

No. 756,819.

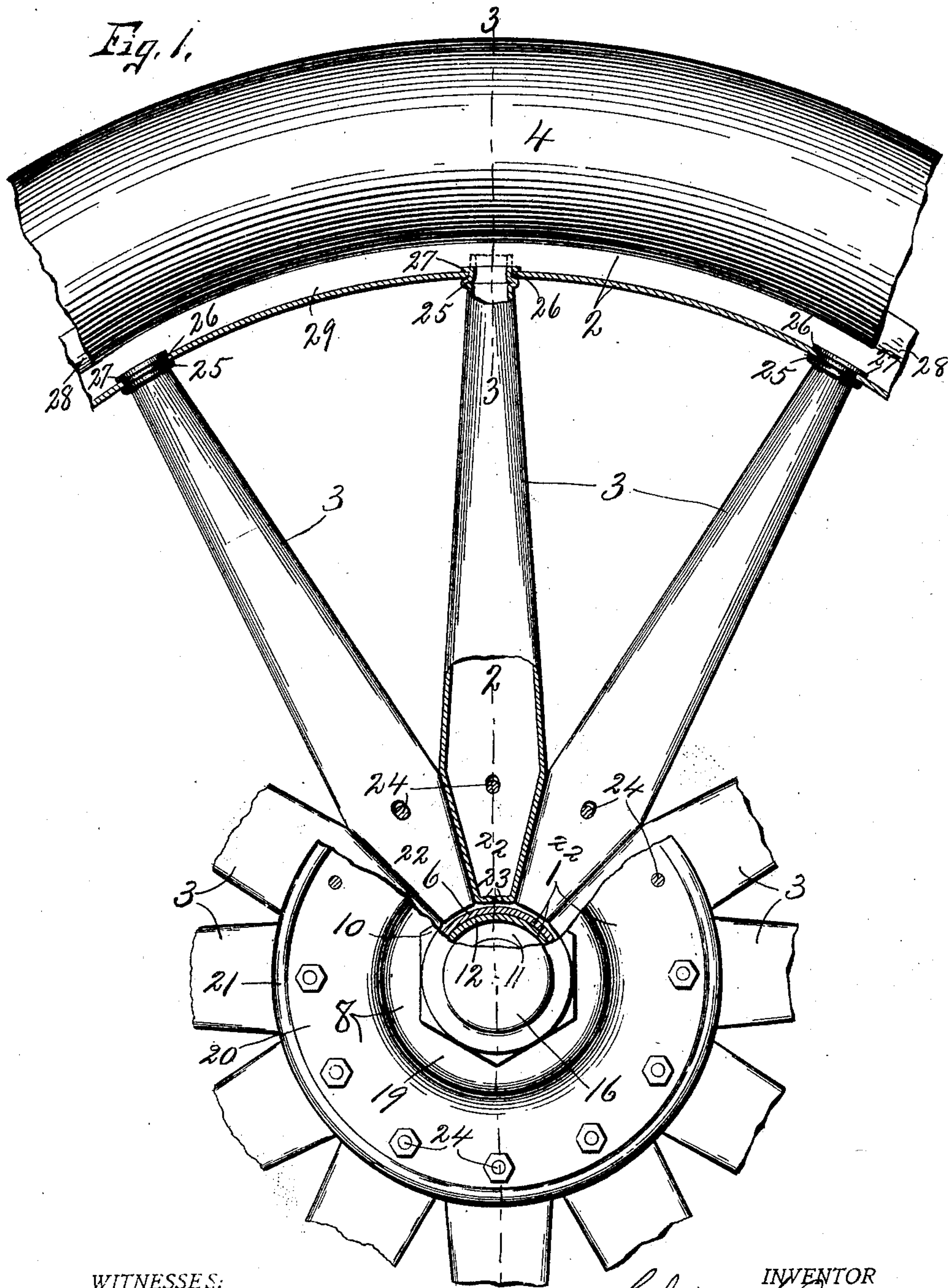
PATENTED APR. 12, 1904.

C. H. BICALKY.
WHEEL.

APPLICATION FILED DEC. 4, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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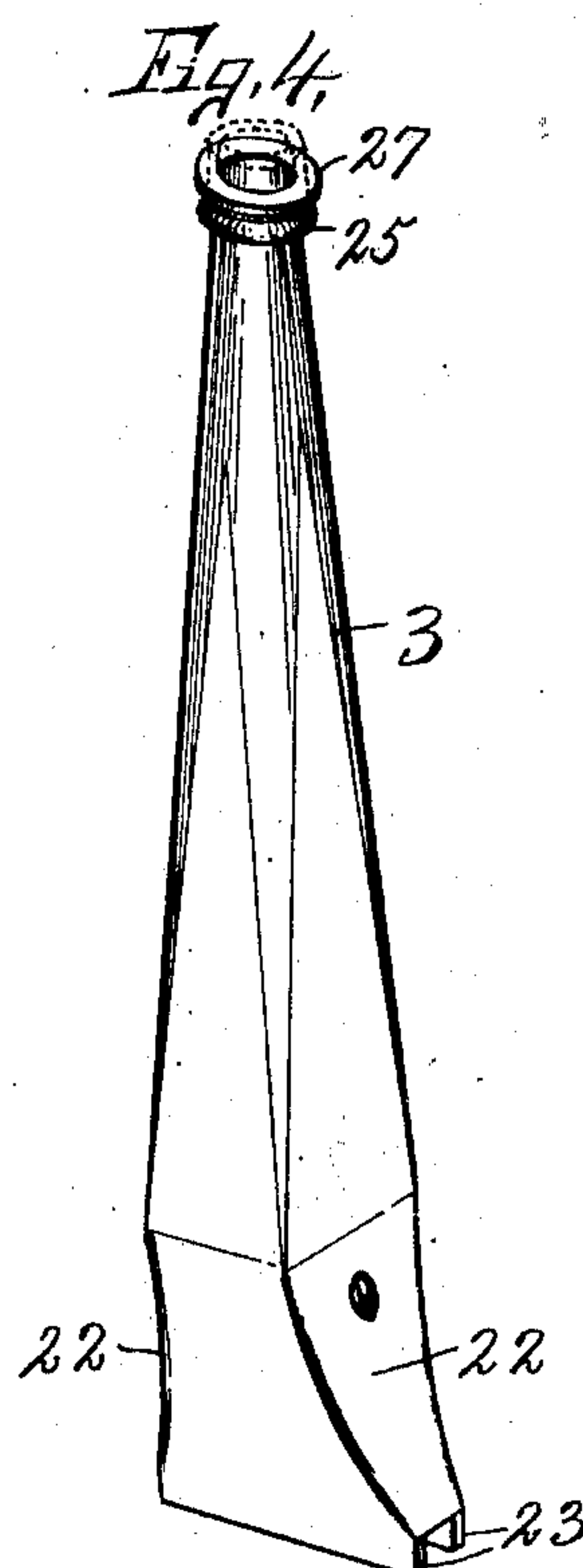
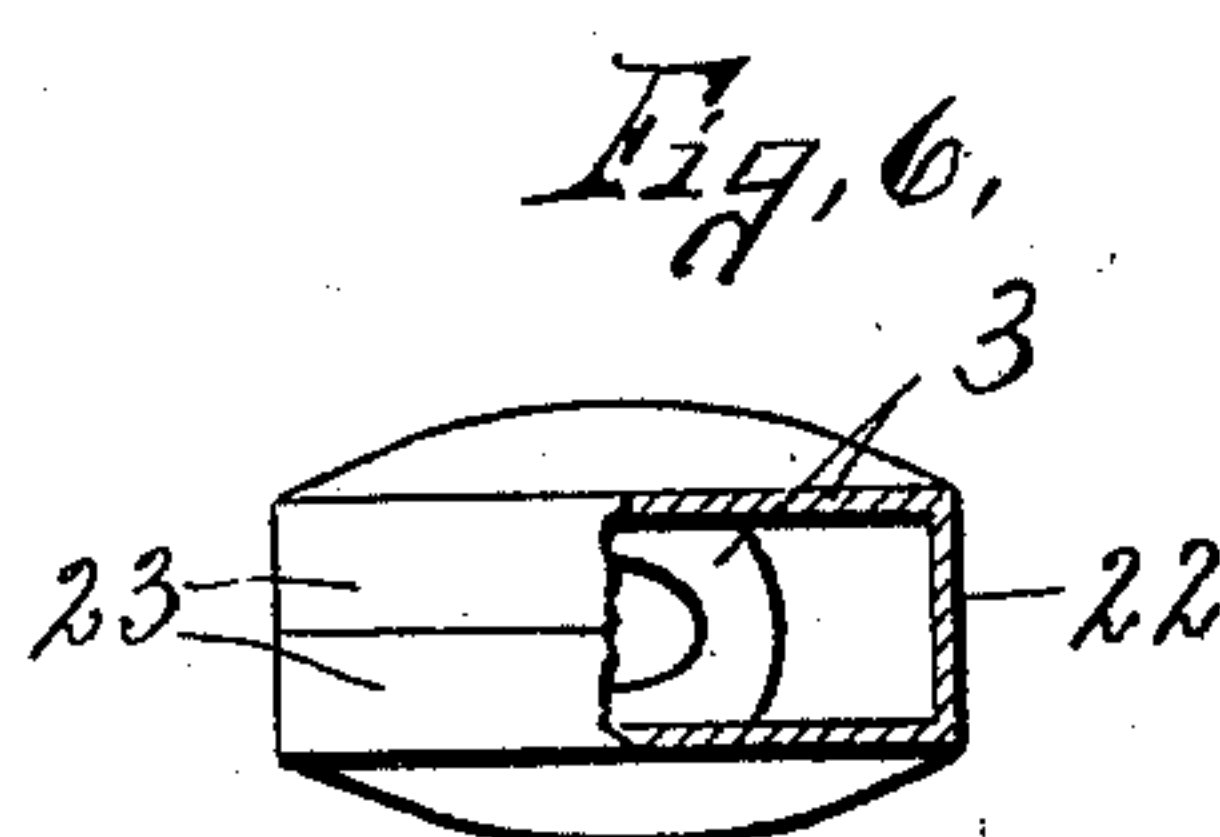
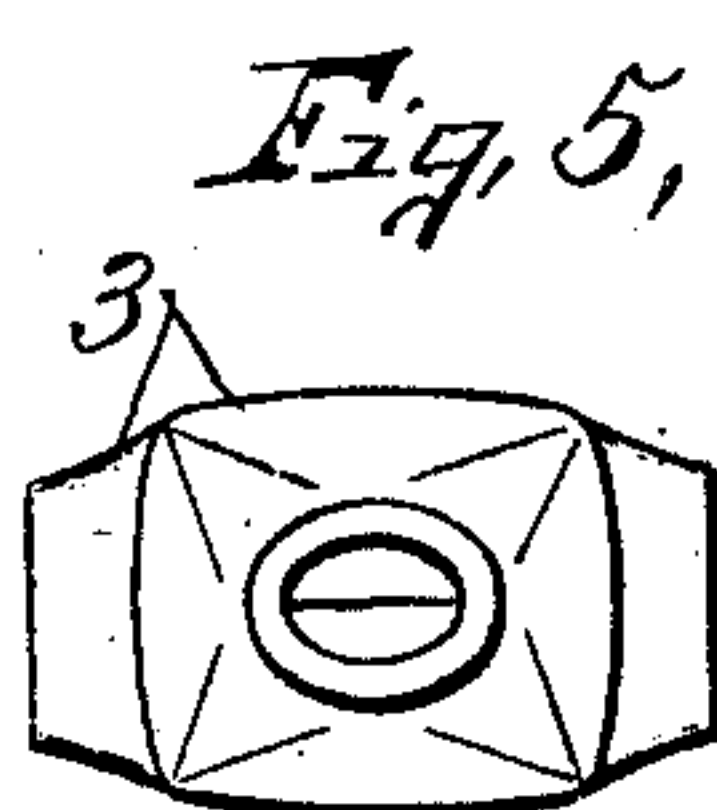
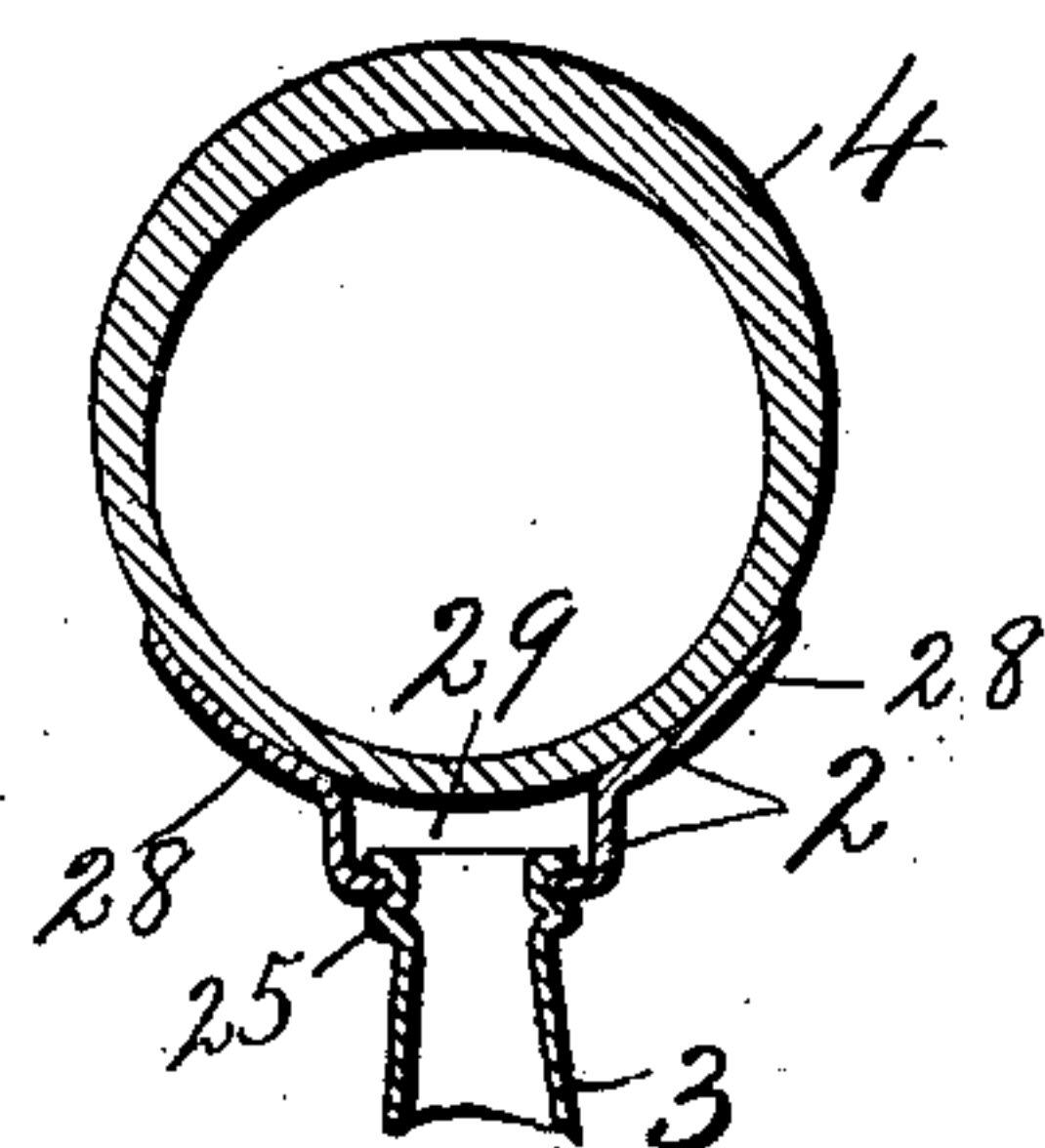
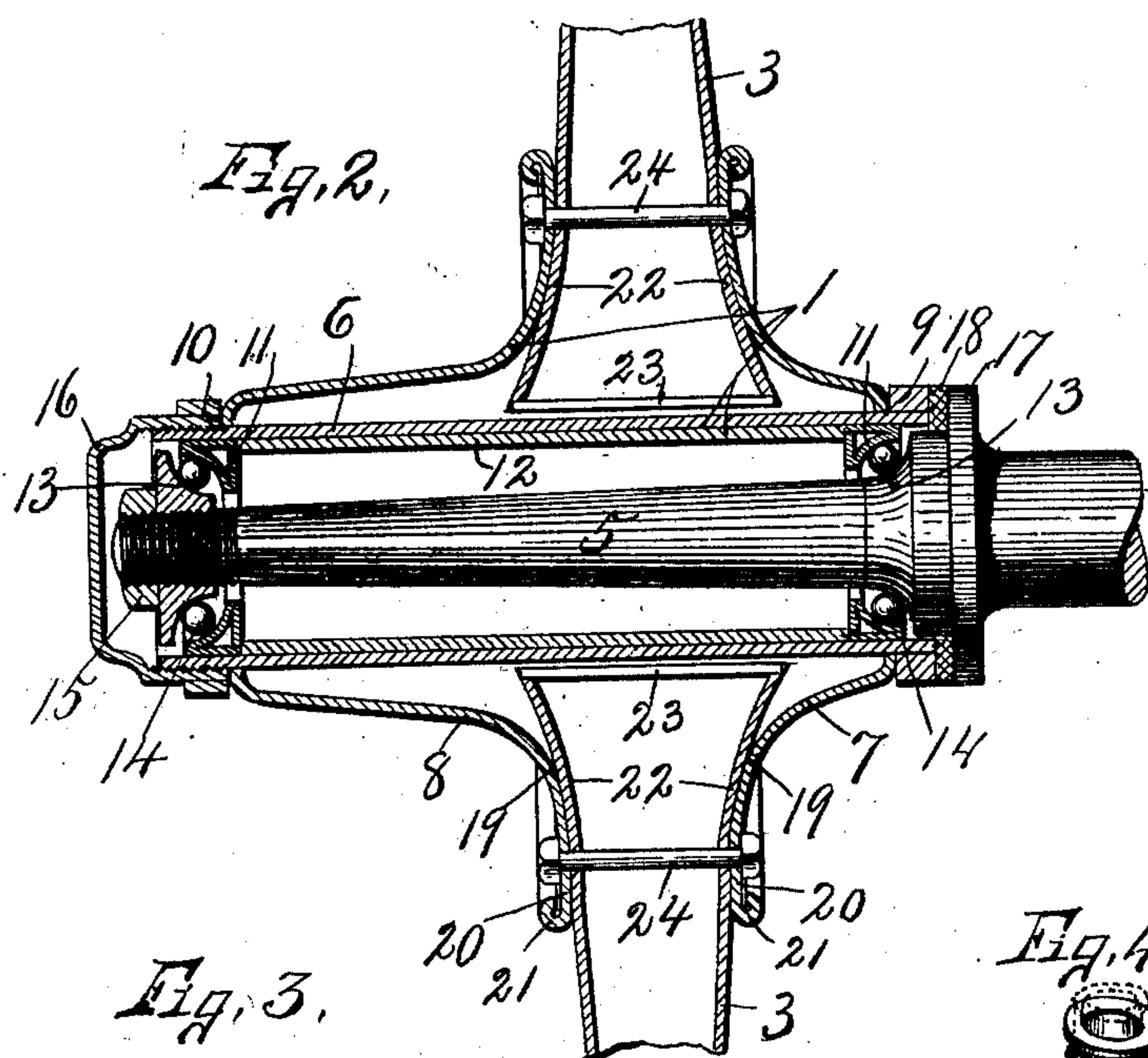
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2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES H. BICALKY, OF ONEIDA, NEW YORK.

WHEEL.

SPECIFICATION forming part of Letters Patent No. 756,819, dated April 12, 1904.

Application filed December 4, 1902. Serial No. 133,900. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. BICALKY, of Oneida, in the county of Madison, in the State of New York, have invented new and useful
 5 Improvements in Wheels, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in
 10 wheels, and is adapted to be used either as a vehicle-wheel or as a pulley.

This wheel is made up almost exclusively of sheet metal; and the object of the various improvements is to assemble the parts in such
 15 manner that the wheel will withstand all ordinary strains and still be considerably lighter than other wheels of the same size in which wooden spokes are used.

A more specific object is to insert the spokes
 20 in a suitable annular recess in the hub with their adjacent faces in contact, whereby each forms a key for the other to resist inward radial strains, thus relieving the hub from such strain and permitting the use of lighter ma-
 25 terial.

A further object is to provide the hub with opposite clamping-disks, which cooperate with tapering walls on the inner ends of the spokes to draw the spokes inwardly as the disks are
 30 drawn axially toward each other.

Further objects will appear in the subsequent description.

Referring to the drawings, Figure 1 is an end elevation of a portion of a wheel embody-
 35 ing the features of my invention, portions of the hub being broken away and one of the spokes being shown partly in section. Figs. 2 and 3 are sectional views taken, respectively, on lines 2 2 and 3 3, Fig. 1. Fig. 4 is a per-
 40 spective view of one of the detached spokes. Figs. 5 and 6 are opposite end views of the spokes seen in Fig. 4, a portion of Fig. 6 being shown in section.

Similar reference characters indicate corre-
 45 sponding parts in all the views.

In order to clearly demonstrate the practicability of my invention, I have shown a vehicle-wheel consisting of a hub 1, a rim 2, spokes 3, uniting the hub and rim, and a tire 4,
 50 encircling the rim, the hub being shown as

mounted upon a suitable axle 5. The hub 1 includes a cylindrical sheet-metal sleeve 6 and oppositely-arranged hub-sections 7 and 8, which are also formed of sheet metal and encircle the opposite ends of the sleeve 6, between
 55 annular shoulders 9 and 10, for holding the hub-sections from endwise movement. Secured tightly within the opposite ends of the sleeve 6 are cup-bearings 11, which are also
 60 formed of sheet metal and are held from endwise movement toward each other by an inner sleeve 12, fitting closely within the sleeve 6 and having its opposite ends abutting against the adjacent end faces of the cups 11. These
 65 cups cooperate with suitable cones 13 upon the axle 5 to receive ball-bearings 14, one of the cones, as the one at the outer end of the axle, being adjustable in the usual manner and is held in its adjusted position by a lock-nut 15.
 70 The shoulder 9 is tightly fitted upon the inner end of the sleeve 6 and forms practically a part of said sleeve, while the outer shoulder 10 is threaded internally and engages with a threaded outer end of the sleeve, being there-
 75 fore adjustable axially of the sleeve and together with shoulder 9 operates to clamp the hub-sections 7 and 8 firmly against the spokes in a manner heretofore described. This
 80 shoulder 10 is preferably angular in outline to receive a suitable wrench and is preferably secured to a cap 16, which closes the outer end of the sleeve and conceals the outer end of the axle, thereby forming a substantially
 dust-proof casing for the bearings.

In order to further protect the bearings
 85 from the entrance of the dust, I provide the axle with an annular shoulder 17, between which and the shoulder 9 is interposed a felt washer 18 for the purpose of excluding the
 90 dust from the inner bearing.

The hub-sections 7 and 8 preferably consist of cup-shaped shells arranged concentrically with the sleeve 6, with their convex ends extending in opposite directions from their adjacent ends, said adjacent ends being
 95 separated from each other for forming an annular recess to receive the inner ends of the spokes. These adjacent ends are formed with flaring portions 19 and substantially flat annular flanges 20, the peripheral edges of
 100

which are turned over outwardly for forming marginal beads 21, which serve to stiffen the hub-sections and gives a more pleasing appearance to the hub when the parts are assembled.

The spokes 3 preferably consist of sheet-metal tubes, having their inner ends inserted into the annular recess of the hub and tapered circumferentially, said tapering ends being arranged edge to edge in contact, so that their meeting edges are disposed in substantially radial lines, and the inner end of each spoke forms a key wedging in between the adjacent spokes to resist radial inward strain, the effect being that the spokes form practically a continuous hub independent of the shells 7 and 8 and sleeve 12 and receive the major part of the strain which may be applied to the rim. In the formation of these spokes they are first made in tapering tubular form—that is, tapering from their inner ends toward their outer ends—after which their inner ends are compressed to the desired angle to entirely fill the annular recesses without engaging the periphery of the sleeve 6. By thus compressing the inner ends of the spokes circumferentially their lateral sides are forced outwardly, or rather the inner ends are expanded laterally, and are therefore wider laterally than circumferentially.

The inner flaring ends of the sides of the spokes are engaged by the flaring portions 19 of the sections 7 and 8, and when these sections are drawn together the flaring portions 19 ride upon the flaring side walls 22 of the spokes and operate to draw the spokes inwardly and to thereby wedge them more firmly against each other.

The inner ends of the meeting walls of the spokes are preferably cut slightly longer than the side walls and are then bent inwardly toward each other for forming flanges 23, which abut against each other and serve to reinforce and strengthen the inner ends of the spokes against lateral and circumferential compression.

It is evident from the foregoing description that the hub-section 7 abuts against the shoulder 9 and that as the cap 16, with its shoulder 10, is screwed inwardly upon the sleeve 6 it engages the outer end of the hub-section 8, and thereby firmly impinges the spoke between the adjacent faces of said hub-sections; but I preferably provide additional clamping members, as bolts 24, which are passed through suitable apertures in the hub-sections and spokes and serve to additionally lock the spokes in operative position, the apertures in the spokes being slightly elongated to permit the spokes to be drawn inwardly and at the same time prevent shearing strain upon the bolts. The outer ends of these tubular spokes are reduced in diameter and are preferably elongated laterally for the purpose of forming as broad a lateral bearing upon the rim as possible to re-

sist torsional and lateral strains upon the rim, and I provide these outer reduced ends with annular beads 25, which abut against the inner face of the rim, the outer ends of said spokes being extended beyond these beads and passed through apertures 26 in the rim, after which the extreme outer ends of the spokes are expanded for forming annular flanges 27, which engage the inner face of the rim and firmly lock the spokes and rim together.

The rim 2 may be of any desired form, and I have shown it as adapted to receive the tire 4, being provided with a curved seat 28 and with a central inward depression for forming a recess 29, which receives the outer ends of the spokes and prevents contact of the tire with said outer ends.

The cups 11, which form the inner and outer bearings for the balls 14, are also preferably formed of sheet-metal strips having their intermediate portions stamped or pressed into the desired curve for forming a bearing proper, and their opposite edges are folded backwardly and abut against each other, so as to form a strong and durable bearing.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wheel, the combination with separate concavo-convex sheet-metal hub-sections having their marginal edges turned over and formed into annular reinforcing-beads, spokes inserted between the sections, and means for clamping the hub-sections and spokes together.

2. In combination with the rim of a wheel, of opposite hub-sections having inclined walls, one of the sections being adjusted toward and from the other, tubular spokes inserted between the sections and provided with flaring side walls engaged by the inclined portions of the hub-sections, whereby the impinging of the inclined portions of the hub-sections against the flaring walls of the spokes operates to draw the spokes inwardly and means to adjust the movable section.

3. In combination with a rim of a wheel of a hub including a cylindrical sleeve and hollow sheet-metal sections surrounding the sleeve, one of the sections being movable toward and from the other, means to adjust and to hold the movable section, one of the sections having an inclined engaging portion for the spokes, and spokes inserted between the sections with the adjacent edges in contact, one of the side walls of the spokes flaring laterally and engaged by the inclined portion of the hub-section for drawing the spokes inwardly when the hub-sections are clamped in operative position.

4. In combination with the rim of a wheel, a cylindrical sheet-metal sleeve having one end provided with a fixed annular abutment, a cap closing the opposite end of the sleeve and also provided with an abutment, said cap

being adjustable on the sleeve, separate sheet-metal hub-sections encircling the sleeve and engaging their respective abutments and tubular spokes inserted between the sections and
5 having adjacent walls tapering inwardly and their side walls flared outwardly and engaged by the hub-sections, the adjacent tapering walls of the spokes being in contact with each other.
10 5. In combination with the rim of a wheel, a cylindrical sheet-metal sleeve having one end provided with a fixed annular abutment, a cap closing the opposite end of the sleeve and also provided with an abutment, said cap
15 being adjustable on the sleeve, separate sheet-metal hub-sections encircling the sleeve and engaging their respective abutments and tubular spokes inserted between the sections and having adjacent walls tapering inwardly and
20 their side walls flared outwardly and engaged by the hub-sections, the adjacent tapering walls of the spokes being in contact with each other, and clamping-bolts passed through the spokes and hub-sections for the purpose de-
25 scribed.

6. In a wheel, the combination with a sheet-metal rim having spoke-openings elongated laterally, a sheet-metal hub forming an annular recess, tubular spokes having their inner ends inserted in the recess and expanded lat- 30 erally and their outer ends inserted through the apertures in the rim and elongated laterally, said outer ends having shoulders engaging the inner and outer faces of the rim.

7. A sheet-metal tubular spoke for wheels, 35 said spoke having a rectangular inner end two of its opposite walls tapering inwardly and having their inner extremities bent toward each other to form reinforcing-flanges, the two opposite walls flaring outwardly for the 40 purpose described and the outer end of the spoke being elongated in the direction of flare of the inner end.

In witness whereof I have hereunto set my hand this 20th day of November, 1902.

CHARLES H. BICALKY.

Witnesses:

H. E. CHASE,
HOWARD P. DENISON.