

No. 620,378.

Patented Feb. 28, 1899.

R. O. STUTSMAN.  
SPOKE FASTENING MACHINE.

(Application filed July 16, 1897.)

(No Model.)

2 Sheets—Sheet 1.

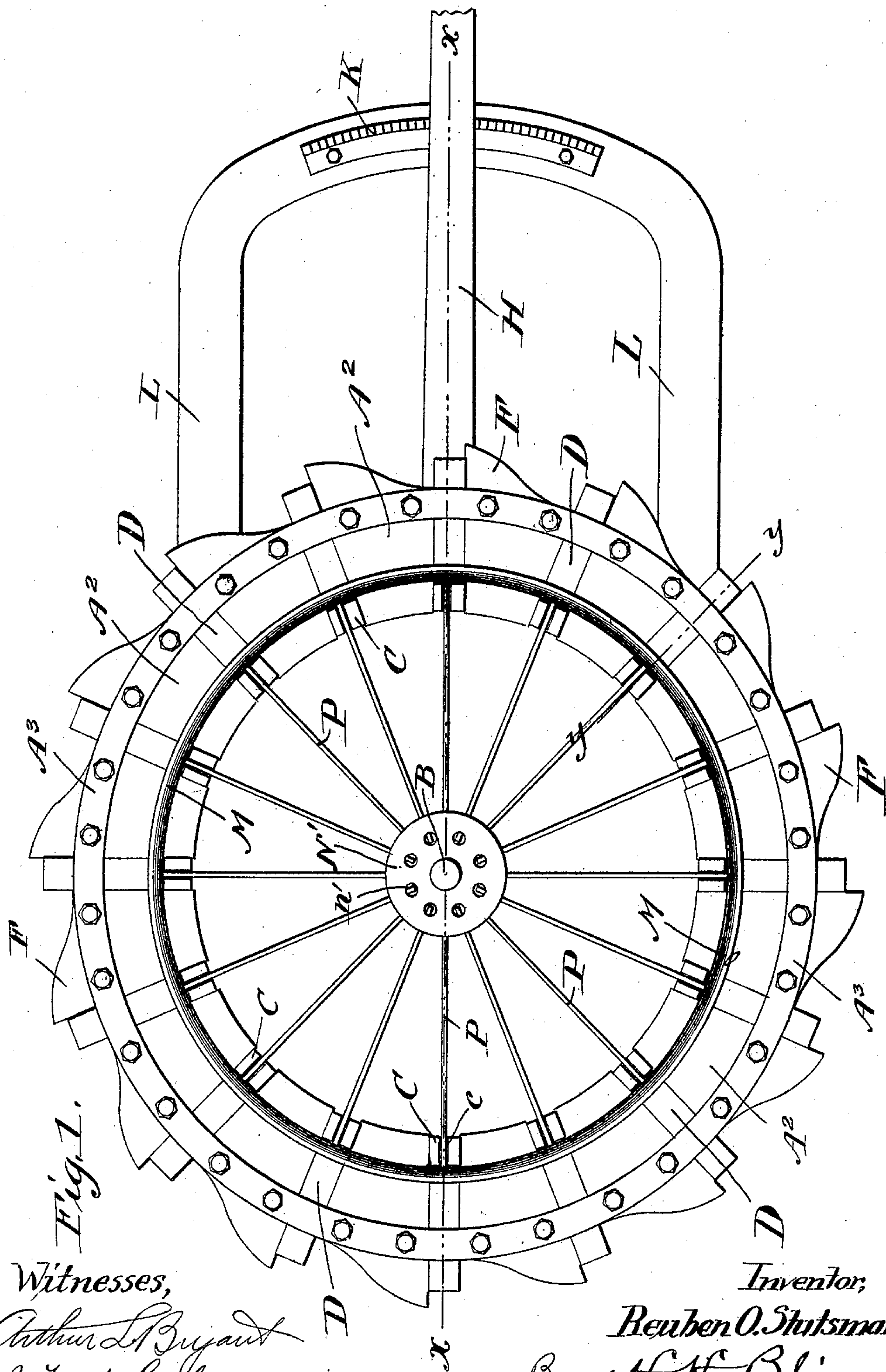


Fig. 1.

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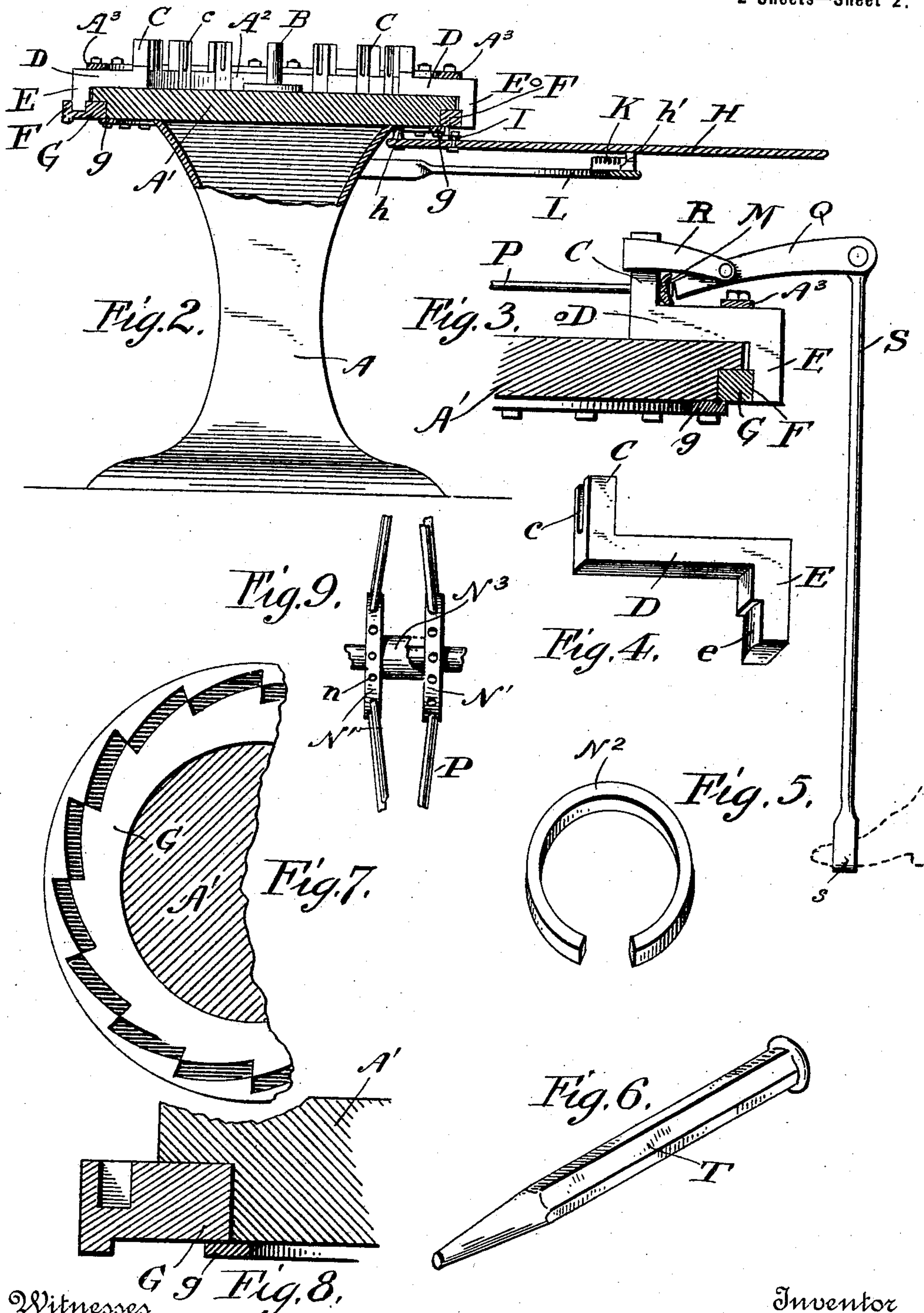
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# UNITED STATES PATENT OFFICE.

REUBEN O. STUTSMAN, OF DES MOINES, IOWA, ASSIGNOR TO THE BARTHOLOMEW COMPANY, OF SAME PLACE.

## SPOKE-FASTENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 620,378, dated February 28, 1899.

Application filed July 16, 1897. Serial No. 644,797. (No model.)

*To all whom it may concern:*

Be it known that I, REUBEN O. STUTSMAN, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Spoke-Fastening Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a plan view of a mechanism embodying my improvements. Fig. 2 is a vertical section on the line  $x x$  of Fig. 1. Fig. 3 is a vertical section, on the line  $y y$  of Fig. 1, enlarged. Figs. 4 and 5 show details. Fig. 6 shows the bending or riveting tool. Figs. 7 and 8 illustrate a slight modification. Fig. 9 is a detail view of a portion of the completed wheel.

In the drawings, A indicates a pedestal or standard adapted to support the operative parts of the machine. At the top it has a bed-plate or table A'. At the center of this table there is a spindle or pintle B, adapted to receive and hold the hub of a wheel.

C C are adjustable abutments or draft devices, there being a series of these arranged in a circular line concentric with the spindle B. These abutments are each provided with a slot  $c$  for the free passage of a wheel-spoke. The abutments of the entire series can be adjusted separately or simultaneously. Each has a draw-bar D, with an angular lug or arm E, the latter having a wedge-like or cam surface at  $e$ . These abutments or draft devices are arranged in such way that the draw-bars D shall rest upon the top of the table A', they lying radial to the spindle B and having their lugs or arms E overhanging the edge of the table A', as shown in Figs. 2 and 3.

A<sup>2</sup> are spacing plates or blocks on the top of the table A', having between them guide-spaces for the bars D. A<sup>3</sup> is a retaining-ring fastened to the top of these plates or blocks A<sup>2</sup> and passing over the bars D to prevent the latter from vertical displacement.

In order to move the abutments outward, I combine with each a cam F, the serial arrangement of these being shown in Fig. 1, and their operative relations to the arms E being shown in Figs. 2 and 3. These cams are all connected to or formed upon a ring G, which is placed in a rabbet at the lower outer edge of the table A'. The ring G is held in place by a ring  $g$ , which overlaps it and is bolted to the under side of the table.

The ring G can be moved the distance required around the axis of the spindle B by means of a lever H, which is pivoted at  $h$  to the under side of the table and has a link I pivoted to it and to the ring G.

K is a rack-segment supported on a frame extension L, and the lever H carries a dog  $h'$ , adapted to engage with the teeth of the rack.

It will be seen that the lever H can be so moved as to throw the cams F practically out of engagement with the arms E, and at such time the abutments or draft devices at C can be pushed to their innermost positions; but if the lever be moved in the opposite direction, carrying with it the ring G, the cams F will be caused to engage with the parts  $e$  on the arms E, and the result will be that the abutments C will all be uniformly drawn outward from the center.

In Figs. 7 and 8 I have shown a modified mechanism for actuating the draft devices, the one here shown being adapted to move them both inward and outward. In this case the ring G is provided with a series of cam-like or curved slots, into which the ends of the lugs or arms E fit, and the parts are so related that when the lever and ring are moved in one direction the tension devices will be all thrust inward, and when the lever and ring are moved in the opposite direction they will all be drawn outward, or the ring may be provided with cam-like lugs and the ears or arms E can be slotted to engage the lugs, so that the same end can be accomplished in moving the parts C positively by the lever and ring.

The manner of using the mechanism above described in the manufacture of a wheel will be readily understood from the above description in connection with the drawings.



M indicates a wheel-rim, which may be of any preferred sort, that shown being a concavo-convex rim of the character now commonly used in the manufacture of wheels with rubber or pneumatic tires. It is provided with a series of apertures, one for each of its spokes, and these apertures are so placed that one of them registers with each of the slots *c* in the abutment-pieces C.

N' N' are hub-disks, each having radial passages *n* for spokes and transverse apertures *n'*.

When the parts are to be secured together, spokes P are inserted from the outside of the rim through the apertures in the latter and through passages *n* in the hub-disks, bringing their inner ends into the apertures *n'* and the alternate spokes extending to the same disk. After the parts have been thus loosely connected the rim is placed on the outside of the abutment-pieces C, the latter having first been moved inward, so as to allow the rim to be readily put into position, and the hub-pieces N' N' are placed on the spindle B. A relatively short thimble or sleeve N<sup>2</sup> is placed between the disks N' N' before they are put on the spindle, this thimble being somewhat shorter than the distance to which the disks are to be ultimately separated, as will be described. The lever H is then moved so as to cause the cams F to uniformly draw outward the abutment-pieces C, whereby the rim is firmly locked in position and has equal stress exerted upon it at substantially all points, at least at all points where spokes are to be applied.

It will be noticed that each spoke prior to its insertion is upset or riveted at its outer end to provide a strong head. For holding each spoke P firmly in proper position during the act of fastening it in the wheel by securing its inner end to the hub an anvil or holder Q is employed. This holder is of the nature of an arm pivoted to the collar piece or carrier R, adapted to be slipped over the upper ends of the abutment-pieces one after the other. S is a link pivoted to the holder-arm Q and extending to a point near the floor, where it is provided with a stirrup *s* to receive the foot of the operator.

When fastening a spoke, the operator places the collar piece or carrier R over the end of the abutment C, brings the end of the holder Q against the spoke-head, and places his foot in the stirrup *s*. Under these circumstances the spoke will be held firmly and with precision longitudinally in its necessary position. Then with suitable tools, such as that at T, and a hammer he bends the inner end of the spoke projecting into the aperture *n'* in the hub-plate and, if necessary, flattens or upsets the metal sufficiently to form a perfectly firm joint.

After the first spoke is fastened the same steps are followed with each spoke around the series.

After the spokes have been fastened in the manner described the relatively short thim-

ble or sleeve N<sup>2</sup> is removed and another (indicated by N<sup>3</sup>) and somewhat longer is forced into place between the disks, the length of this sleeve or tube being such as to impart to the spokes the proper tension.

With means of this character I have found that not only can the wheels be constructed much more rapidly and cheaply than heretofore, but also that great accuracy is obtainable and uniformity in the spokes with respect to their lengths, their tension, and their fastening devices.

What I claim is—

1. The combination with the central support for the hub-plate of the adjustable abutment devices having passages for the spokes, and means for holding the spokes longitudinally against displacement, while the inner ends are being fastened to the hub; substantially as set forth.

2. The combination of the central support for the hub, the support for the rim uniformly expansible and engaging positively with the rim at points adjacent to the spoke-apertures and having passages through which the spokes can be inserted from the rim to the hub, means for drawing uniformly outward the several parts of the rim-support, and independent means for holding the spokes in engagement with the rim and positively preventing any longitudinal movement thereof, substantially as set forth.

3. The combination with the central support for the hub, of the series of adjustable pieces, C, each having a spoke-aperture, and a holder Q adapted to be supported by said adjustable pieces C and to be pressed against the outer end of the spoke, to prevent longitudinal movement thereof while its inner end is being secured in a hub, substantially as set forth.

4. The combination with the rim-support having the series of slotted or apertured abutments, C, adapted to engage with the inner face or surface of a wheel-rim and each secured to a draft-bar D on which the wheel-rim rests, and a power-arm E, of the series of cams, F engaging with said arms E and adapted to be simultaneously moved; substantially as set forth.

5. In a spoke-fastening machine, the combination with a rim-holder having means for drawing outward against the rim at points adjacent to a spoke, of means for engaging with the outer end of the spoke and pressing it inward, to bring its inner end into proper position relative to the hub, substantially as set forth.

6. In a spoke-fastening machine, the combination with the central support for the hub, of a series of rim-abutments, arranged radially about said hub-support, and adapted to extend across the inner face of the rim, and each provided with a spoke passage or aperture, and a spoke-holder, comprising a carrier, adapted to be detachably engaged with any one of said rim-abutments, and a lever,



pivoted to said carrier and adapted to force the outer end of the spoke, extending through the passage or aperture in the abutment toward the center of the wheel, substantially as set forth.

7. In a spoke-fastening machine, the combination of a central hub-support, a series of rim-abutments arranged radially about said hub-support, and each provided with a spoke aperture or passage, means for adjusting said rim-abutments toward and from the central hub-support, and a spoke-holding device, consisting of a carrier, adapted to detachably engage any one of said abutments, a lever pivoted to said carrier, and having its free end arranged to force a spoke through the aperture in said abutment toward the hub-support, and means controllable by the operator's foot, for actuating said lever, substantially as set forth.

8. In a spoke-fastening machine, the combination with a central support for the hub, of a series of radially-sliding rim-supports, each provided at its inner end with an upwardly-extending abutment adapted to engage the inner face of the rim and having a spoke aperture or passage, and provided at its outer end with a depending arm, a series of cams, each adapted to engage with the inner face of one of said depending arms, a single hand-lever for simultaneously moving all of said cams, and means for holding said lever in any adjusted position, substantially as set forth.

9. The combination with a pedestal, or base, A, having the top plate, A', provided with the central hub-support, B, of the series of rim-supports, arranged radially about said central hub-support, and each having at its inner end an abutment, adapted to engage the inner face of the rim, and having at its outer end an arm, E, adapted to project downwardly over the edge of the top plate, A', means engaging with the horizontal portions,

D, of said rim-supports, for preventing vertical movement thereof, a ring, F, mounted in a peripheral groove, in the top plate, A', and having a series of cam-surfaces, each adapted to engage with the inner face of one of said depending arms, E, and a lever for moving said ring relatively to said top plate, to simultaneously adjust all of said rim-abutments toward or from the central hub-support, substantially as set forth.

10. In a spoke-fastening machine, the combination of a radially-expandible wheel-support, having abutments for holding the wheel-rim from lateral movement, and power devices adapted to be detachably mounted on said support in position to engage with any one of the spokes of the wheel and move said engaged spoke longitudinally, substantially as set forth.

11. In a spoke-fastening machine, the combination of a support adapted to maintain a wheel-hub and rim in proper relative positions, and power devices for positively forcing a spoke inwardly toward the hub and retaining it in its innermost position until it is secured in the wheel, substantially as set forth.

12. In a spoke-fastening machine, the combination of a support for a wheel-hub, a support for a wheel-rim arranged to hold the rim concentric with the hub, and power devices for engaging with any one of the spokes of the wheel, and moving the same longitudinally into proper position with relation to both the hub and the rim, and maintaining the engaged spoke in that position until it is permanently secured, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

REUBEN O. STUTSMAN.

Witnesses:

W. G. MILES,  
O. T. BLACK.