April 12, 1938. C. J. RODMAN 2,114,150

METHOD OF MANUFACTURING A TUB

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Fig. 1.

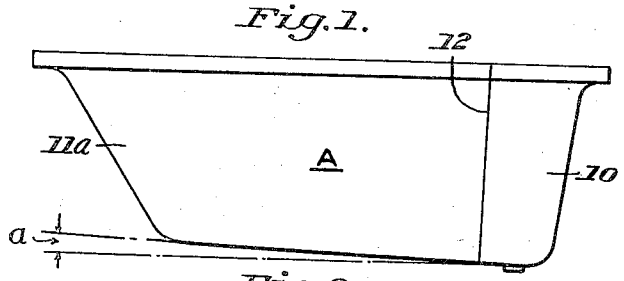


Fig. 2.

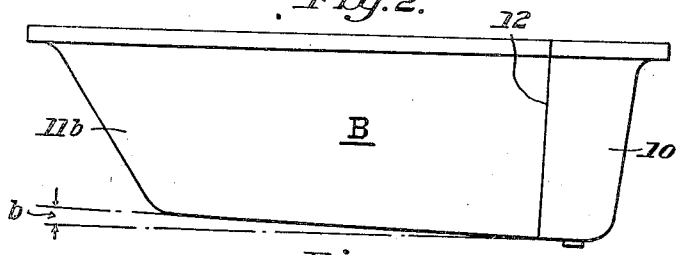


Fig. 3.

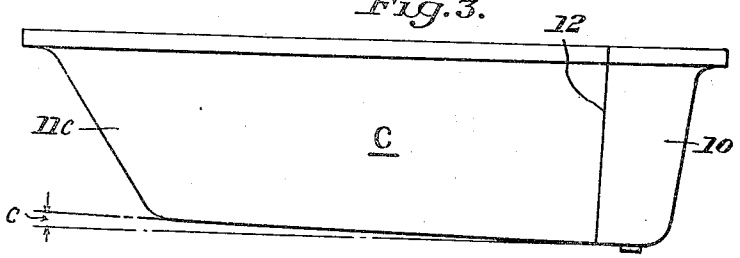


Fig. 4.

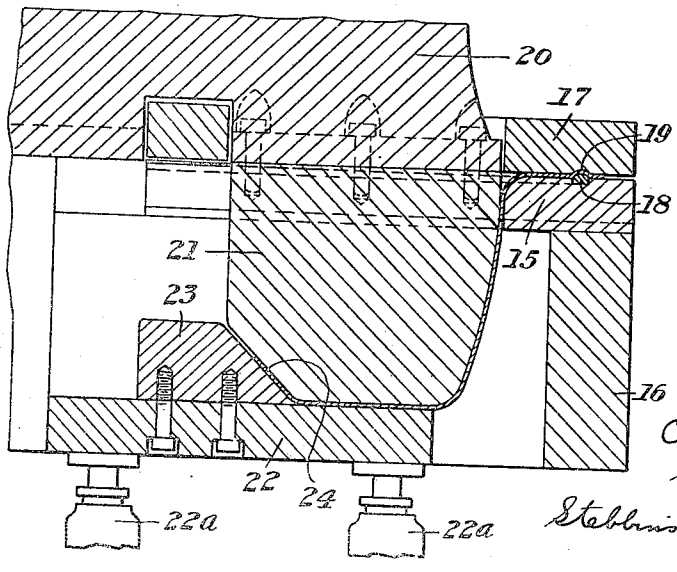
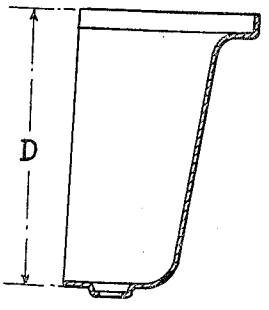


Fig. 5.



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Fig. 6.

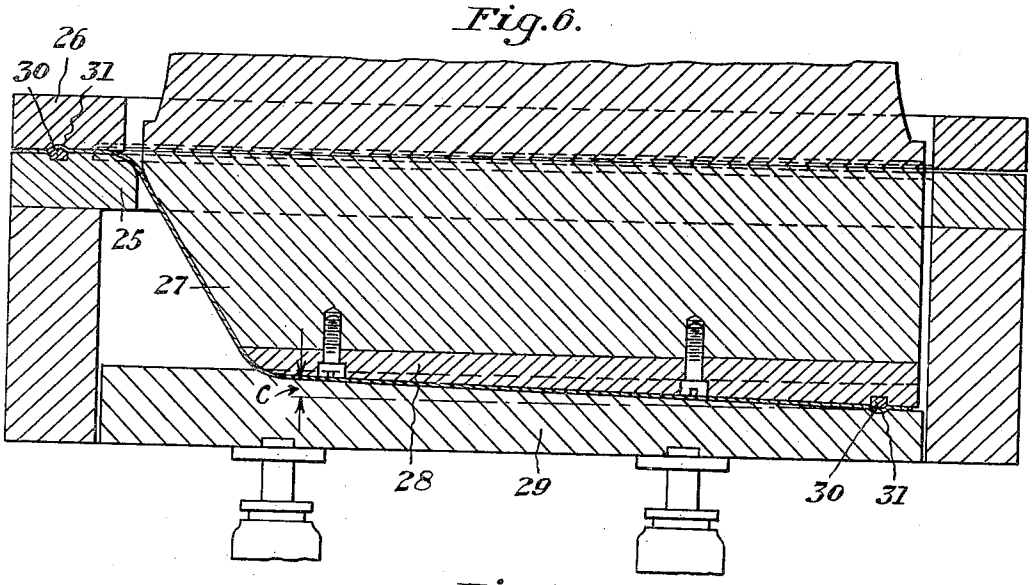


Fig. 7.

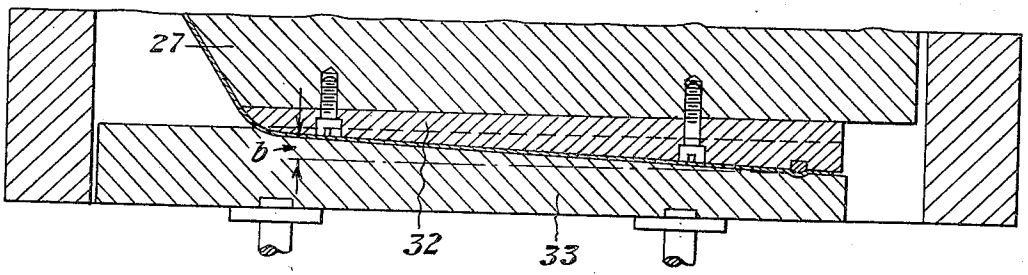
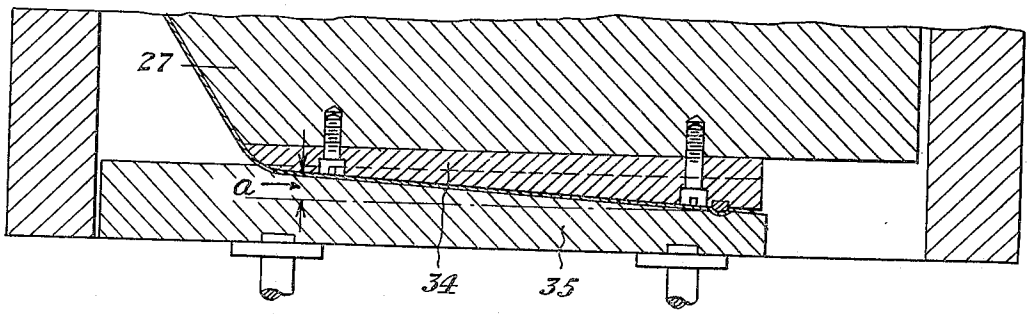


Fig. 8.



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METHOD OF MANUFACTURING A TUB

Clarence J. Rodman, Alliance, Ohio, assignor to The Steel Sanitary Company, Alliance, Ohio, a corporation of Ohio

Application July 14, 1936, Serial No. 90,527

1 Claim. (Cl. 113—120)

This invention relates to a method of manufacturing tubs, and is concerned particularly with bath tubs, although the principles of the invention may be utilized in manufacture of other articles of like character. While the invention will be described in detail with reference to bath tubs, it will be understood that the word "tub" refers to any article of the general character of a bath tub.

Tubs have usually been made heretofore of cast iron with the aid of sand molds. It has also been proposed to make tubs of sheet metal by joining shaped sections in a variety of ways. A serious objection exists, however, to the manufacture of tubs by either of these methods. The plumbing trade demands tubs of a relatively wide range of lengths. The standard sizes are 4½', 5' and 6', although special intermediate sizes are sometimes required. While the problem of satisfying this demand is not serious in the cast iron field, it is vital in the sectional, pressed steel field. The additional patterns necessary for molding cast iron tubs involve considerable expense, but it is relatively small compared to the cost of the dies heretofore necessary for shaping sheet steel sections to provide the several tub sizes required by the trade. The object of this invention, therefore, is to provide a sectional sheet steel tub and a method whereby it can be manufactured in a variety of sizes, without the necessity of duplicating the die equipment for each different size.

In accordance with the invention, I form a bath tub of the usual general outline from two stampings drawn from sheet steel. One stamping is shaped to form the portion of the tube adjacent the drain opening, which I term the drain-end blank. After trimming, this stamping or blank is relatively short, representing only about one-sixth of the entire length of the tub. The drain-end blank is substantially identical for all sizes of tubs.

The other stamping forming part of each tub is shaped in the dies and, after trimming, is butt-welded to the drain end by a flash welding process. The welded seam is then ground smooth and the entire tub enameled. In order to provide tubs of different overall lengths, I vary the length of the second stamping which I term the bell-end blank. To facilitate drainage, the bottoms of the bell ends of all tubs are given a certain slope. According to my invention, I vary the degree of slope between different tub sizes, so that the depth of the bell-end blank, at the open end thereof adapted to abut the open end of the drain-end blank, will be the same for all sizes, so as to match up with identical drain-end blanks.

A complete understanding of the invention may be obtained from the following detailed description thereof, referring to the accompanying drawings illustrating a preferred embodiment and practice. In the drawings,

Figs. 1 to 3 are side elevations of tubs of different sizes made in accordance with the invention;

Fig. 4 is a sectional view through the die for forming the drain ends of the tubs;

Fig. 5 is a sectional view of a finished drain-end blank;

Fig. 6 is a view similar to Fig. 4 showing the dies for shaping the bell-end blanks; and

Figs. 7 and 8 are views similar to Fig. 6 showing the shaping of different sizes of bell-end blanks.

Referring now in detail to the drawings, Figs. 1 to 3 show sheet metal sectional tubs of various sizes, which will be designated A, B and C respectively. Each tub comprises a drain end **10** which is identical for all tub sizes, and a bell end. The bell ends for the several sizes are shown at **11***a*, **11***b* and **11***c*. The drain and bell ends are shaped from sheet steel by drawing in suitable dies, as will be described in detail shortly. After drawing, the resulting blanks, each having a bottom, sides, one closed end and one open end, are trimmed to a predetermined length and are then ready to have their open ends abutted, as shown in Figs. 1 through 3, and welded together, the position of the welded seam being indicated at **12**. The welded seam is ground down and the tub is then ready for enameling, although any additional parts such as supporting feet, aprons, or the like, may be attached in any desired manner.

The dies for shaping the blanks forming the drain and bell ends of the tubs are described in detail and claimed in application Serial No. 48,664, filed November 7, 1935, by Harold W. Clark, for Method and apparatus for making metallic receptacles. The dies for making the drain-end blanks are shown somewhat diagrammatically in Fig. 4 and consist briefly of a die ring **15** supported on a suitable base **16**, a blank-holder ring **17** actuated by one of the slides of a toggle press, and cooperating with the die ring to retard flow of the edges of a sheet of flat stock during the drawing operation. To this end, the die ring and blank-holder ring are provided with a cooperating bead **18** and groove **19** extending around the edges thereof. A punch **20** mounted on the other slide of the press carries an extension **21** and cooperates with a pressure pad **22** yieldably supported beneath it, on pistons reciprocable in pneumatic cylinders **22***a*, for example. The pad **22** has a filler block **23** attached thereto.

The procedure in forming a stamping or blank for the drain end involves simply the placing of a sheet of stock on the die ring **15** after the punch **20** and the blank-holder ring **17** have been raised. Elevation of the punch permits the pad **22** to rise to its normal position adjacent the die ring **15**.

The press is then operated to lower the blank-holder ring 17 and the punch 20 successively. After the blank-holder ring has gripped the edges of the stock, the punch extension 21 engages the middle portion thereof and, as it descends, forms it into the shape shown in Fig. 4. The inner edge of the stock is bent up as at 24 between the filler block 23 and the extension 21. This interposes resistance to flow of the metal between the extension 21 and the pressure pad 22. The bead 18 and groove 19 in the die ring and blank-holder ring similarly restrain flow of the edges of the stock. Some flow actually takes place but it is relatively small in amount. After drawing, the drain-end blank is trimmed as indicated in Fig. 5. When so trimmed, it has a depth D.

The bell-end blanks are similarly drawn by the aid of a die ring 25, a blank-holder ring 26 and a punch 27, as shown in Fig. 6. The punch 27, however, has a removable bottom plate 28 which cooperates with a pressure pad 29 having a shaped recess therein. The plate 28 and the pad 29, as well as the die ring and blank-holder ring 25 and 26, are provided with cooperating beads and grooves 30 and 31 to restrain flow of the material adjacent the edges of the stock.

After forming a bell-end blank, it is trimmed and is then ready for abutment with a drain-end blank and welding thereto. The depth of the open end of the bell-end blank, of course, must be the same as the depth D of the drain-end blank, in order that the abutting edges register accurately for welding. The bottom of the bell-end blank is given a slope indicated by the angle *c* in Fig. 6, the plate 28 and the pad 29 being shaped accordingly. This slope is chosen with regard to the length of the finished bell-end blank so as to ensure proper drainage thereof.

In order to make other sizes of tubs, for example smaller sizes as shown in Fig. 8, it is only necessary to substitute for the plate 28 and the pad 29, a plate 32 and a pad 33 as shown in Fig. 7, or a plate 34 and a pad 35 as shown in Fig. 8. The plate 32 and the pad 33 are shaped to provide a bell-end blank having a bottom which slopes at an angle *b* as shown in Fig. 7, while the plate 34 and the pad 35 are shaped to provide a blank having a bottom-slope angle *a* as shown in Fig. 8. The angles *a* and *b* are chosen with respect to the lengths of the bell-end blanks to be made, so that when trimmed to length, these blanks will have at their open ends, a depth D whereby they are adapted for abutment and welding to identical drain-end blanks as shown in Fig. 5, to provide tubs having different overall lengths as indicated in Figs. 1 to 3. Since the angle *c* for the longest tub is chosen to ensure proper drainage, this result will also be achieved in the shorter lengths since the angles *a* and *b* are greater than the angle *c*.

It will be apparent from the foregoing that the invention makes it possible to provide a series of tubs of various lengths utilizing a drain-end blank which is substantially identical for all tub sizes, and bell-end blanks which differ in length and slope of the bottom, depending on the overall length of the finished tub. The invention thus permits a large economy in the manufacture of tubs in that the same die equipment is used to form the drain ends of all sizes, and the same equipment, except for the removable bottom plates and pressure pads, is employed to make the bell-end blanks for all sizes. The cost of extra sets of removable plates and pressure pads for different sizes of bell-end blanks is relatively small. It will be understood, furthermore, that the size of the sheet of stock used for the bell-end blanks varies with the overall length of the finished blank.

The advantages of tubs of sheet steel are so well recognized as to require no discussion here. It is sufficient to state that this invention, for the first time, permits a reduction in the cost of dies for making sheet steel sectional tubs such that it is practical, from a commercial standpoint, to manufacture them. While I have illustrated the invention as applied to the manufacture of tubs and, specifically, two-piece tubs, it will be understood that it is also applicable to the manufacture of other analogous articles and is not limited to those composed of only two stampings.

Although I have described the invention as applied to only three different tub sizes, it may be extended to provide as many different sizes as desired. An important feature of the invention, furthermore, is that it permits the manufacture of odd or intermediate sizes, without even requiring special removable bottom plates and pressure pads. Since the angles of slope of the tub bottoms, *a*, *b* and *c*, are all quite small, it will be apparent that a slight change in the length of the bell-end blank will not involve a very great departure from the predetermined depth D at the open end thereof. Manufacturing tolerances permit a slight variation in this figure so that, within limits, the bell-end blank may be trimmed longer or shorter than the standard length, in order to provide odd or intermediate tub sizes, and still be capable of satisfactory welding to a drain-end blank having a depth of D at the open end thereof.

While I have illustrated and described herein but a preferred embodiment and practice of the invention, it will be apparent that changes in either or both 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 a tub of predetermined length, the steps comprising providing a drain-end blank for said tub, said blank having a bottom, sides and one closed end, the other end being open, providing a plurality of bell-end blanks of different lengths to match said drain-end blank, each of said bell-end blanks having a sloping bottom, sides and one closed end, the other end being open, the depth of all the bell-end blanks at the open end thereof being the same as the depth of the drain-end blank at its open end, and the slope of the bottoms of the bell-end blanks varying from one size to the next whereby to obtain accurate registry of the meeting edges of the bell-end and drain-end blanks when their open ends are abutted, selecting one of said bell-end blanks having a length such as to produce a tub of said predetermined length when welded to said drain-end blank, abutting the open ends of said selected bell-end blank and said drain-end blank, and welding them together.

CLARENCE J. RODMAN.