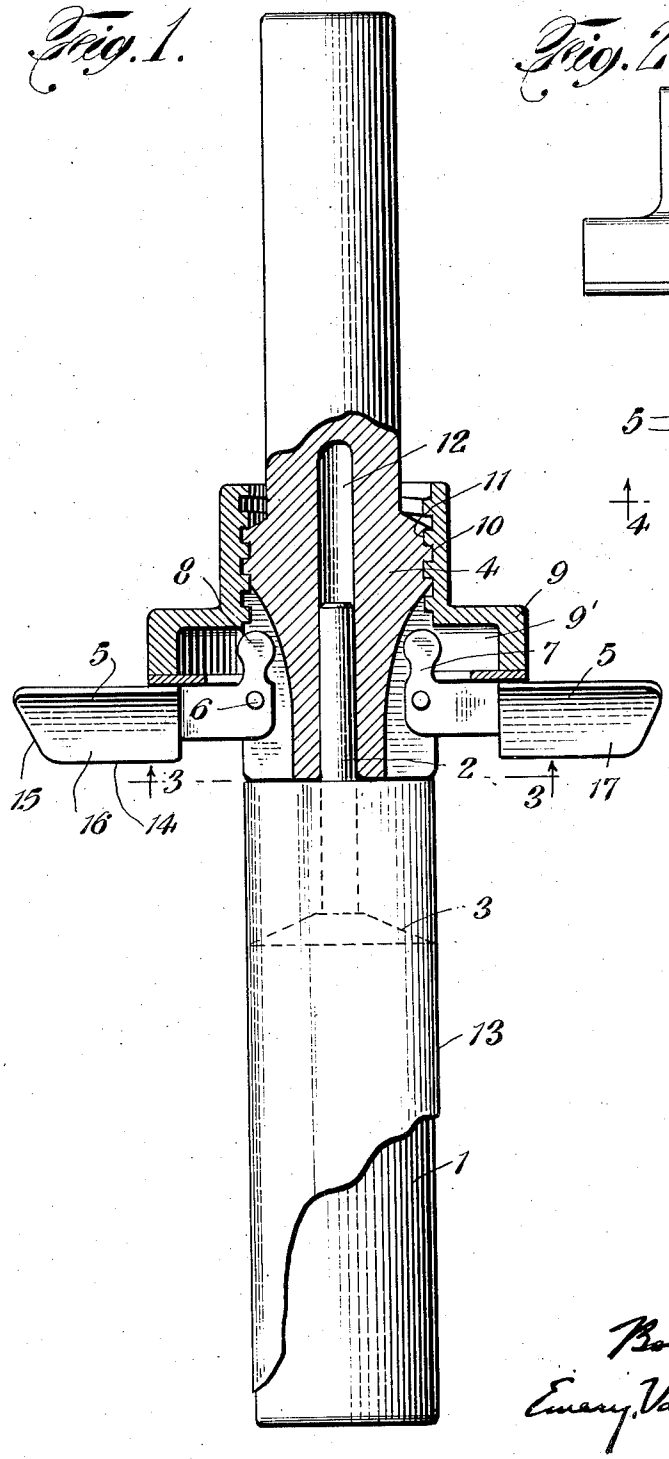
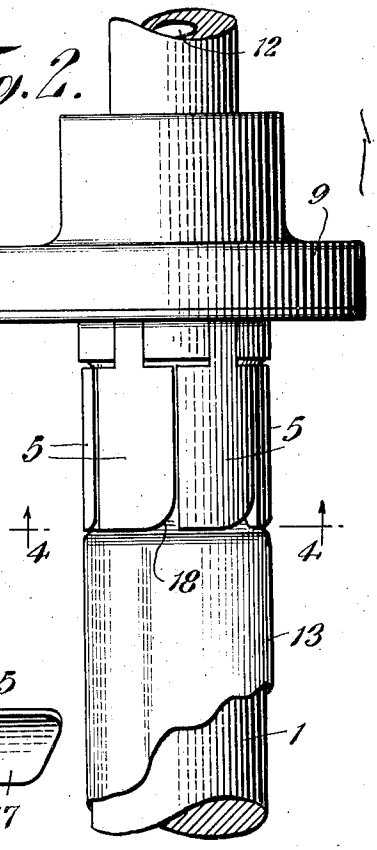


Fig. 2.



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Fig. 3.

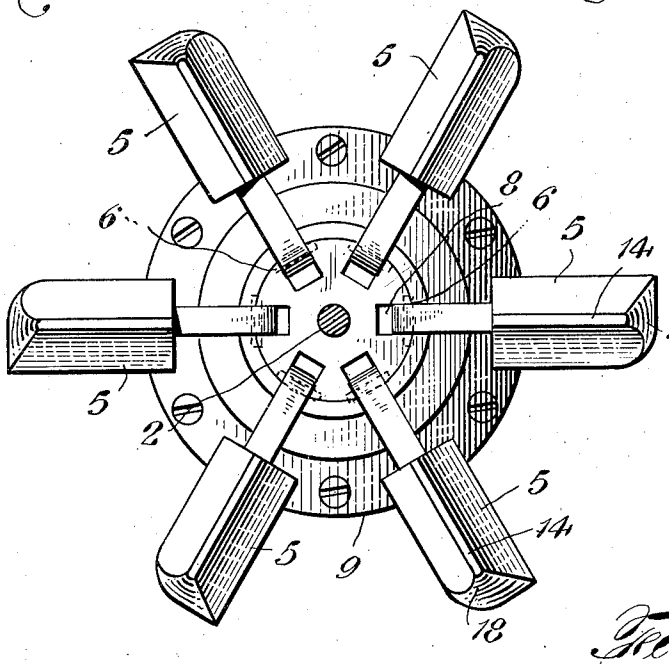


Fig. 5.

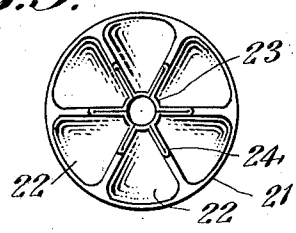


Fig. 6.

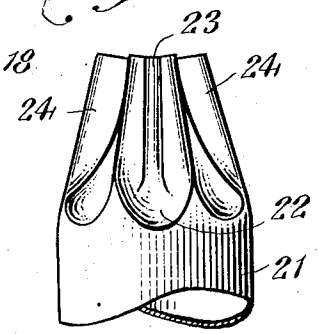


Fig. 7.

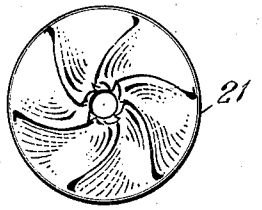


Fig. 4.

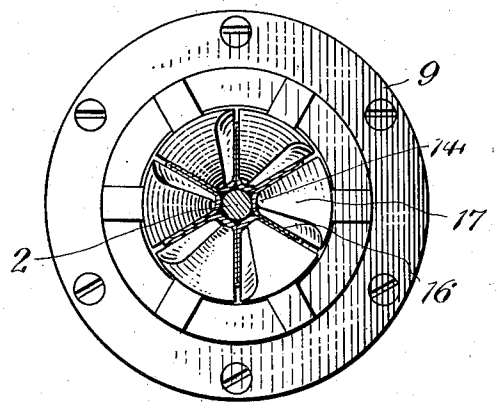
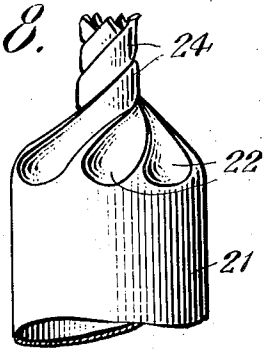


Fig. 8.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR SHAPING TUBULAR BLANKS

Boris Bogoslowsky, Jackson Heights, N. Y.

Application December 8, 1944, Serial No. 567,267

2 Claims. (Cl. 93—36.8)

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This invention relates to apparatus for shaping tubular blanks. Such tubular blanks, so shaped, may then be subjected to additional operations to form tubular containers of various types.

For example, in my copending application Serial No. 550,238, filed August 19, 1944 (now Patent No. 2,411,244), I have described methods and apparatus for making collapsible tubes in which I first shape a tubular blank to provide an embryo collapsible tube having a shoulder and elongated tubular neck consisting of folded material, and I then subject the neck and shoulder to pressure to form a completed collapsible tube.

It is an object of the present invention to provide an improved apparatus for shaping a tubular blank to provide an embryo tube also having a shoulder and elongated tubular neck consisting of folded material, which said embryo tube may then be subjected to pressure as before to form a completed collapsible tube.

It is a further object of the present invention to provide an improved apparatus for shaping a tubular blank to provide an embryo tubular article which may then be subjected to additional operations to form tubular containers of various types.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which,

Figure 1 is a front elevation of the apparatus, partly in section, the fingers being shown in open position.

Figure 2 is a similar view showing the fingers in closed position.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 2.

Figures 5 and 6 are top plan and front elevation views, respectively, of the end of the tubular blank as folded in the first stage of the method described.

Figures 7 and 8 are similar views showing the embryo tube after completion of the second stage of the method described.

As materials for use in the manufacture of embryo tubular articles according to my invention, I may use many of the plastic films or sheets now available in the commercial market, as for example, the various cellulose base films such as the commercial product "Cellophane," or resin base films such as the commercial product "Vinylite," or rubber base films such as the commercial product "Pliofilm." Or I may use paper, metal foil or other sheet materials for some purposes. The selection of a suitable material will depend entirely on the nature of the contents to be packaged in the container formed therefrom, but for most purposes I prefer to use material which is thermoplastic or heat sealing for reasons which will be apparent hereinafter. If paper, metal foil or other sheet materials which are not thermoplastic or heat sealing are used, such materials should preferably be coated or laminated with thermoplastic or heat sealing materials. For example, I have found that aluminum foil, coated on both sides with "Vinylite" (vinyl ester resin) is admirably suited to use in the manufacture of embryo collapsible tubes in accordance with the invention hereinafter described.

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In practicing the invention hereinafter described I prefer to start with the sheet or film material in the form of cylindrical tubular blanks cut to the desired length. It is possible to obtain some of the above-named plastic films or sheets in the form of seamless tubing, and I may employ such tubing in carrying out my invention. However, it is cheaper and for most purposes more satisfactory to form cylindrical tubular blanks from flat sheet or strip material, either by convolute winding or by spiral winding, and sealing the windings in any suitable manner, as by application of heat and pressure in the case of thermoplastic or heat sealing materials. Such tubular blanks may consist of one or more plies, depending on the nature of the material. The formation of such tubular blanks forms no part of the present invention.

According to the present invention I first fold spaced portions of one end of such a tubular blank inwardly toward a central spindle and at the same time I fold the portions of said tubular blank lying between said inwardly folded portions to form a plurality of spaced pleats projecting outwardly from said spindle. Then I fold said spaced plates around said central spindle while holding the unfolded body portion of the tubular blank stationary so as to wrap said pleats around said spindle. As a result, the lower parts of the inwardly folded portions extend inwardly from the tubular body to the central spindle to form a shoulder wall of the tube, and the upper parts of the inwardly folded portions extend upwardly from the shoulder along the spindle to form a neck wall of the tube. Then when the pleats are folded around the spindle, the lower parts of the pleats reinforce and stiffen the shoulder wall and the upper parts of said pleats which are wrapped around said spindle reinforce and thicken the neck wall.

In the preferred embodiment of the invention illustrated in the drawings, I have shown apparatus in which the successive steps of folding inwardly and forming the pleats and then folding the pleats around the spindle may be performed by proper successive manipulations of the apparatus. Thus, referring to the drawings the apparatus comprises a mandrel 1 having a spindle 2 of lesser diameter projecting from one end thereof. The mandrel is provided with a frusto-conical shoulder 3 extending inwardly from the cylindrical wall of the mandrel to the spindle.

A head 4 is located above the mandrel, which said head carries a plurality of fingers 5, six of such fingers being illustrated herein. In the embodiment illustrated, said fingers are pivotally mounted on head 4 at 6, and each finger is provided with a lever arm 7 having a head 8 which extends into an annular groove 9' in the ring 9. As a means of operating the fingers in unison, the ring is provided with internal threads 10 which engage the threads 11 of the head, so that by rotating the ring with respect to the head, the fingers may be moved radially inwardly or outwardly as hereinafter described. If desired, the head 4 may be provided with a longitudinal passage 12 adapted to receive the spindle so as to center the spindle and mandrel with respect to the fingers.

In using the apparatus for the purpose described, a tubular blank 13 of the selected material is placed on the mandrel with an end portion thereof extending beyond the shoulder of the mandrel as shown in Figure 1, so that the main portion of the blank is internally supported by the mandrel, while the said end portion is unsupported. The position of the tubular blank is adjusted on the mandrel to provide a sufficient length of unsupported material to form a neck of any desired length in the embyro tube to be formed.

The tubular blank may be held on the mandrel by any desired means, and after being placed thereon, the mandrel and blank are centered on the head, as by inserting the spindle in the passage 12, the fingers 5 being open at this time, of course. After the mandrel is properly centered, the fingers are moved radially inwardly to closed position, as shown in Figure 2, by rotating the ring 9 on the head 4.

The fingers are so shaped that as they close, they fold the unsupported portion of the tubular blank in the desired manner. For this purpose, each of the fingers is provided with surfaces adapted to engage spaced portions of the tubular blank to fold the same inwardly as the fingers are closed. Thus, each finger has an inner surface 14 and a bottom surface 15, the surface 14 folding the material inwardly toward the spindle 2 and the surface 15 folding the material inwardly toward the shoulder 3. Preferably the surface 14 is concavely shaped to conform with the spindle, and the surface 15 is beveled to conform with the shoulder 3. Furthermore, each finger is provided with flat side surfaces 16 and 17 which cooperate with the opposed surfaces of the adjacent fingers on each side to fold the spaced pleats which project outwardly from the spindle. Thus the surface 16 of each finger cooperates with the opposed surface 17 of the next adjacent finger for this purpose, said surfaces being spaced a sufficient distance to accommodate the pleats therebetween.

After the tubular blank has thus been initially folded, the pleats which have been formed are folded around the spindle. With the apparatus described, this may be accomplished by holding the body portion of the tube stationary on the mandrel while producing relative rotation between the mandrel and the head. Such relative rotation causes the pleats to be withdrawn from the spaces between the fingers and wrapped around the spindle. If desired, the lower corner of each of the fingers may be rounded off as shown at 18 to cause the lower parts of the pleats to slide more easily as rotation takes place, and reducing the tendency to tear the material.

In some cases it may be desirable to relax (open) the fingers very slightly before producing such rotation in order to prevent tearing of the material, but with materials of relatively high tensile strength or with smooth surfaced materials such relaxation may not be required. In the event that the fingers are so relaxed, they may be closed again after the pleats have been withdrawn from the spaces between the fingers so that the folded material may be wrapped more tightly around the spindle.

Figures 5 and 6 show the condition of the tubular blank after the initial folding operation, showing the tubular body 21, the inwardly folded portions forming the shoulder wall 22 and the neck wall 23, and the spaced pleats 24. Figures 7 and 8 show the embryo tubular article after the pleats have been folded around the spindle. The embryo tubular article as shown in Figures 7 and 8 may then be subjected to additional operations to form a collapsible tube as described in my copending application above referred to, or it may be subjected to other operations to form tubular containers of various types.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. Apparatus for making an embryo tubular article having a tubular body portion and a shoulder and tubular neck integral with said tubular body, comprising, a head, a plurality of fingers mounted on said head and spaced at intervals around a center, and means for moving said fingers radially inwardly toward said center, each of said fingers having surfaces which engage spaced portions of one end of a tubular blank to fold the same inwardly, and each of said fingers having radially disposed surfaces opposed to but spaced from similar radially disposed surfaces of the next adjacent finger on each side, which said radially disposed surfaces serve to fold the portions of said tubular blank lying between said inwardly folded portions to form outwardly projecting pleats.

2. Apparatus for making an embryo tubular article having a tubular body portion and a shoulder and tubular neck integral with said tubular body, comprising, a mandrel adapted to internally support a portion of a tubular blank, a spindle projecting from one end of said mandrel, a head, a plurality of fingers mounted on said head and spaced at intervals around said spindle, and means for moving said fingers radially inwardly toward said spindle, each of said fingers having surfaces which engage spaced portions of one end of a tubular blank carried on said mandrel to fold the same inwardly toward said spindle, and each of said fingers having radially disposed surfaces opposed to but spaced from similar radially disposed surfaces of the

next adjacent finger on each side, which said radially disposed surfaces serve to fold the portions of said tubular blank lying between said inwardly folded portions to form pleats projecting outwardly from said spindle.

BORIS BOGOSLOWSKY.

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