Dec. 7, 1948. M. THEIL ET AL 2,455,828

METHOD FOR PRODUCTION OF WASHING MACHINE TUBS

Filed Feb. 3, 1944 3 Sheets-Sheet 1

Fig. 1

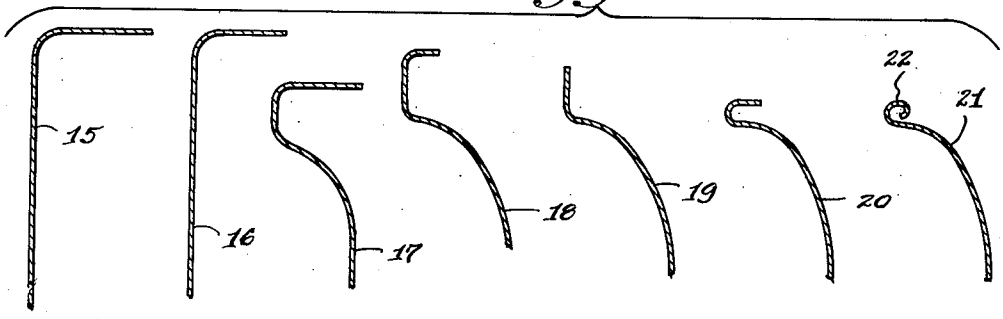


Fig. 2

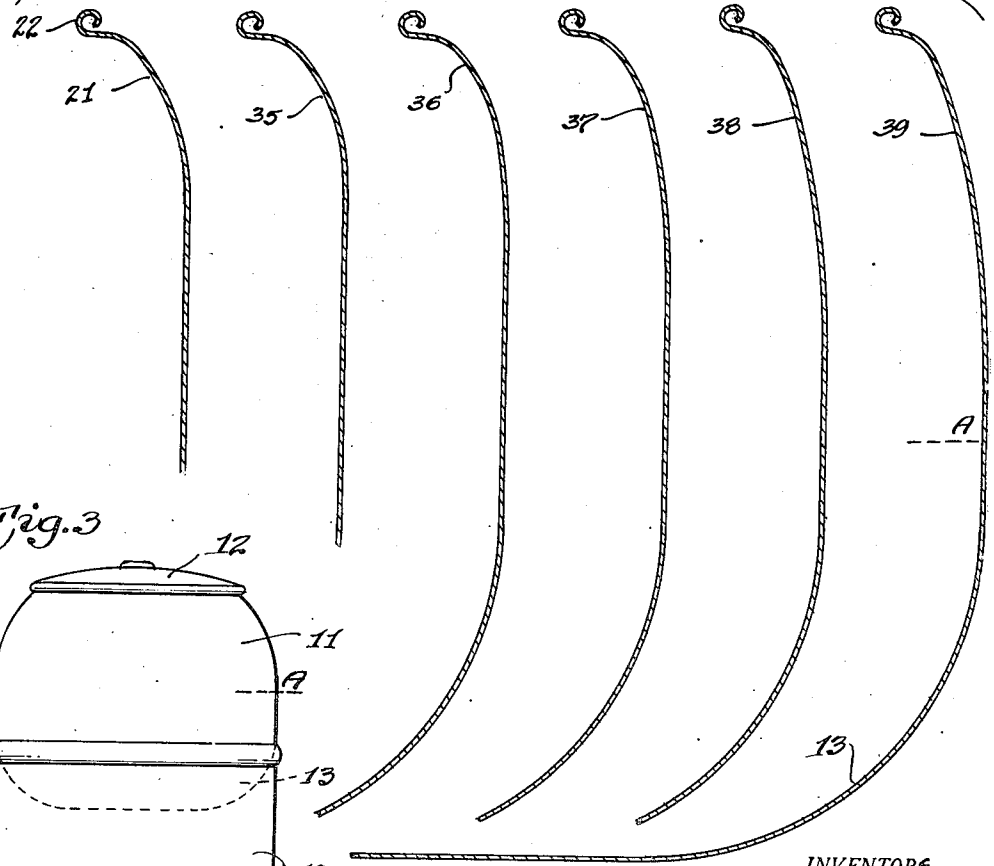


Fig. 3

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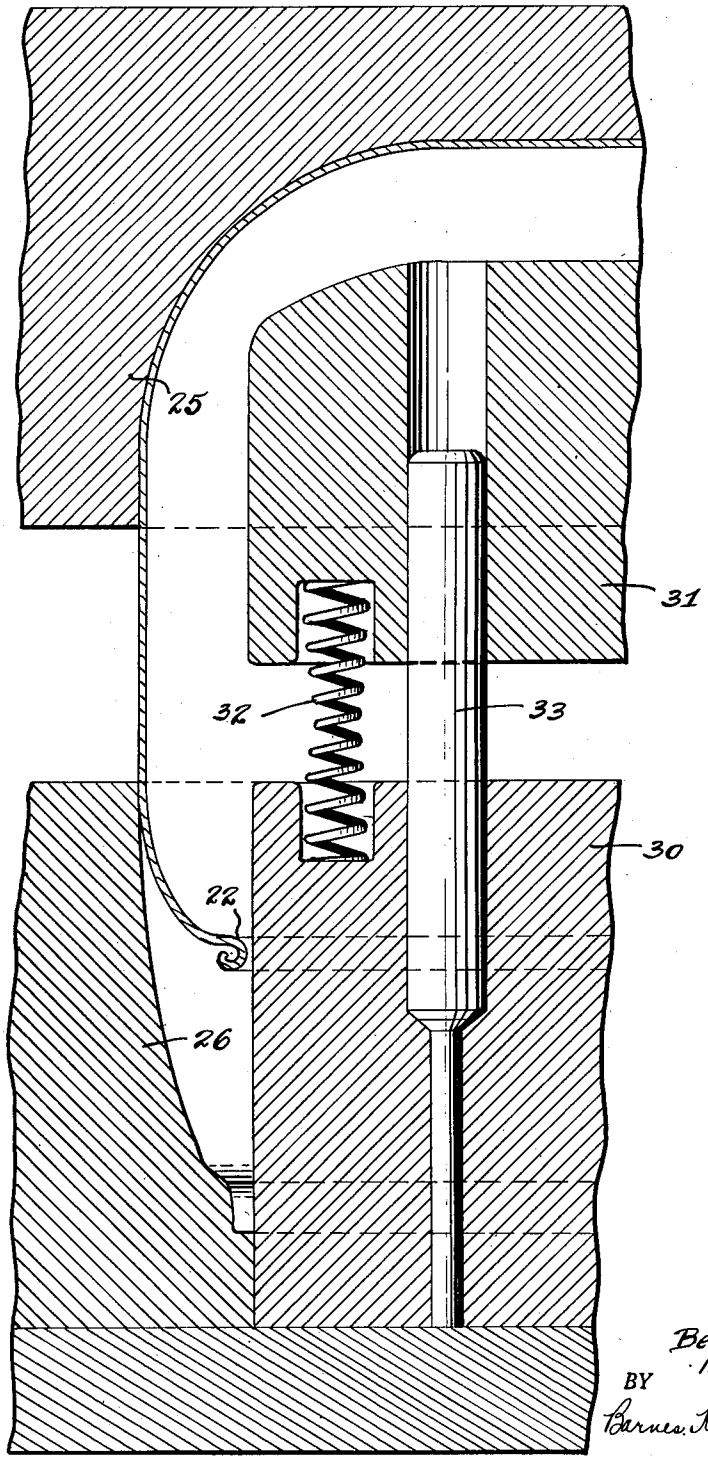


FIG. 4

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Fig. 5

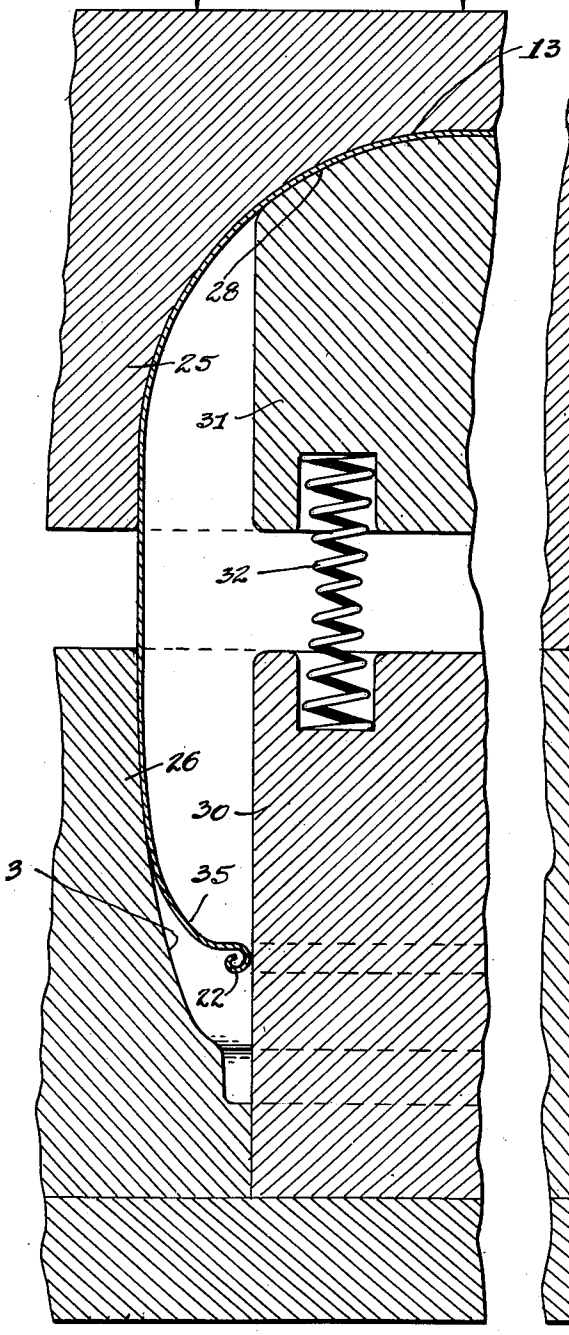
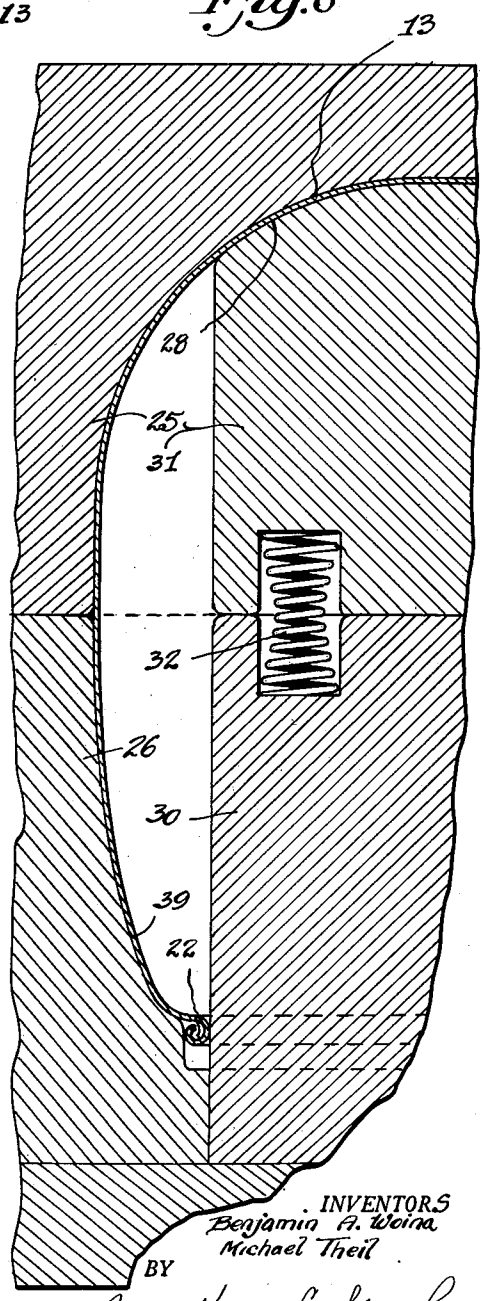


Fig. 6



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UNITED STATES PATENT OFFICE

2,455,828

METHOD FOR PRODUCTION OF WASHING MACHINE TUBS

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Application February 3, 1944, Serial No. 520,908

4 Claims. (Cl. 113—120)

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This invention relates to method for production of a washing machine tub. More particularly the invention relates to the steps in the production of a streamline or long-sweep, bottleneck tub. As illustrated in the patent to French, No. 2,131,027, issued September 27, 1938, and the patent to Bohn, No. 2,239,696, issued April 29, 1941, there has been an attempt in the last few years to obtain a streamline tub formation and to devise practical methods for manufacturing in production such streamline, bottleneck tub. The long sweeping curve cannot be successfully imparted by rolling operations. Buckling, wrinkling and cracking result.

The present invention contemplates tub construction whereby the bottom curve of the tub may be formed while the upper half of the side walls are still in straight cylindrical shape. Subsequently the top half of the tub may be subjected to forming rolls and then to the step of the present invention giving it a streamline curve which blends with the lower portion of the tub. The result is a tub of pleasing appearance and efficient action which is readily produced in quantities.

Other objects and features of the invention having to do with details of the method and the apparatus will be brought out in the following description and claims.

In the drawings:

Fig. 1 illustrates a series of steps in the roll formation of the upper edge of the tub.

Fig. 2 illustrates the changes in the side wall configuration wrought by the method of the present invention.

Fig. 3 is a view of the completed tub and support.

Fig. 4 illustrates the tub in the forming apparatus prior to the forming step.

Fig. 5 illustrates the die being applied.

Fig. 6 shows the final shape and die position.

In Fig. 3 a washing machine base is shown at 10 and the completed tub at 11 and the cover 12. Below the point marked A in Fig. 3 the tub is formed by a stamping process which gives the bottom 13 a well-rounded curved form. When this is done the upper portion of the side wall has a straight configuration and is shown at 15 in Fig. 1. By subjecting the wall 15 to a series of forming rolls, illustrated for example in the above mentioned patents, the upper portion of the wall takes the shapes shown respectively in Fig. 1 from 16 through 21. The final form has a roll-back curved lip 22 and serves as a reinforcing marginal formation for the bottleneck

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of the tub to prevent wrinkling or reduction in size of the opening provided.

After the above steps the tub is placed in a die composed of split parts 25 and 26 which define the outer contours of the tub. The part 25 is intended to fit the bottom contour of the tub whether it be curved or straight. The part 26 receives the open end of the tub as it is shown in Fig. 4 prior to the time that any forming movement is given to the two parts. Within the die parts 25 and 26 is a centering structure composed of split parts 30 and 31. These are cylindrical in shape and serve to center the tub in the die and to guide the reinforced margin 22 of the tub in its downward movement. Springs 32 tend to hold parts 30 and 31 in a separated condition and serve also as an extractor or knockout to help disengage the tub from the die upon completion of the operation. The alignment is maintained by guide pins 33 shown in Fig. 4.

The pilot 30—31 serves then in the formation as a centering device and guide as well as an extractor at the completion of the process.

After the tubs have been brought to the form shown in Fig. 4 they are placed in the die with no annealing step between the cold forming of the open edge and the final shaping into a sweeping curve. In this hardened condition, set up by the previous cold working, the tub is forced into the shape of die 26. The metal is restrained by the shape of the outer die but not otherwise, except by reason of the fact that the edge 22 is preformed and reinforced to withstand distortion and to prevent buckling. As the die 25 moves down, thereby forcing the outer end of the tub into die 26, the restraint exercised by the outer die actually causes an increase in the thickness of the wall. The metal is compressed circumferentially when the straight portion of the tub moves into the die but the strain is relieved by normal metal flow in at least two other directions which accounts for increased wall thickness and increased length without collapse on the unsupported inside.

Figs. 5 and 6 show an intermediate stage and final stage of movement. The tub literally wraps itself into the die 26 to have a final formation as shown at 39 in Fig. 2. The exact effect of the die on the tub is not known apart from the fact that the contour of the die is imparted thereto. In the orthodox method of imparting a curve to a tub localized pressures are applied but the result is a buckling and wrinkling effect. With the present method it is thought that the equalized stress application over a large area of the tub per-

mits a greater deformation before a fragmentation of crystallites occur. Since the tub is restrained only in one direction it may thicken and elongate in the process of radial compression. In Fig. 2 the numerals 35 to 39 illustrate the various stages of contours of the tub as it enters the die 26.

The present method is particularly adapted to large tubs of relatively thin gage metal such as approximately 18 gage. As above explained the problem of wrinkling of this thin metal is solved with the method disclosed here. Where the metal is relatively thick, this problem of wrinkling is not met.

We claim:

1. The method of making a container such as a washing machine tub, which comprises, necking in the margins of the side walls adjacent the opening in a relatively short radius curve wherein the opening is concentric with the side walls, forming the margins of the opening into a reinforcing roll-back curved head, inserting the open end of the tub so reinforced and necked-in into a die having a recess provided with the materially longer and less sharp curves desired and a centering member having substantially the diameter of the reinforced opening, and forcing the top portions of the tub into the die recess without internal support except at the reinforced edge by pressure distributed on the bottom and the side walls adjacent the bottom whereby the sidewalls adjacent the opening assume the curve of the recess without crinkling, buckling or cracking.

2. The method of making a container such as a washing machine tub, which comprises, necking in the margins of the side walls adjacent the opening in a relatively short radius curve leading into the side walls of the tub wherein the opening is concentric with the sidewalls, forming the margins of the opening into a rolled reinforcing structure leading into the short radius curve of the tub, inserting the open end of the tub so reinforced and necked-in into a die having a recess provided with the materially longer and less sharp curves desired, and a centering member having substantially the diameter of the reinforced opening, and forcing the top portions of the tub into the recess without internal support except at the reinforced edge by pressure distributed on the bottom and the side walls adjacent the bottom whereby the side walls adjacent the opening assume the curve of the recess without crinkling, buckling or cracking.

3. The method of making a container such as a washing machine tub, which comprises, beading the margins directly adjacent the opening while forming the more remote margins in a short curved marginal surface connecting with the vertical side walls, and reshaping the short curved marginal portion into a materially longer and less sharp curved marginal connecting surface by forcing the top portion of the container into a die recess having the desired longer and less sharp curves without internal support of the short curved marginal portion to increase materially the length of the partial top wall curved connecting surface, the forcing pressure being applied externally of the container on the bottom walls by another die with a recess conforming to such walls.

4. The method of making a container such as a washing machine tub, which comprises, necking in the opening of a tub and forming the margins of the opening into a reinforcing bead and a comparatively sharp and short curved portion leading to the straight walls of the tub, and increasing the length and the radius of the curves of the short curved portion by forcing the tub open-end first into a die recess having the desired longer and less sharp curves without internal support on such short curved portion, whereby the margins of the tub adjacent the opening assume the curves of the recess without crinkling, buckling or cracking.

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