June 26, 1945. R. M. CHESNEY 2,378,982

METHOD FOR MAKING TUBS OR SIMILAR ARTICLES

Filed Nov. 29, 1941 2 Sheets-Sheet 1

Fig. 1.

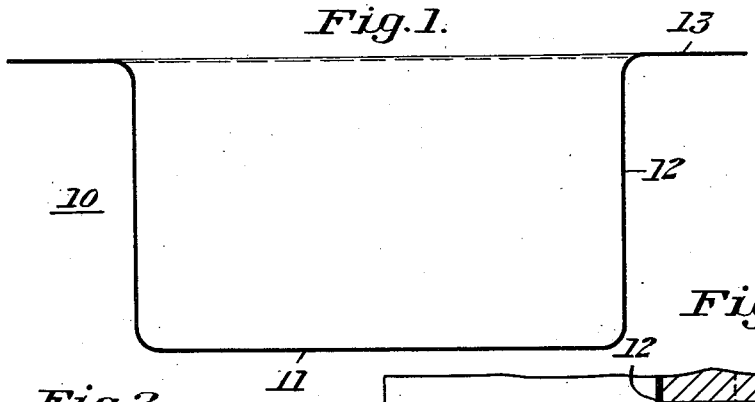


Fig. 2.

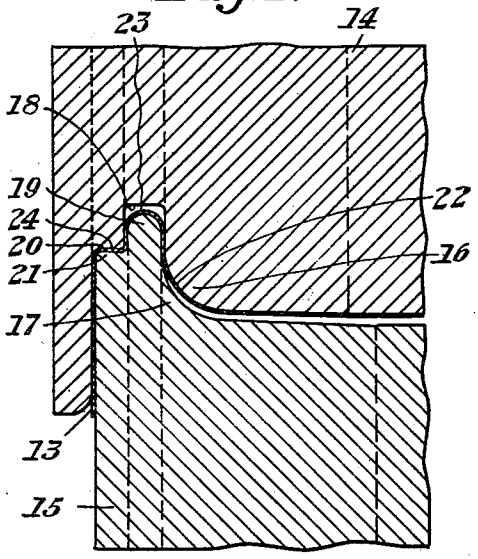


Fig. 3A.

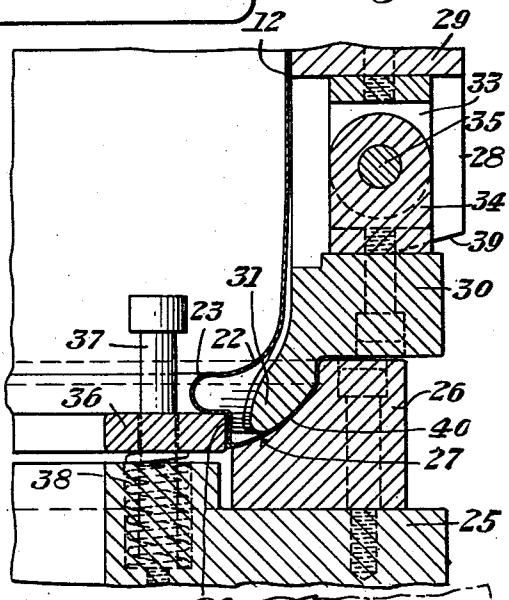


Fig. 3.

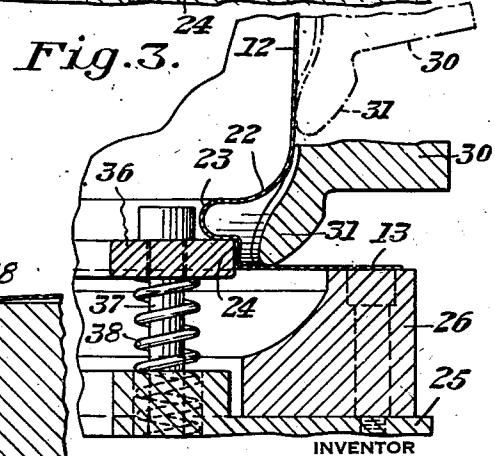
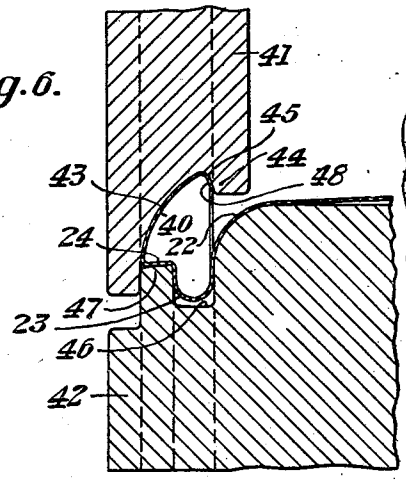


Fig. 6.



INVENTOR
Robert M. Chesney
by his attorneys
Stebbins and Blenko

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Filed Nov. 29, 1941 2 Sheets-Sheet 2

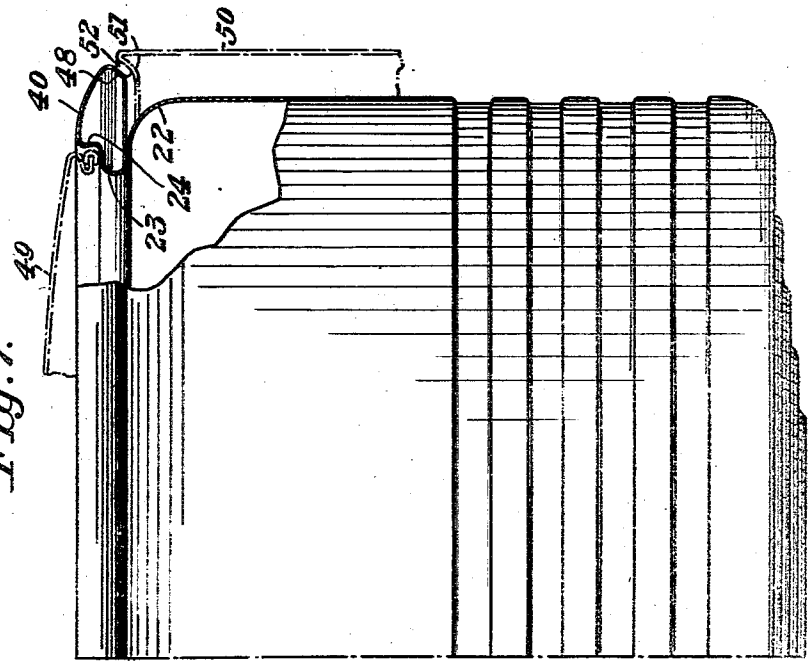


Fig. 7.

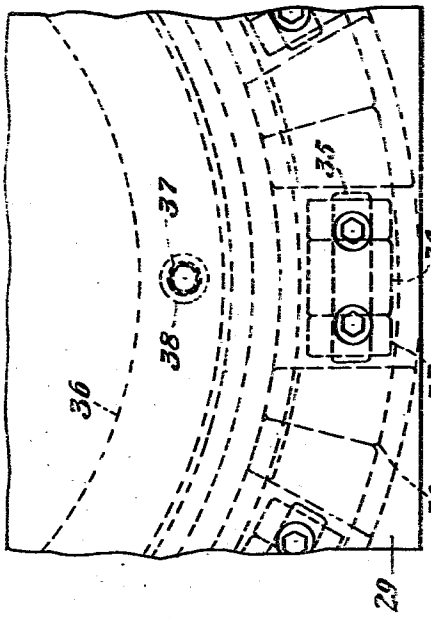


Fig. 4.

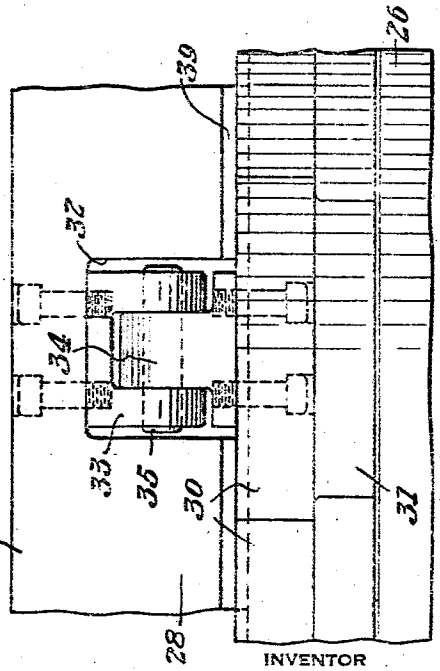


Fig. 5.

INVENTOR
Robert M. Chesney
by his attorneys
Stellins and Blenko

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UNITED STATES PATENT OFFICE

2,378,982

METHOD FOR MAKING TUBS OR SIMILAR ARTICLES

Robert M. Chesney, Alliance, Ohio, assignor to The Alliance Porcelain Products Company, Alliance, Ohio, a corporation of Ohio

Application November 29, 1941, Serial No. 421,014

1 Claim. (Cl. 113—120)

This invention relates broadly to the art of drawing sheet metal and, in particular, to the manufacture of a generally cylindrical article such as a washing machine tub or the like, by drawing and shaping flat stock. More specifically, the invention concerns the manufacture of a tub for a washing machine of the skirted or jacketed type.

Washing machines having an exterior jacket or skirt spaced from the side wall of the usual cylindrical tub have certain advantages from the standpoint of appearance and prevention of heat loss, over conventional machines having exposed tubs. It has not been possible, however, prior to my invention, to produce a tub suited for cooperation with an enclosing jacket or skirt. I have invented a novel method and apparatus for making tubs specially adapted for skirted or jacketed machines, characterized by a laterally extending, downwardly curved flange at the top of the side wall and a contracted neck therebelow, the flange being adapted to rest on a rim flange on the upper edge of the enclosing jacket or skirt. The flange on the upper edge of the side wall of the tub constitutes a continuation of the curvature of the tub cover which is usually of mushroom shape and presents therewith a streamlined appearance lacking any exposed edges or angles.

In a preferred practice of the invention, I provide a generally cylindrical blank having a laterally extending flange, by drawing flat stock. I then subject the side wall of the blank adjacent the flange to a shaping operation, thereby producing an inwardly contracted neck joined to the remainder of the tub by a downwardly curved connecting portion. I also provided a raised shoulder above the neck. The laterally extending flange is then subjected to a die-shaping operation to impart to it a downward curvature. The extreme edge of the downwardly curved flange is then bent inwardly to form an edge bead.

The apparatus which I prefer to employ for the several steps of the method includes shaping rolls for forming the neck and shoulder and the edge bead. I utilize a segmental shaping die and a cooperating die ring for imparting to the laterally extending flange the downward curvature necessary to provide a smooth transition from the contour of the washing machine cover to that of the jacket or skirt.

The invention may be more fully understood from a consideration of the following detailed description and explanation which refer to the accompanying drawings illustrating the preferred embodiment and practice mentioned above. In the drawings,

Fig. 1 is a central transverse section through a tub blank as produced by the initial drawing operation, from flat stock.

Fig. 2 is a partial axial section through a pair of cooperating shaping rolls which I utilize to form the inwardly contracted neck and the shoulder upstanding therefrom, adjacent the upper edge of the side wall of the blank.

Fig. 3 is a partial radial section through the segmental die and cooperating die ring which I utilize to impart the downward curvature to the laterally extending flange.

Fig. 3*a* is a view similar to Fig. 3 showing the die in its extreme downward position.

Fig. 4 is a partial plan view of the die and cooperating ring.

Fig. 5 is a partial side elevation thereof.

Fig. 6 is a view similar to Fig. 2, showing the shaping rolls for forming the edge bead on the downwardly curved flange; and

Fig. 7 is a partial side elevation, with a portion in section, showing the finished tub and parts of the cover and enclosing jacket or skirt.

Referring now in detail to the drawings, I first produce a tub blank 10 from flat stock by conventional drawing procedure. The blank 10 is generally cylindrical and includes a bottom 11, side wall 12 and a laterally extending flange 13 at the upper edge of the side wall, which lies substantially in a plane normal to the axis of the blank. After the blank 10 has been drawn, the flange 13 is trimmed to a suitable width by any convenient method or apparatus.

The blank is then subjected to a shaping operation between cooperating rolls 14 and 15 which work on the side wall 12 adjacent the flange 13. The rolls 14 and 15 have cooperating portions 16 and 17 which are curved convexly and concavely respectively. The roll 14 also has a groove 18 with which cooperates a bead or rib 19 on the roll 15. The roll 14 also has an offset 20 cooperating with a similar offset 21 in the roll 15.

The rolls 14 and 15 are initially spaced apart and are brought together after the blank 10 has been appropriately positioned therebetween. As the rolling of the side wall 12 of the blank adjacent the flange 13 proceeds, the rolls 14 and 15 are brought closer together until they finally reach the relative positions shown in Fig. 2. This operation imparts an inward curvature to the portion of the side wall engaged by the curved portions 16 and 17 of the rolls. This portion of

the shaped blank designated 22 is concave downwardly, i. e., toward the tub bottom 11 and terminates in a contracted neck 23 formed by the cooperation of the groove 18 and the bead 19. At the same time, the offsets 20 and 21 of the shaping rolls produce a raised shoulder 24 upstanding from the neck 23 and spaced a short distance outwardly thereof. The flange 13 is substantially unaffected by the shaping of the side wall adjacent thereto by the coaction of the rolls 14 and 15. In other words, the shaping of the side wall is effected by deforming the latter alone. The shaping rolls, furthermore, produce a smooth surface on the downwardly curved portion 22 of the side wall, free from wrinkles or buckles, despite the fact that the neck 23 is formed by contracting the side wall from its original position. Since the upper portion of the side wall 12 is rolled between the coacting surfaces of the rolls 14 and 15, the deformed portions of the side wall have the contour of surfaces of revolution.

After shaping the portion of the side wall 12 adjacent the flange 13 as above described, I next impart to the flange a downward curvature by means of die-forming apparatus shown in Figures 3 through 6. This apparatus includes a die base 25 on which is secured a die ring 26 having a concave surface 27 on the inner side thereof. A punch 28 cooperating with the ring 26 includes a reciprocable shoe 29 having a plurality of segmental blocks 30 pivoted thereon and provided with depending shaping portions or dies 31 conforming to the contour of the surface 27 of the ring 26. As best shown in Figures 4 and 5, the shoe 29 has recesses 32 spaced circumferentially thereof in which hinge blocks 33 are secured. Cooperating hinge blocks 34 are secured to the segmental blocks 30 and a hinge pin 35 extends through aligned holes in the overlapping portions of the two hinge blocks. By this construction, the blocks 30 may be swung outwardly to clear the side wall 12 of the tub blank, as indicated in chain lines in Fig. 3.

To effect the shaping of the flange 13, the blank 10 is inverted and disposed with the flange on the ring 26. A centering ring 36 is vertically slidable on guide pins 37 spaced circumferentially of the base 25 and is normally held in its uppermost position by compression springs 38. As clearly shown in the drawings, the outside diameter of the ring 36 is slightly less than the inside diameter of the shoulder 24 formed in the side wall of the tub blank.

When the blank has been positioned as described, the punch shoe 29 is forced downwardly into engagement with the flange 13. It will be understood that the base 25 is preferably the platen or work table of a suitable press and that the punch shoe 29 is carried on the reciprocating head of the press. As previously explained, the blocks 30 are swung outwardly as they descend past the bottom of the blank and the side wall adjacent thereto. On engaging the flange 13, the blocks are swung inwardly to the position shown in Figures 3 and 3a. They thus engage the flange within the projection of the side wall thereon. The bottom of the shoe 29 is partially bevelled as at 39 to permit the blocks 30 to swing outwardly. At the same time, the unbevelled portion of the bottom of the punch limits inward movement of the blocks.

As the punch shoe 29 and the segmental blocks 30 descend after the latter engages the flange 13, a mushroom shape is imparted to the flange by the contour of the cooperating surfaces of the portions 31 of the blocks and the surface 27 of the ring 26. The centering ring 36 is forced down against the pressure of the springs 38 as the blocks 30 descend.

When the shaping of the flange 13 as described has been completed, the punch shoe 29 is retracted. The blocks 30 again swing outwardly to clear the side wall of the blank. The ring 37 rises under the pressure of the springs 38 and lifts the blank from the ring 26. When the punch shoe 29 has been sufficiently retracted, the blank may be removed from the press.

At this stage, the blank has, in addition to the downwardly curved portion 22, the contracted neck 23, and the upstanding shoulder 24, an outwardly and downwardly curving flange designated 40, which is concave downwardly or toward the bottom of the tub, the same as the curved portion 22 of the side wall. The blank is thus ready for a final flange shaping operation which is effected by cooperating rolls 41 and 42 shown in Fig. 6.

The roll 41 has a concave surface 43 bounded by a shoulder 44. The curvature of the portion 43 is slightly greater than that of the surface 27 of the die ring 26. The roll 41 also has an outwardly curving surface 45 between the portion 43 and the shoulder 44. The ring 42 has a groove 46 to receive the neck 23 and a rim or bead 47 to engage the shoulder 24 of the blank.

As in the case of the rolls 14 and 15, the rolls 41 and 42 are initially spaced apart sufficiently to admit the flange of the tub blank. When the blank has been positioned between the rolls they are brought together and rotation thereof serves progressively to shape the flange 40 to its final curvature and to bend inwardly the extreme edge thereof designated 48. When this operation has been completed, the blank has the appearance shown in Fig. 7, disregarding the circumferential grooves in the side walls adjacent the bottom and the stepped condition of the bottom.

Fig. 7 clearly illustrates how the downwardly curved flange 40 constitutes a continuation of the mushroom contour of the cover 49 and provides a smooth transition between the edge thereof and the upper edge of a substantially cylindrical jacket or skirt 50. The jacket has an inturned flange 51 on which the bead 48 rests, with a gasket 52 therebetween.

It will be apparent from the foregoing description and explanation that the invention provides a simple but thoroughly practical method and apparatus for making tubs having a laterally extending downwardly curving flange adapted to harmonize with the contour of a mushroom-shaped cover and provide a smooth surface joining the cylindrical jacket or skirt to the cover, thereby enhancing the appearance of the complete tub and eliminating unsightly joints. Since the bead 48 is bent sharply inward, the space between it and the skirt is barely visible. In any event this space is filled by the gasket 52 leaving a smooth exterior which can readily be cleaned. The invention provides a successful means and method for accomplishing a difficult shaping operation without any detrimental effect on the blank such as tearing the edge or leaving buckles or wrinkles in the flange or the curved portion of the side wall. Such irregularities become quite noticeable after enameling the blank and are, therefore, seriously objectionable. The smooth surfaces resulting from the forming method and apparatus which I employ, however, may readily be enameled and when so treated exhibit a smooth

surface which is entirely uniform in appearance. The apparatus which I employ is relatively simple and inexpensive and no special skill, furthermore, is required to operate it.

Although I have illustrated and described but a preferred embodiment and practice of my invention, it will be understood that changes in the construction and procedure disclosed may be made without departing from the spirit of the invention or the scope of the appended claim.

I claim:

In a method of making washing-machine tubs of the jacketed type having an upwardly convex rim flange, or the like, the steps including drawing a sheet of flat stock into a cylinder having a bottom and side wall, leaving a flange around the upper edge of the side wall lying in a plane substantially normal to the axis of the cylinder, deforming said side wall adjacent said flange to produce a contracted neck on the cylinder, and applying pressure to the flange at circumferentially spaced points on the under surface thereof within the projection of the side wall thereon, and thereby forcing the flange into a die ring adapted to impart an upwardly convex shape thereto.

ROBERT M. CHESNEY.