Oct. 6, 1931. W. N. BOOTH 1,826,449

METHOD OF FORMING VEHICLE WHEEL RIM MEMBERS

Filed April 23, 1928 4 Sheets-Sheet 1

Fig. 3.

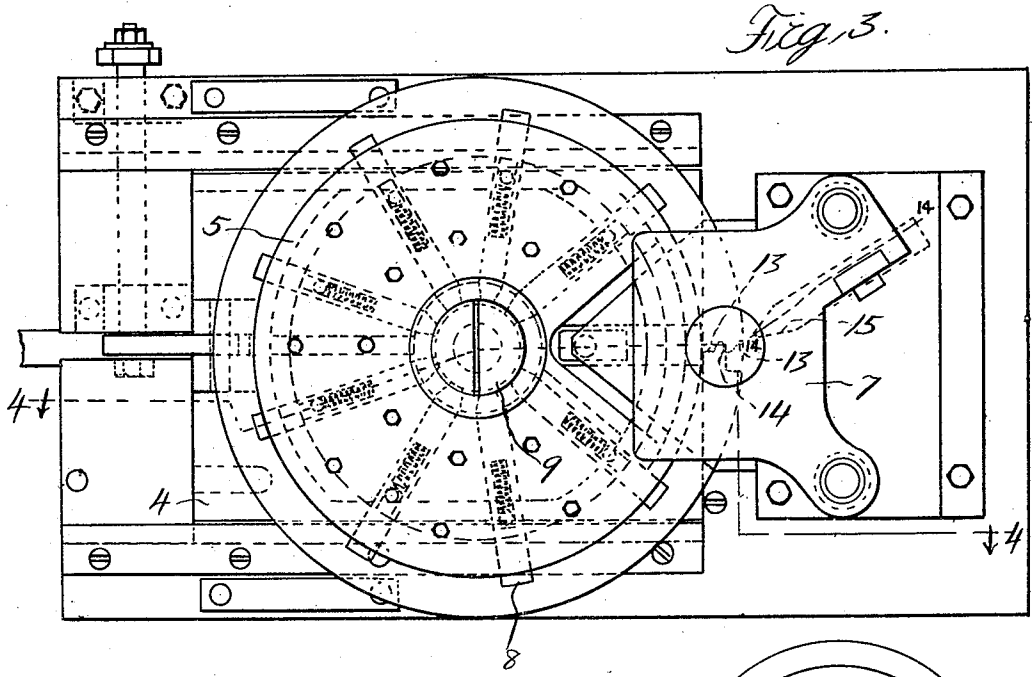
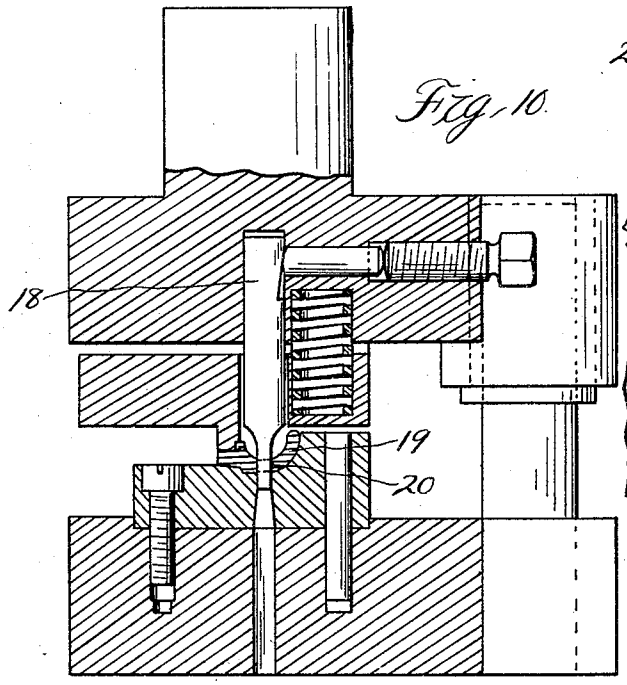


Fig. 10.



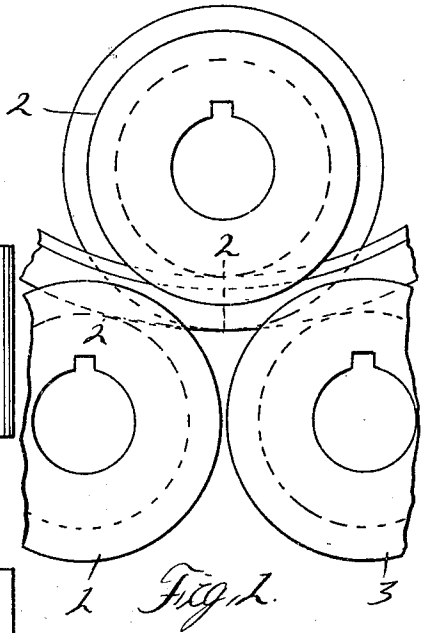


Fig. 2.

Inventor
William N. Booth

By Whittemore Hulbert & Whittemore Belknap
Attorneys

Oct. 6, 1931. W. N. BOOTH 1,826,449

METHOD OF FORMING VEHICLE WHEEL RIM MEMBERS

Filed April 23, 1928 4 Sheets-Sheet 2

Fig. 7.

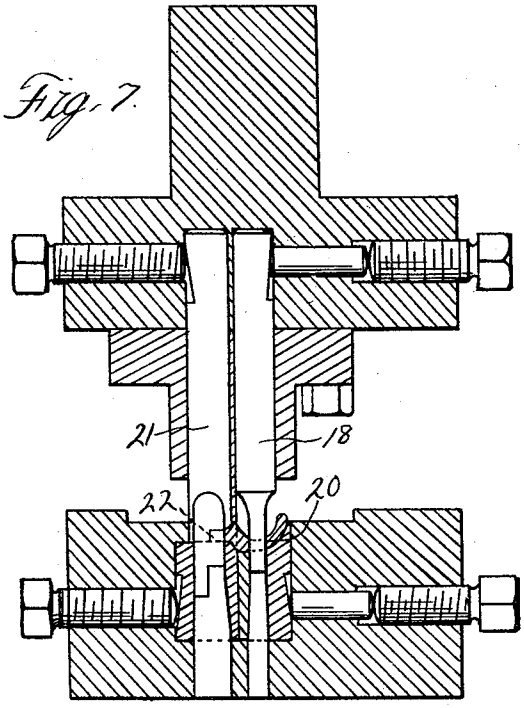


Fig. 13.

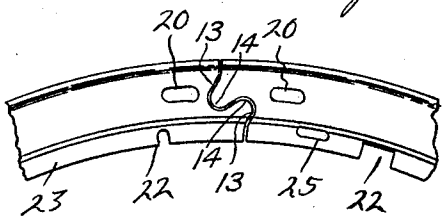


Fig. 11.

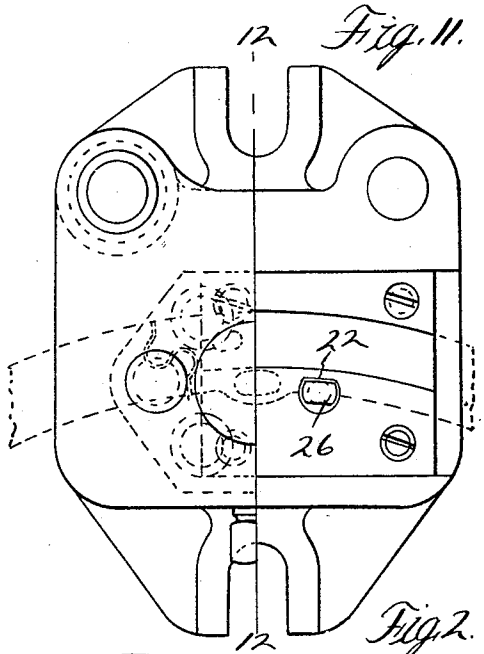


Fig. 12.

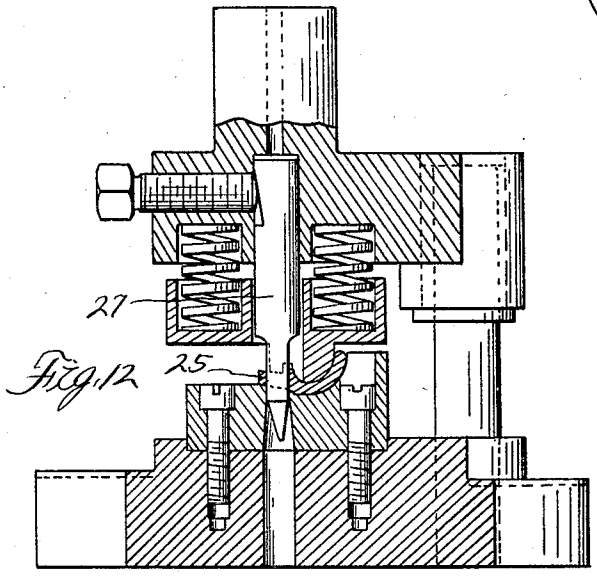
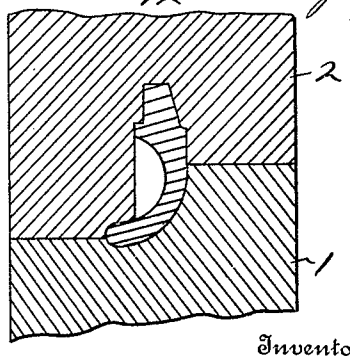


Fig. 2.



Inventor
William N. Booth

By Whittemore, Hulbert & Whittemore, Belknap
Attorneys

Oct. 6, 1931. W. N. BOOTH 1,826,449

METHOD OF FORMING VEHICLE WHEEL RIM MEMBERS

Filed April 23, 1928 4 Sheets-Sheet 3

Fig. 4.

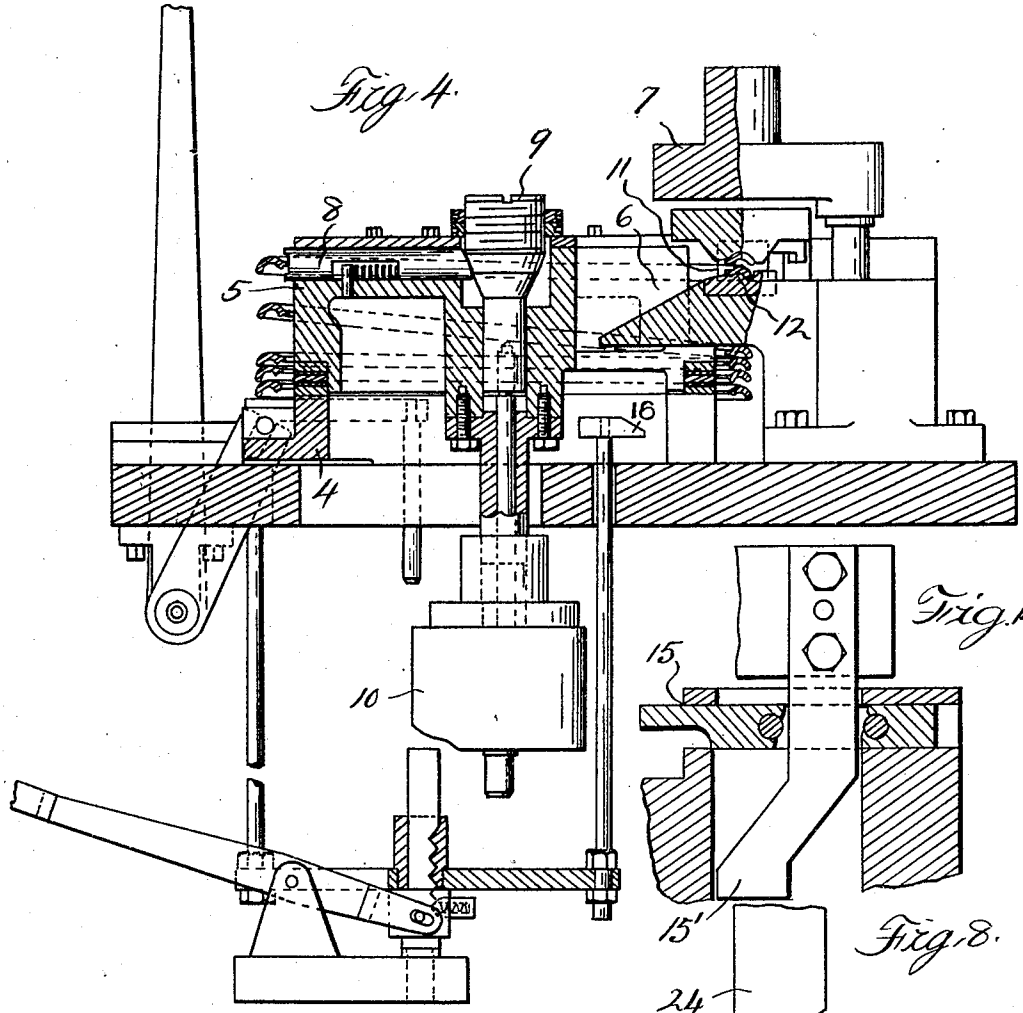


Fig. 14.

Fig. 8.

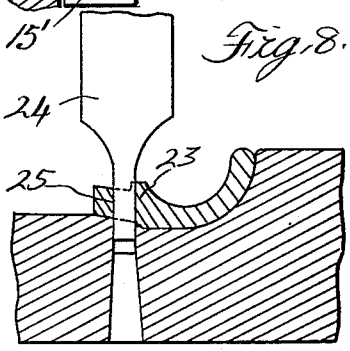
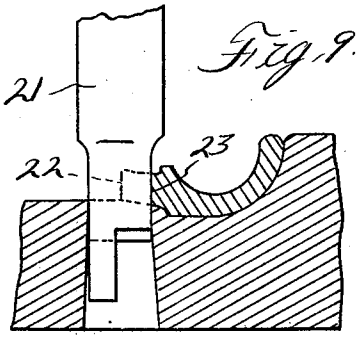


Fig. 9.



Inventor
William N. Booth

By Whittemore, Hulbert & Whittemore, Belknap
Attorneys

Oct. 6, 1931. W. N. BOOTH 1,826,449

METHOD OF FORMING VEHICLE WHEEL RIM MEMBERS

Filed April 23, 1928 4 Sheets-Sheet 4

Fig. 5.

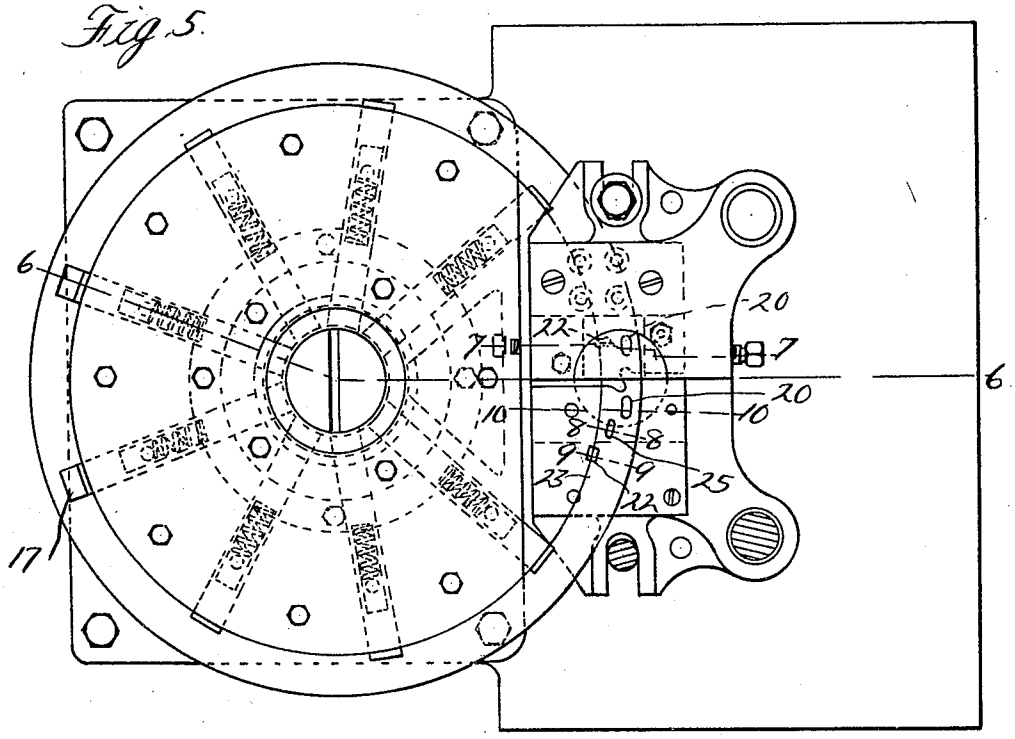
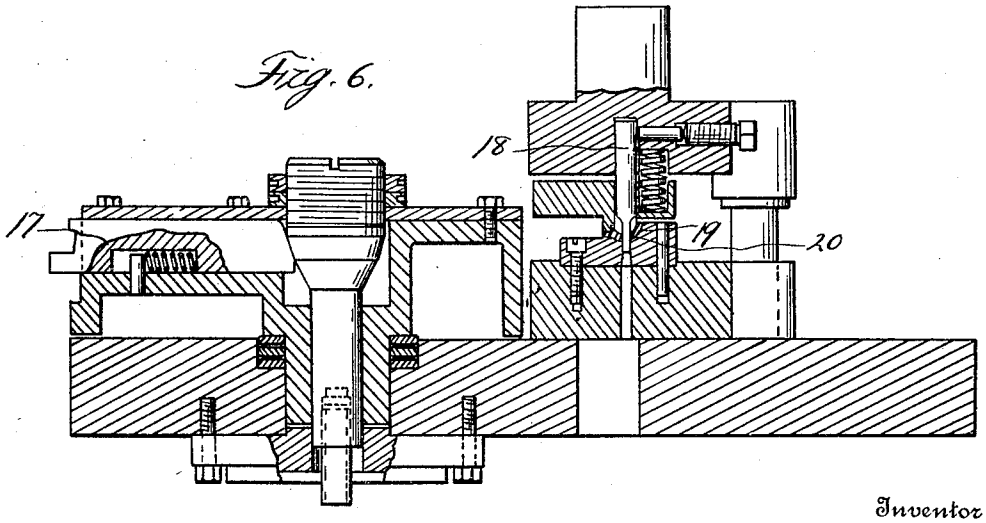


Fig. 6.



Inventor

William N. Booth

By Whittemore Hulbert & Whittemore Belknap

Attorneys

Patented Oct. 6, 1931

1,826,449

UNITED STATES PATENT OFFICE

WILLIAM N. BOOTH, OF DETROIT, MICHIGAN, ASSIGNOR TO KELSEY-HAYES WHEEL CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF NEW YORK

METHOD OF FORMING VEHICLE WHEEL RIM MEMBERS

Application filed April 23, 1928. Serial No. 272,167.

The invention relates to the manufacture of vehicle wheel rim members and refers more particularly to the manufacture of detachable side rings for tire carrying rims of the solid base type. Side rings have heretofore been made from individual strips of stock, each having a length approximately equal to that of the side ring made therefrom. Each strip of stock was formed into an annulus by suitable means such as a forming roll machine and as a result had flats at its ends which were removed either by severing the same or by a number of expensive forming operations, either of which greatly increased the cost of manufacture of the side ring.

It is an object of my invention to reduce the cost of manufacture of the side ring. Another object is to accurately form the side ring and make the same circularly true. With these as well as other objects in view, the invention resides in the novel features as more fully hereinafter set forth.

In the drawings:

Figure 1 is a side elevation of a portion of a forming roll machine and showing the manner of carrying out the first step of the method embodying my invention;

Figure 2 is a cross section on the line 2—2 of Figure 1;

Figure 3 is a plan view of a severing machine and showing the manner of carrying out the next steps in the method;

Figure 4 is a sectional side elevation taken on the line 4—4 of Figure 3;

Figure 5 is a plan view of a piercing machine and showing the manner of carrying out the next steps in the method;

Figures 6, 7, 8, 9 and 10 are cross sections, respectively, on the lines 6—6, 7—7, 8—8, 9—9 and 10—10 of Figure 5;

Figure 11 is a plan view of a swaging machine and showing the manner of carrying out the next step;

Figure 12 is a cross section on the line 12—12 of Figure 11;

Figure 13 is a plan view of a portion of the completed rim member;

Figure 14 is a sectional view taken on the line 14—14 of Figure 3.

The apparatus illustrated herein for carrying out the method about to be described is shown and described in detail in my copending application, Serial No. 266,713, filed April 2, 1928. It should be understood, however, that the apparatus shown herein is for the purpose of illustration only and that the following method is not limited to the use of such apparatus.

With my method, a strip of stock having a section corresponding to that of the side ring of a tire carrying rim of the solid base type and having a length sufficient to produce a plurality of side rings is inserted between the forming rolls 1, 2 and 3 of a usual forming roll machine, such as a pyramid roll machine, shown in Figures 1 and 2. These rolls are arranged to bend the stock with a constant radius of curvature, as long as the stock is completely between the rolls. The stock, after passing between the rolls, is deflected out of the path of the unformed stock by a suitable deflector upon the machine, which compels the stock to assume a spiral form or more specifically a helical form. The extent to which the stock is deflected is preferably within the limits of elasticity of the stock.

After the strip has been coiled it is then severed. However, before severing the convolutions of the coiled strip, I size the same and further so position them that they are severed to accurate length. For carrying out these steps I may use the machine shown in Figures 3 and 4, in which 4 is the holder or carrier for the coiled strip, 5 is the sizing means for the convolutions of the coiled strip, 6 is the means for separating the convolutions of the coiled strip and 7 is the severing means. The sizing means includes the radially movable jaws 8 at the upper end of the holder which are adapted to be moved radially outward to engage the inner edge of the uppermost convolution by means of the plunger 9, which latter is actuated by a piston in the air cylinder 10. The holder is mounted upon the bolster plate of the machine so that it may be moved toward or away from the separating means 6, which latter is in the nature of a wedge-shaped member engageable between the uppermost convolution and the next lower convolution upon movement of the

holder toward the wedge-shaped member. This wedge shaped member raises the uppermost convolution to a position to be engaged by the jaws 8 of the sizing means, which latter are then actuated to size the uppermost convolution and to make the same circularly true. The holder with the coiled strip thereon may then be rotated to a position to sever the uppermost end portion of the coiled strip by means of the punch 11 and die 12, the latter being stationary with the wedge-shaped member and the former being vertically movable in a direction parallel to the axes of the holder and coiled strip. As shown in the present instance, the ends of the convolutions forming the side rings are S-shaped and interlocking, each end having parallel portions 13 and an intermediate or connecting return curved portion 14, the arrangement being such that the ends when together form cooperating interlocking ears and recesses. After the strip has been coiled, the holder with the coiled strip is rotated to engage the free upper end thereof with a positioning finger 15 and the punch 11 is again lowered for the purpose specified above. In this connection it is to be noted that the finger 15 is actuated by a cam 15′ carried by the plunger. The arrangement is such that when the punch is in its uppermost position, the positioning finger is forced inwardly by the cam to engage the uppermost end of the coiled strip to position this end prior to severing the spaced and sized convolution. During the downward movement of the punch, the cam operates to withdraw the positioning finger, preferably just after the clamping and stripping block has engaged the separated and sized convolution and at the same time sufficiently in advance of the punch so as not to interfere therewith.

After the severing operation the holder 4 may be moved away from the wedge-shaped separating member and the jaws 8 of the sizing means retracted, whereupon the severed convolution may be removed from the machine. The coiled strip is then raised to a position such that when the holder is again moved toward the wedge-shaped separating member the latter will engage between the uppermost convolution and the next lower convolution. This raising means includes the rest blocks 16 which are engageable with the lowermost convolution of the coiled strip.

It will be seen that the machine above described will separate the successive convolutions of the coiled strip from the remaining convolutions, size these separated convolutions and then sever the separated and sized convolutions.

After the convolutions have been severed, they may then be operated upon individually to form the completed side ring. In the present instance, each convolution is operated upon by the machine shown in Figures 5, 6, 7, 8 and 9, which has means for sizing and holding the severed convolutions circular and has a punch holder carrying a number of punches adapted to cooperate with corresponding dies to pierce the several convolutions. The means for sizing and holding the severed convolutions circular comprises radially movable jaws 17 which operate in the same manner as the jaws 8. The punch holder has the punches 18 for piercing the tire engaging portion 19 of the severed convolution near its ends to form the openings 20 therein. The punch holder also has the shearing punches 21 for forming the open ended openings 22 near the ends of the base portion 23 of the convolution. The punch holder further carries the piercing punch 24 for forming the opening 25 near one end of the base portion 23 of the convolution.

After these openings have been formed the convolution is removed from this machine and placed in the machine shown in Figures 10 and 11. This convolution is positioned by means of the pin 26 which engages in one of the open ended openings 22 and is operated upon by the punch 27 which engages in the opening 25 and swages the metal to enlarge this opening.

The convolution as now completed forms the side ring shown particularly in Figure 12 and by reason of the method employed, this side ring is circular and is as nearly accurately formed as commercially possible so that it may be highly finished and present a neat and pleasing appearance. With this method a material decrease in the cost of manufacture of the side ring is also effected.

What I claim as my invention is:

1. The method of forming a vehicle wheel rim member, which consists in forming with a constant curvature stock having a section substantially of the completed rim member and of a length to produce a plurality of rim members, deflecting the formed stock out of the path of the stock to be formed and into a helix, applying radial pressure to the convolutions of the helical stock to size the same, and severing the sized convolutions.

2. The method of forming a vehicle wheel rim member, which consists in forming with a constant curvature stock having a section, substantially of the completed rim member and of a length to produce a plurality of rim members, deflecting the formed stock out of the path of the stock to be formed and into a helix, separating the convolutions of the helical stock, and severing the separated convolutions at predetermined points and in a direction substantially parallel to the axis of the helical stock.

3. The method of forming a vehicle wheel rim member, which consists in forming with a constant curvature stock having a section substantially of the completed rim member and of a length to produce a plurality of rim

members, deflecting the formed stock out of the path of the stock to be formed and into a helix, separating the convolutions of the helical stock, applying radial pressure to the separated convolutions to size the same, and severing the separated and sized convolutions at predetermined points.

4. The method of forming a vehicle wheel rim member, which consists in forming with a continuous arc stock having a section substantially of the completed rim member and a length to produce a plurality of rim members, deflecting the formed stock out of the path of the stock to be formed and into a helix, separating the convolutions of helical stock, applying radial pressure to the separated convolutions, and shearing in a direction substantially parallel to the axis of the helical stock the sized convolutions at predetermined points.

5. The method of forming a vehicle wheel rim member, which consists in forming a coiled strip having a section substantially of the completed rim member and a length to produce a plurality of rim members, applying radial pressure to the end convolutions of the coiled strip to size the same, and severing the sized convolutions.

6. The method of forming a side ring of a tire carrying rim, which consists in forming a coiled strip having a section substantially of the side ring and a length to produce a plurality of side rings, axially separating successive convolutions of the coiled strip from the remaining convolutions, applying radial pressure to the separated convolutions to size the same, and severing the sized convolutions.

7. The method of forming a side ring of a tire carrying rim of the solid base type, which consists in forming a coiled strip having a section substantially of the side ring and a length to produce a plurality of side rings, applying radial pressure to successive convolutions of the coiled strip to size the same, severing the sized convolutions, and subsequently fashioning the severed convolutions.

In testimony whereof I affix my signature.

WILLIAM N. BOOTH.