D. A. CLARK AND C. E. LOWE.

TIRE FORMING MANDREL.

APPLICATION FILED MAR. 7, 1919.

1,316,274.

Patented Sept. 16, 1919.

2 SHEETS—SHEET 1.

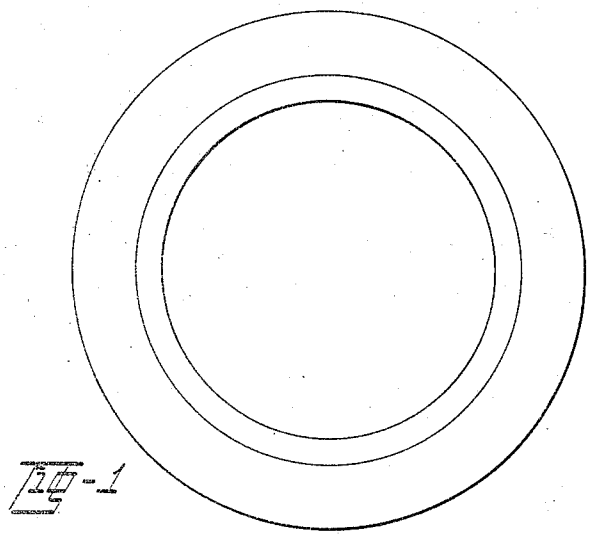


Fig-1

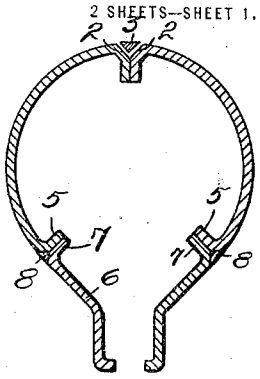


Fig-2

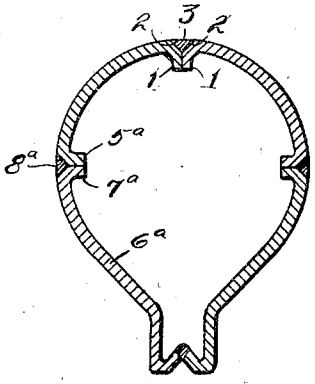


Fig-3

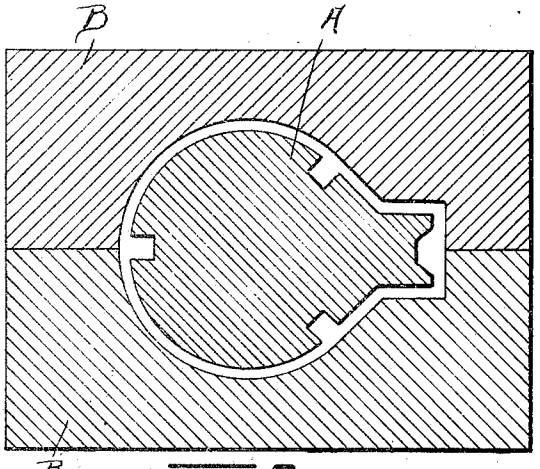


Fig-6

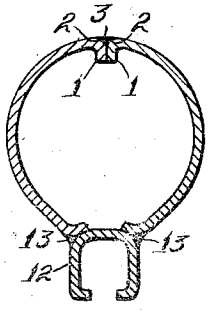


Fig-5

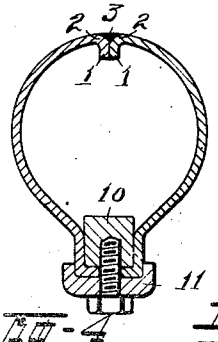


Fig-4

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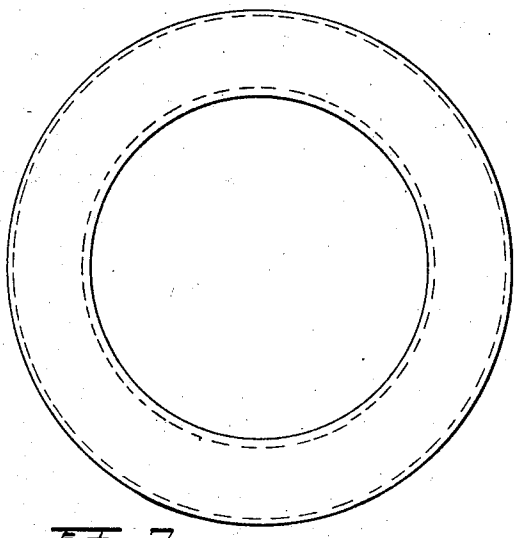


Fig-7

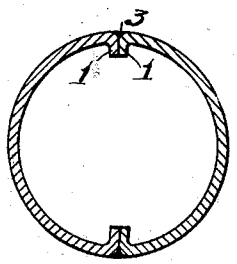


Fig-11

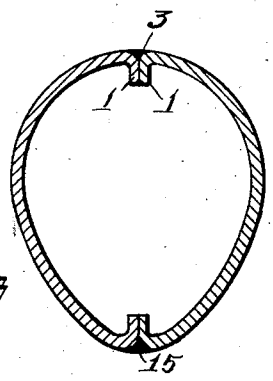


Fig-8

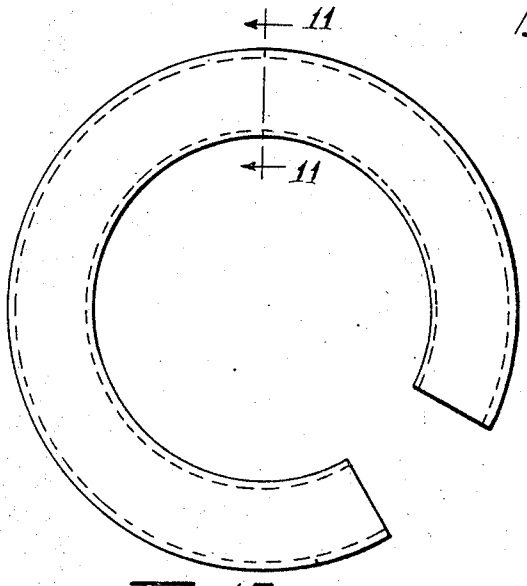


Fig-10

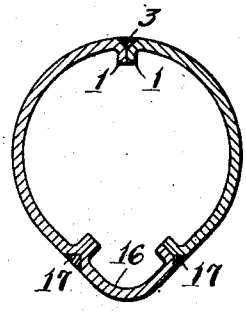


Fig-9

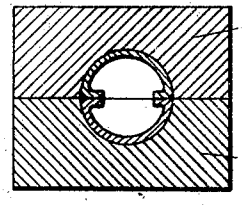


Fig-12

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UNITED STATES PATENT OFFICE.

DON A. CLARK AND CLYDE E. LOWE, OF CLEVELAND, OHIO, ASSIGNORS TO THE CLYDE E. LOWE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

TIRE-FORMING MANDREL.

1,316,274. Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed March 7, 1919. Serial No. 281,281.

To all whom it may concern:

Be it known that we, DON A. CLARK and CLYDE E. LOWE, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Tire-Forming Mandrels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to mandrels for use in making pneumatic tires and the various parts and adjuncts thereof such as casings, tubes, liners, patches, and the like. These mandrels vary slightly in cross section according to the use intended and according to the manufacturer, but are alike in having a nearly or wholly complete torus shape. Thus the mandrel for an inner tube is generally of substantially circular cross section but does not form a complete ring owing to the necessity for removing the tube therefrom; a mandrel for a liner is generally of ovoid cross section and constitutes a complete ring; and a mandrel or core for outer casings is distinguished by the possession of a continuous internal bead or rib to assist in forming the tire beads. The dimensions of these devices depend upon the size of tire to be made thereon.

These devices were formerly made of cast iron and brought to the necessary exactness of shape and smoothness of surface by turning on a boring mill. This was extremely expensive and also resulted in a very heavy mandrel, entailing much expense in operation. To overcome these disadvantages we have devised mandrels of sheet metal as described and claimed in our Patent No. 1,273,032, granted July 16, 1918, and in our application Serial No. 242,019, filed June 26, 1918, and No. 272,412 filed Jan. 22, 1919.

The object of the present invention is the strengthening of these sheet metal mandrels the better to resist denting and deformation; and the provision of local reinforcement to the vulnerable points of such mandrels so as to enable equal strength to be obtained with the use of thinner metal, thus enhancing the advantages of cheapness, lightness, and permanence. It is found that the chief deformation of these devices comes from peripheral denting caused by dropping the mandrels edgewise upon stone floors and the like hard objects; and the essence of the present invention resides in the formation of integral inturned stiffening flanges at the vulnerable points.

In the drawings accompanying and forming a part of this specification we have shown certain embodiments of our said invention as applied to different forms and constructions of mandrel although it will be understood that these drawings are illustrative only and are not intended to limit us to the particular forms and embodiments therein delineated. In these drawings Figure 1 is a plan view of a flanged or key hole core as employed in the manufacture of pneumatic tire casing; Figs. 2, 3, 4, and 5 are cross sectional views showing different details of construction of such key hole cores, all however embodying our said invention; Fig. 6 is a cross sectional view of a set of finishing dies and the mandrel employed therewith as designed for the manufacture of the core whose cross section is shown in Fig. 2; Fig. 7 is a front view of a reliner or flangeless core; Figs. 8 and 9 are sectional views of two different constructions of such cores; Fig. 10 is a plan view of an inner tube mandrel embodying our improvement; Fig. 11 is a sectional view of the mandrel shown in Fig. 10; and Fig. 12 is a cross sectional view of the dies used for compressing to its finished stage the section shown in Fig. 11.

The devices shown in Figs. 1–6 are constructed essentially in accordance with the process set forth and claimed in our copending application filed June 26, 1918, Serial No. 242,019, the same being a division of our earlier application filed October 22, 1917, Serial No. 197,785; that is to say: suitable pieces of sheet metal are first formed by stamping between dies to the appropriate channel-shape, then welded together to form arcuate hollow bodies, a suitable

mandrel is inserted as shown at *a* in Fig. 6, and the bodies forced to the requisite shape and size by striking between finishing dies B—B as shown in Fig. 6, whereby the metal of the entire core is forcibly stretched to its completed shape under this single blow, and the various strains due to welding and other operations are overcome. According to our present invention, the edges of the blanks which form the peripheral portion of the section, instead of being sheared flush and smooth are bent inwardly to form a continuous internal flange 1—1. This produces the double advantage of providing a stiffening web at that point and also, by rounding the outer edge of the bend as at 2—2, to produce a shallow groove for the reception of the weld material 3 and thus avoids the necessity of chamfering or beveling the edges. This weld metal, added to the stiffness produced by the flanges 1—1 produces a kind of peripheral bridge which is extremely efficacious in preventing denting or distortion when the core is dropped edgewise upon the floor or against other hard objects as is frequently and accidentally done in practical use.

The opposite margins of the several blanks may be handled in any one of many ways, and the other welds, if any, may fall at any one of many different points. In Fig. 2 these are shown at 5—5, as located along the flat sides of the core and somewhat removed from the internal rim, the core being completed by additional channel-pieces or blanks 6 which similarly have inturned flanges 7 which match the flanges 5 and by the bending produce a groove for the weld material at 8. In the embodiment shown in Fig. 3 the side seams are formed at the rounded side of the core, 90° from the first seam, but are formed in the same manner, namely by the inturned flange 5^a abutting against the flange 7^a of a blank section 6^a and joined by a weld 8^a. This arrangement has the added advantage of giving great stiffness against dents by sidewise blows.

The modification shown in Fig. 4 comprises only two blanks and one weld, the free edges of the blanks being clamped to a filler member or stiffening ring 10, by means of the securing ring or clamp 11, as described in our patent granted July 16, 1918, No. 1,273,032.

In the modification illustrated in Fig. 5, the rim is made of a separate member 12 rolled to channel form, and the body of the mandrel is secured thereto by longitudinal welds 13—13, one at each side. In this embodiment the core is brought to finished form by the compression method described and claimed in our copending application filed January 22, 1919, Serial No. 272,412.

The reliner mandrels shown in Figs. 7, 8, and 9 are formed around their outer peripheries with the same inturned flanges 1—1 forming a peripheral stiffening bridge and also defining a space for the weld metal 3. The remainder of the article can be made in any desired way, for example by welding the two side-members directly together at 15, as shown in Fig. 8, or by inserting a channel as shown at 16, in Fig. 9, and welding the same at two places 17—17; or in numerous other modes not illustrated.

Likewise the tube mandrels shown in Figs. 10 and 11 which are exactly circular in section have the same identical peripheral bridge formed by the inturned flanges 1—1 and weld metal 3. All the last devices are preferably fashioned according to the process set forth in our application No. 272,412, last above mentioned, namely by compression in finishing dies *c*—*c* as shown in Fig. 12, operating upon the last named tube mandrel. The tube mandrel shown in Fig. 10 is discontinuous while the remaining mandrels are continuous owing to the fact that casings and liners, while continuous, are split all the way around and can hence be removed from a circular complete mandrel, while inner tubes are made of a complete tubular form but not endless which necessitates a discontinuous mandrel to permit their removal.

It will be understood that the generic idea of our invention can be realized by many means and constructions not herein specifically set forth, wherefore we do not restrict ourselves to our exact disclosure except as pointed out in the claims hereto annexed.

Having thus described our invention what we claim is:—

1. A tire forming mandrel having a body part made of sheet metal in approximately torus form, said body part being formed at its portion of greatest diameter with an integral inturned stiffening rib.

2. A tire forming mandrel having a hollow curvilinear body part made of sheet metal and formed with a longitudinal internal, peripheral stiffening rib.

3. A tire forming mandrel comprising a hollow arcuate sheet metal body having at its portion of greatest diameter an inturned integral stiffening flange.

4. A tire forming mandrel comprising a plurality of arcuate sheet metal channel members having inturned margins, said channel members being assembled together to form a hollow body and welded together along their meeting edges, whereby said inturned margins will form reinforcing ribs.

5. A tire forming mandrel comprising a hollow arcuate sheet metal body having at its portion of greatest diameter an internal, rigid, circumferential reinforcement.

6. A tire forming mandrel comprising a plurality of arcuate sheet metal channel

members located with their margins in contact and welded together, said margins being turned inwardly for the double purpose of producing increased stiffness and producing a groove for the weld-metal.

7. A tire forming mandrel comprising a plurality of arcuate sheet metal channel members each having its margin turned inwardly to produce a flange and welded to the margin of the adjacent member.

In testimony whereof, we hereunto affix our signatures.

DON A. CLARK.
CLYDE E. LOWE.