July 5, 1927. 1,634,700

H. H. WILLIAMS

METHOD AND APPARATUS FOR MAKING WHEELS

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Fig. 1.

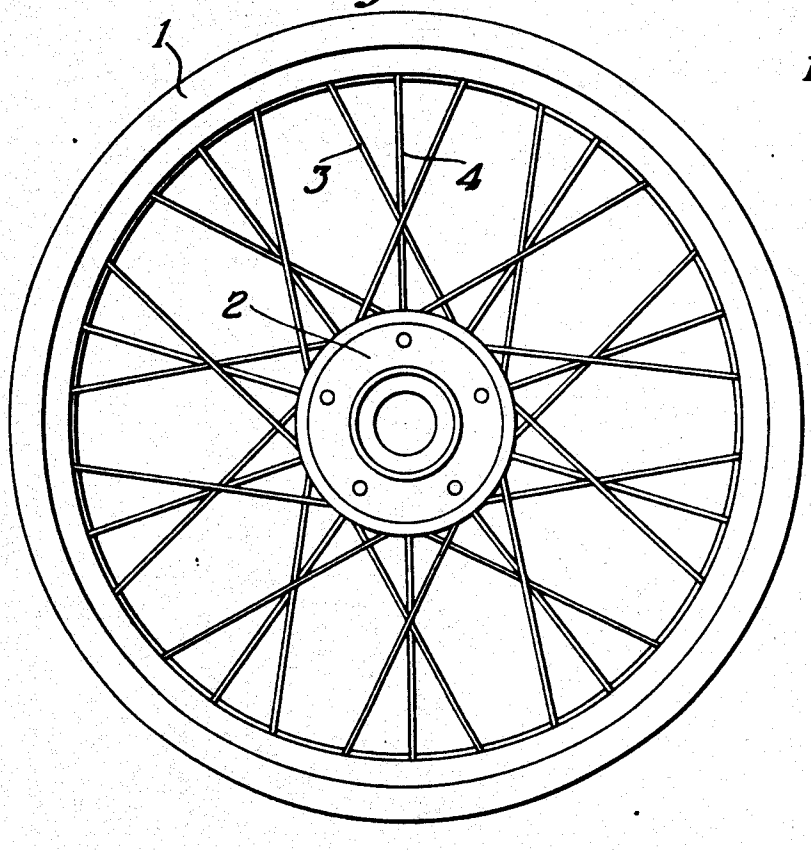


Fig. 2.

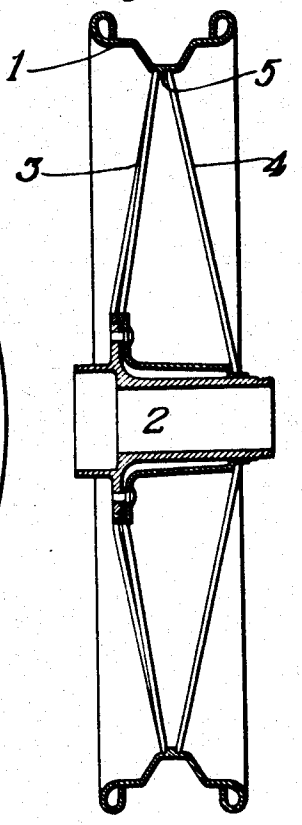


Fig. 3.

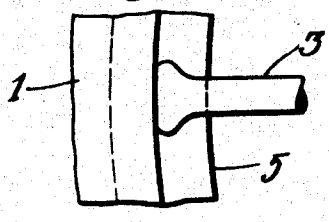


Fig. 4.

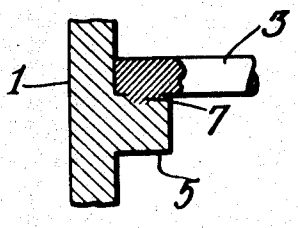
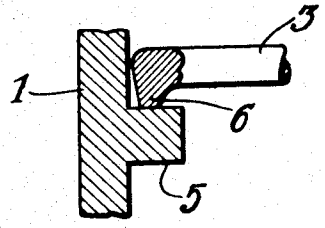


Fig. 5.



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Fig. 6.

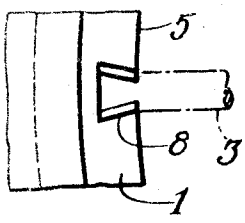


Fig. 7.

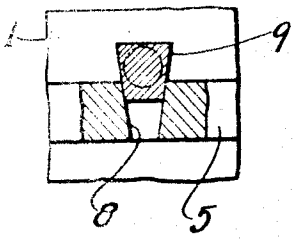


Fig. 8.

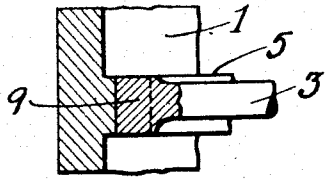


Fig. 9.

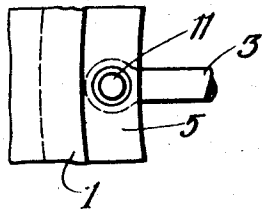


Fig. 10.

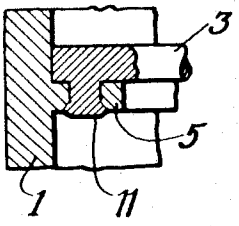


Fig. 11.

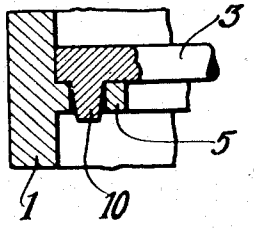


Fig. 12.

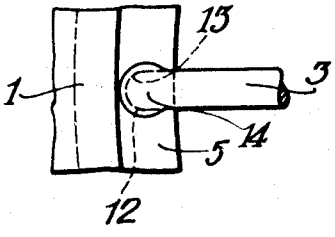


Fig. 13.

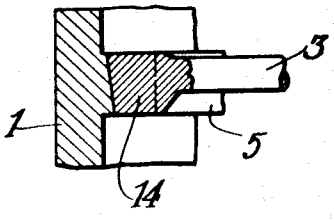
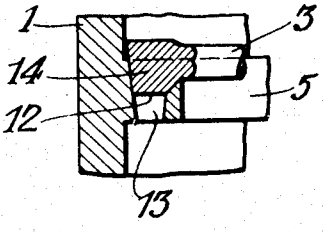


Fig. 14.



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Fig. 15.

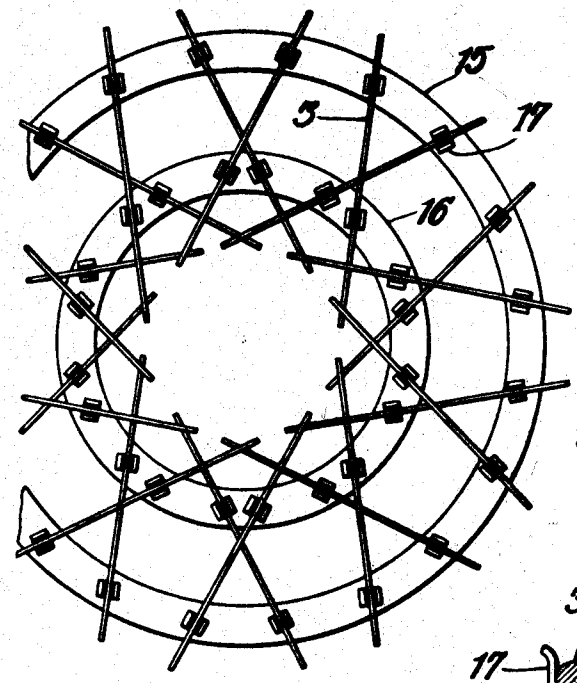
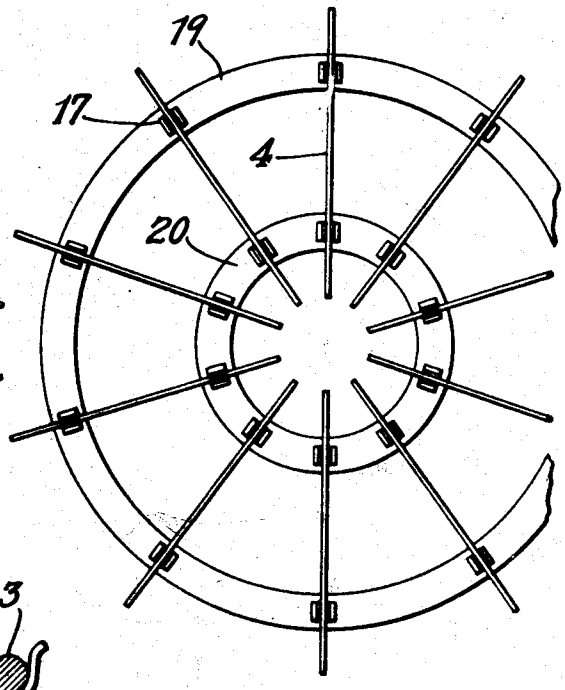


Fig. 17.



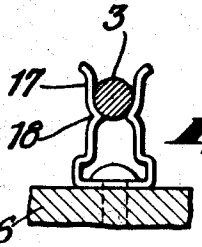
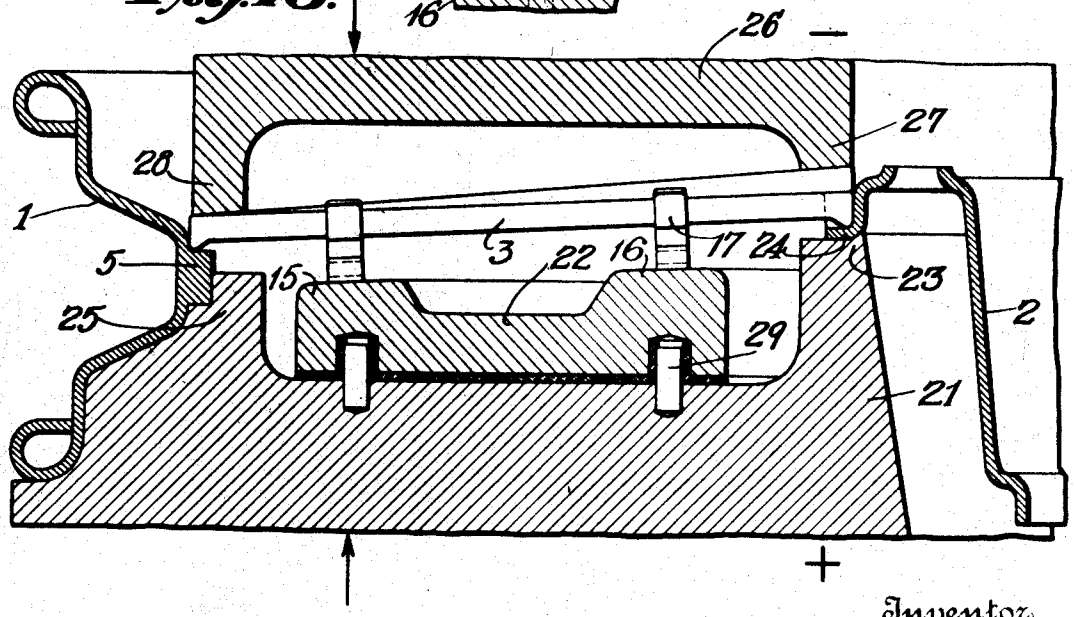


Fig. 16.

Fig. 18.



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METHOD AND APPARATUS FOR MAKING WHEELS

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Fig. 19.

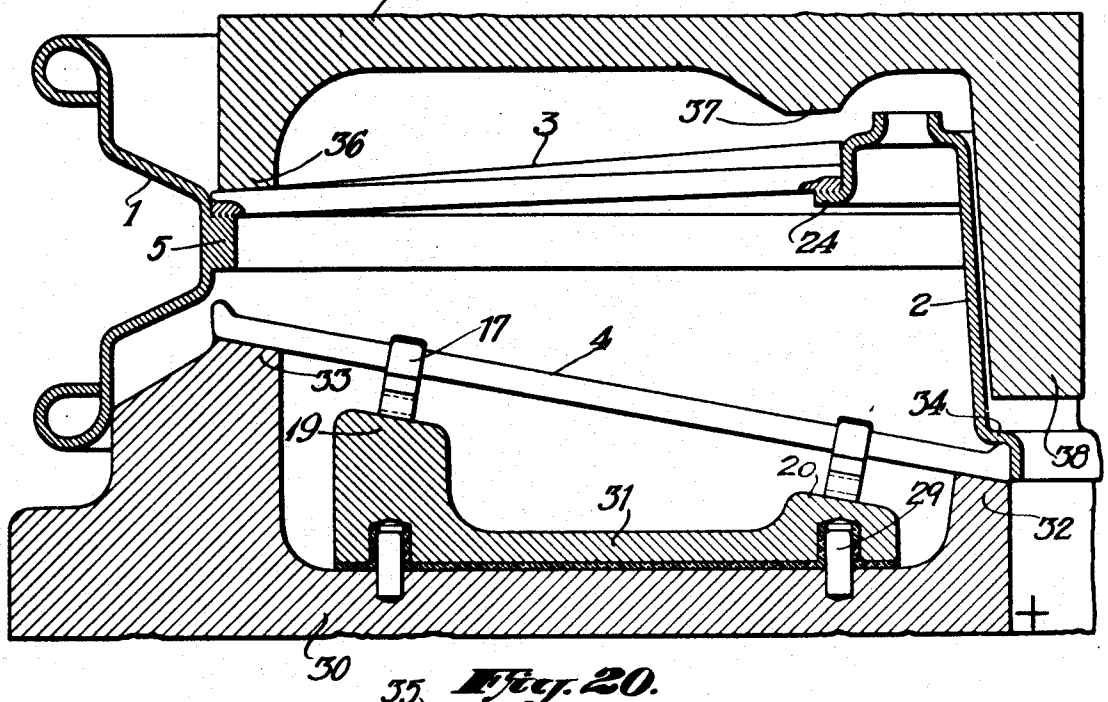
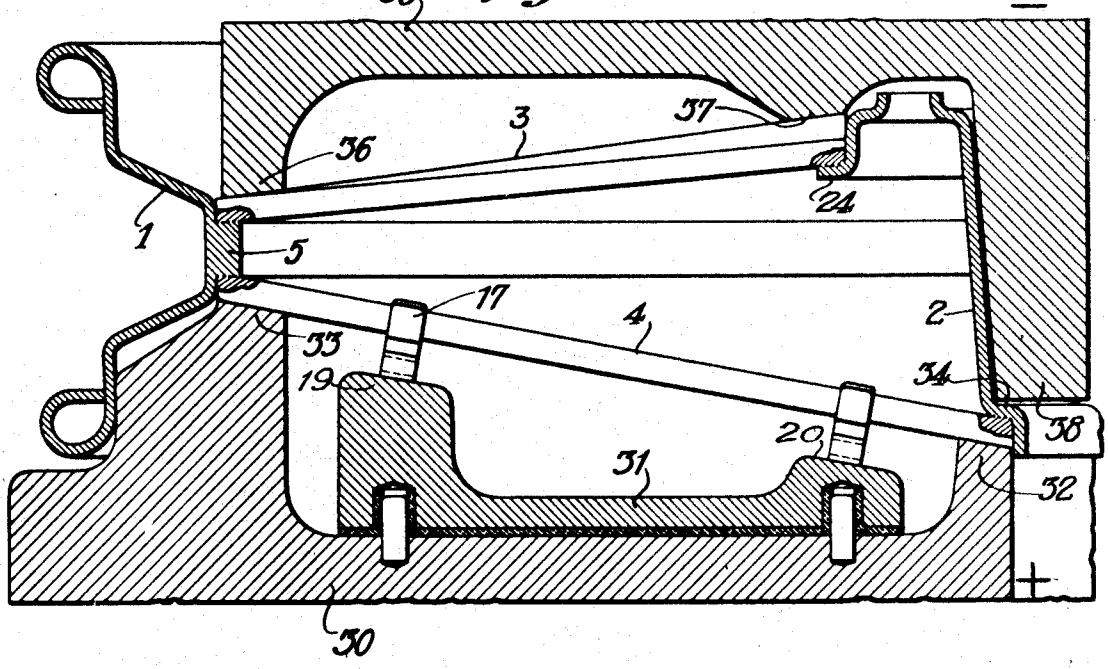


Fig. 20.



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D. Anthony Mann

Patented July 5, 1927. 1,634,700

UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR MAKING WHEELS.

Application filed August 27, 1926. Serial No. 131,835.

My invention aims to provide certain improvements in the production of wheels with wire or rod spokes.

The accompanying drawings illustrate embodiments of the invention.

Figs. 1 and 2 are respectively a plan and a vertical section of a typical wire or rod spoke wheel;

Figs. 3, 4 and 5 illustrate one type of welded joint between the rim and a spoke; Fig. 3 being a plan and Fig. 4 a section of the joint and Fig. 5 a section before welding;

Figs. 6, 7 and 8 illustrate another type of joint; Fig. 6 being a plan of the rim; Fig. 7 a cross-section before welding and Fig. 8 a longitudinal section after welding;

Figs. 9, 10 and 11 illustrate another style of joint; Figs. 9 and 10 being an underside plan and a section of the finished joint and Fig. 11 a section before completion;

Figs. 12, 13 and 14 are similar views of another style of joint;

Fig. 15 is a plan of one group of spokes assembled in a jig preparatory to welding;

Fig. 16 is a section through a spring clip of the jig;

Fig. 17 is a plan of another type of jig used for the radial spokes;

Figs. 18, 19 and 20 are radial sectional views in the successive stages of the welding operations.

Referring to the embodiments of the invention illustrated, the wheel has a rim 1 and a hub 2 between which are two sets of spokes 3 and 4 which are tangential and radial respectively; the tangential spokes 3 at one side and the radial spokes 4 at the other. But the particular direction of the wires or spokes is not important to this invention.

The ends of the spokes are welded to the rim and to the hub by pressure in the axial direction, preferably using the method of the Murray Reissue Patent No. 15,466 of October 10, 1922, in which the parts are pressed together and a current of extremely high ampere strength passed across the joint for a very brief regulated period of time. This method may be applied to the welding of all the joints for both sets of spokes in a single operation or for welding the joints in various groups successively.

As shown in Figs. 3, 4 and 5, the rim 1 has a flange 5 in a plane transverse to the axis, and the end of the spoke is formed with a lateral projection 6 which is pressed down on the flange and welded as indicated at 7.

According to Figs. 6, 7 and 8 the flange 5 is formed with tapered notches 8 and the end 9 of the spoke is tapered and forced down into the notch 8 while the welding current is passed, making a joint as in Fig. 8.

According to Figs. 9, 10 and 11 the flange 5 is formed with a circular hole in it and the spoke 3 has a lateral pin 10 which projects through the hole and is upset or riveted in the welding operation as indicated at 11.

According to Figs. 12, 13 and 14 the spoke 3 is provided with a laterally projecting end 12 which fits partially into a hole 13 in the flange 5 and in the welding operation the parts are welded and also swaged together to bring the end of the spoke to the shape shown at 14.

Various other styles of welded joint may be provided by properly shaping the ends of the spokes and the flanges on the rim and hub. While it is not essential in all cases, yet it is preferable to design the joint so that the parts are pressed together in the axial direction as hereinafter described.

The spokes and other parts are carried in jigs which hold them in proper relative position during the welding operation.

Fig. 15 shows the shape of jig for the tangential spokes. A pair of rings 15 and 16, which may be parts of a single structure, carry upwardly projecting clips 17, shown separately in Fig. 16, with arms which spring inward and clamp the spokes 3. The arms are bent inward to provide stops 18 which limit the penetration of the spokes into the clips. These clips, of course, release the spokes when the welding has been performed and the jigs are to be removed. Such clips are located at such points on the rings 15 and 16 as to locate the spokes in the desired lines.

According to Fig. 17 similar rings 19 and 20 constitute parts of the jig, and the spring clips 17 are so located as to carry the spokes 4 in radial positions. In the remaining figures it is assumed that we are dealing with tangential spokes in one set and radial spokes in the other; it being understood that the jig with the operative faces of the electrodes will be fitted to whatever arrangement of the spokes may be desired.

In Fig. 18 the lower electrode 21 is shown

carrying a jig designated as a whole by the numeral 22, with spring clips 17 holding the spokes 3 in place. The electrode has a shoulder or abutment 23 which bears under a flange 24 on the wheel hub and has a similar shoulder 25 which bears under the flange 5 of the wheel rim and which fits within the rim so as to accurately center the latter. The shoulder 23 also is slightly concaved so as to fit within and centre the flange 24 of the hub. The flange 24 of the hub is arranged with successive parts in different planes where the inner ends of the spokes are to be welded in order to allow for the crossing of the spokes in the tangential arrangement; the operative faces of the electrodes being correspondingly stepped. If this set of spokes were radial the flange 24 would be in a single plane around its circumference and the electrode correspondingly shaped.

The upper electrode 26 has inner and outer projecting annular portions 27 and 28 respectively which bear on the spokes near their ends and transmit the current thereto. The jig 22 is located on the lower electrode by means of pins 29 registering with holes in the underside of the jig. The parts are located in the position of Fig. 18. The application of pressure and current then results in a quick welding of the entire set of spokes at both ends.

The second set of spokes 4 are welded as in Fig. 19 by pressing the rim and hub downward against the spokes. A lower electrode 30 carries a jig 31 with spring clips 17 which locate the spokes with their ends resting on shoulders 32 and 33 of the electrode. The partially welded wheel is then placed on the lower electrode with the flange 34 of the hub resting on the inner end of the spokes and the top electrode is brought into position as in Fig. 19.

The first set of spokes 3 are welded in a nearly horizontal position, that is, with their outer ends nearly on the same transverse plane as their inner ends. After these spokes have been welded, they will hold the rim 1 up above the outer ends of the rods 4 as shown in Fig. 19.

In the welding of the outer ends, the rim 1 will have to be pressed downward. The upper electrode 35 has a projection 36 which bears against the flange 5 of the rim and has projections 37 and 38 which in the initial position stand clear of the flanges 24 and 34 of the hub. When the pressure is applied the part 36 forces the flange 5 of the rim into contact with the outer ends of the spokes and brings shoulders 37 and 38 into contact with flanges 24 and 34 respectively. The current passes in the usual way, the pressure is continued and welds are effected simultaneously upon both ends of all of the spokes of the set, Fig. 20.

The pressing down of the outer ends of the first set of spokes 3, while their inner ends are held in their original plane, has the effect of putting the spokes 3 under tension during the welding operation, since the rim, of course, cannot yield inwardly. Upon releasing the wheel by raising the upper electrode, the tension of the first welded group of spokes tends to restore the rim to its original transverse plane and thus puts a tension on the second welded group of spokes; equalizing the tension in the two sets of spokes.

Various modifications of the embodiment of the invention described may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:

1. In the manufacture of a spoked wheel, the method which consists in assembling a plurality of spokes in proper relative positions and holding them so by means separate from the hub and rim, applying them thus assembled to a hub and rim and welding them to the hub and rim.

2. In the manufacture of a spoked wheel, the method which consists in welding simultaneously to a hub and rim the entire set of spokes at one side of the wheel and welding all the spokes of another set simultaneously to the opposite side of the hub and rim.

3. In the manufacture of a spoked wheel, the method which consists in welding the spokes thereof to the hub and to the rim simultaneously.

4. In the manufacture of a spoked wheel, the method which consists in welding a set of spokes at one side and putting said first welded set of spokes in a state of tension while welding a second set at the other side.

5. In the manufacture of a spoked wheel, the method which consists in providing lateral projections on the ends of the spokes and welding them by pressure and current through said projections to transverse shoulders of the adjacent part of the wheel.

6. In the manufacture of a spoked wheel, the method which consists in welding the spokes to the adjacent parts with the passage of current and the application of pressure in an axial direction.

7. In the manufacture of a spoked wheel, the method which consists in welding a first set of spokes at one side, pressing the hub and rim in opposite axial directions to put said first set of spokes under tension, and welding a second set of spokes at the opposite side so as to hold the first set under tension.

8. An apparatus for the manufacture of a spoked wheel, comprising in combination means for welding a first set of spokes at one side to a hub and rim, means for effect-

ing axial motion of the hub and rim in opposite directions so as to put the first set of spokes under tension, and means for welding a second set of spokes to the said hub and rim at the opposite side while holding the first set under tension.

9. An apparatus for the manufacture of a spoked wheel, comprising in combination a pair of electrodes adapted to engage the hub and rim and a set of spokes at one side and to weld the latter at their ends, and a second set of electrodes adapted to effect a relative axial movement between the hub and the rim so as to put said first set of spokes under tension and, while such tension is maintained, to weld a second set of spokes at the opposite side to said hub and rim.

10. In the manufacture of a spoked wheel, the method which consists in welding a first set of spokes at one side, pressing the hub and rim in opposite axial directions to put said first set of spokes under tension, and welding a second set of spokes at the opposite side by the passage of electric current and the application of pressure in an axial direction so as to hold the first set under tension.

In witness whereof, I have hereunto signed my name.

HERBERT H. WILLIAMS.