July 20, 1937. C. J. RODMAN 2,087,302

FORMING DIE

Filed June 6, 1935

Fig. 1.

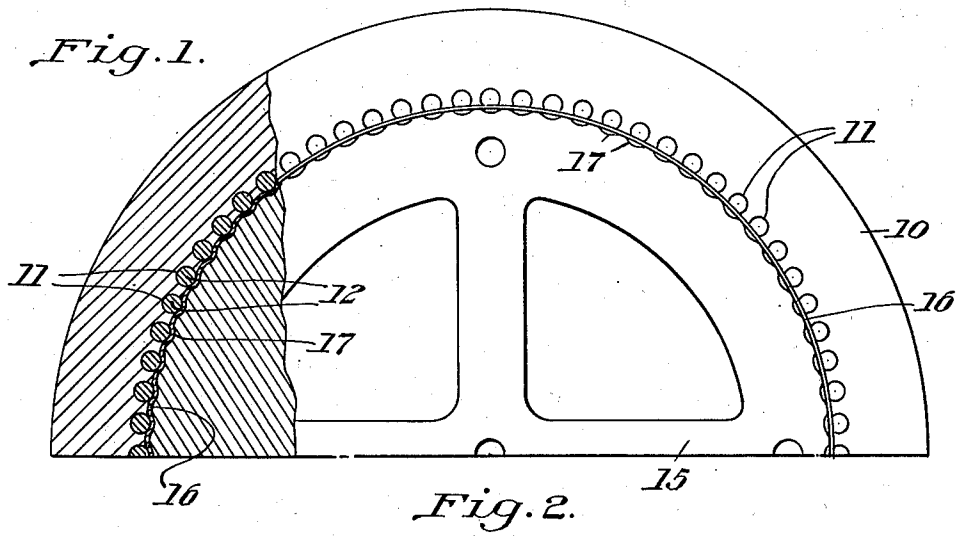
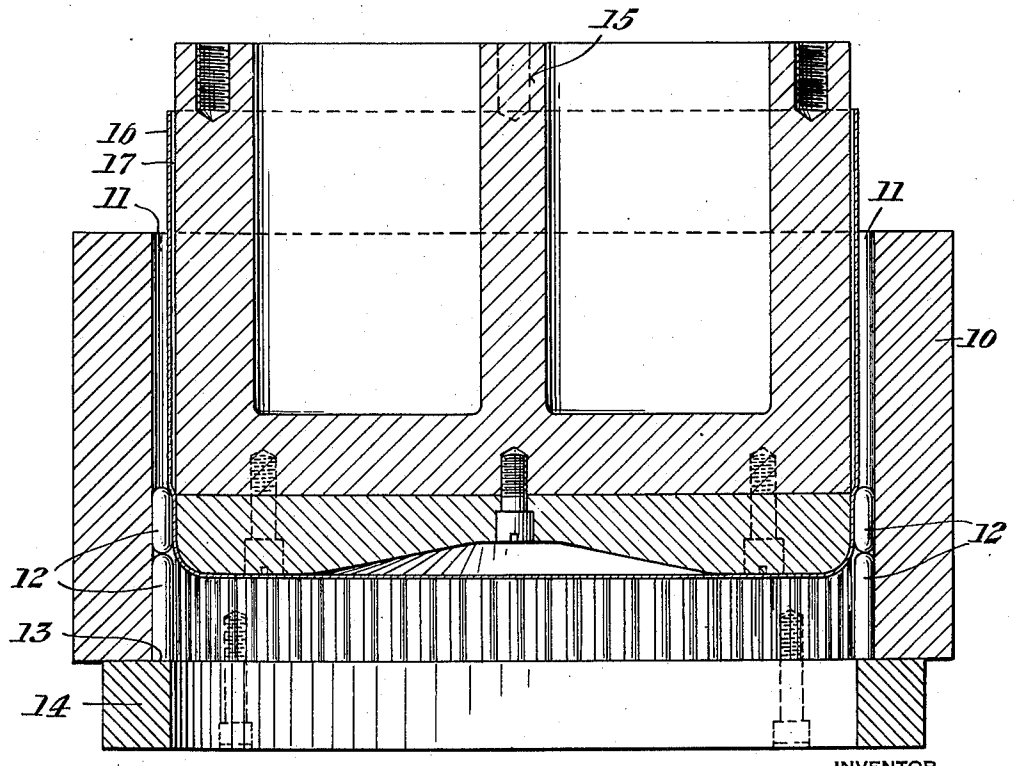


Fig. 2.



INVENTOR

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FORMING DIE

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5 Claims. (Cl. 153—70)

My invention relates to the art of forming sheet metal and will be described herein as applied to the forming of longitudinal grooves or corrugations in hollow tubular articles such as tubs.

It has been proposed previously to provide a tub-forming die with grooving rolls or balls projecting inwardly thereof and adapted to engage a blank pressed thereinto by a suitable plunger, and form longitudinal corrugations in the side wall thereof. It has been observed in the operation of such devices, however, that the balls or rollers are subject to rapid wear along the line of contact and soon get out of round and present flattened surfaces to the work so that the desired shape of corrugation is not produced. An example of the prior art to which I refer is the Stanitz Patent No. 1,919,869.

I have invented a forming apparatus which overcomes the above mentioned objections to the construction known previously and is also characterized by additional improvements which will become apparent as the detailed description of the invention proceeds, and will be particularly pointed out in the appended claims. In accordance with my invention, I form a plurality of slots extending longitudinally of the die adapted to receive a tub blank pressed thereinto by a suitable mandrel or plunger. In the slots, I dispose corrugating pins adapted to extend at least partially through the slots so as to engage the blank and form grooves therein. The pins may be of different lengths around the periphery of the die so as to produce a patterned effect in which the corrugations are of different heights at different points on the tub circumference. The mandrel or plunger is preferably grooved to cooperate with the pins in forming the corrugations.

A complete understanding of the invention may readily be obtained by a consideration of the accompanying drawing in connection with the following detailed description. In the drawing, illustrating a present preferred embodiment of the invention:

Figure 1 is a plan view of the die and plunger according to my invention with a blank therebetween, a portion being shown in section, to reveal the actual forming of the corrugations; and

Figure 2 is a transverse sectional view on a plane through the axis of the die and plunger.

Referring now in detail to the drawing, a die 10 is composed of a metallic annulus of a size suitable for the operation contemplated. The die 10 has a plurality of axial grooves 11 formed on the inner periphery thereof and preferably spaced uniformly apart. Corrugating pins 12 are removably disposed in the slots 11 and are supported on a shoulder 13 provided by a ring 14 attached to the bottom of the die ring 10. As shown in Figure 2, a plurality of pins may be employed in each groove, as desired, or as necessary to build up to the desired height of the finished corrugation.

A plunger or mandrel 15 is adapted to press a tub blank 16 into the die 10. The periphery of the plunger 15 is preferably grooved as at 17 for cooperating with the forming pins 12. As shown in the sectional part of Figure 1, the lateral surfaces of the pins project partly from the slots 11 so as to form corrugations or grooves in the blank 16 progressively as it is pressed into the die by the plunger 15. The plunger, of course, may be connected to any type of pressure-applying device, such as a hydraulic cylinder and piston. The die ring 10 will similarly be supported on any convenient means, such as the table or platen of a press.

It will be apparent that a variety of corrugation patterns may be produced in the finished tub by the use of my invention. Instead of disposing the groove-forming pins 12 in every slot 11, they may be placed in alternate slots or in every third slot to vary the spacing between the corrugations in the finished tub. The height of the corrugations may be varied by using longer or shorter pins, or various combinations thereof, as shown.

It has been observed from the use of the invention described hereinabove that the forming pins 12 are less subject to wear than the balls or rollers of corrugating dies previously known. The pins, furthermore, may be removed very readily for replacement or change in the corrugation pattern produced, since they are merely dropped into the slots from the top and may be manually lifted out of the slots with great facility. The invention is thus characterized by a long life and a much greater flexibility than similar devices previously known.

Although I have illustrated and described herein but one preferred form of the invention, it will be apparent that changes therein may be made without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. Forming apparatus comprising a die, a mandrel or plunger adapted to advance the work through the die, said die having axial slots therein, and elongated, cylindrical groove-forming

pins removably disposed in said slots, said pins having rounded upper ends.

2. Apparatus for corrugating hollow articles comprising a die adapted to receive the articles, a plunger or mandrel for advancing the articles into the die, said die having slots extending in the direction of movement of the plunger or mandrel, and elongated pins removably disposed in said slots and extending at least partially therethrough, for engaging and progressively deforming the articles as they advance through the die, said pins having substantially hemispherical upper ends.

3. Apparatus for corrugating the side wall of a tub comprising a die adapted to receive the tub, a mandrel or plunger for pressing the tub into the die, the die having longitudinal slots, and elongated pins removably disposed in the slots effective to form grooves in the tub wall as it is pressed into the die, said pins having rounded ends.

4. The apparatus defined by claim 1 characterized by said pins being of different lengths.

5. The apparatus defined by claim 1 characterized by said pins extending to different heights in various slots.

CLARENCE J. RODMAN.