(No Model.) 4 Sheets—Sheet 1.

I. DAVIS.

METALLIC WHEEL.

No. 589,961. Patented Sept. 14, 1897.

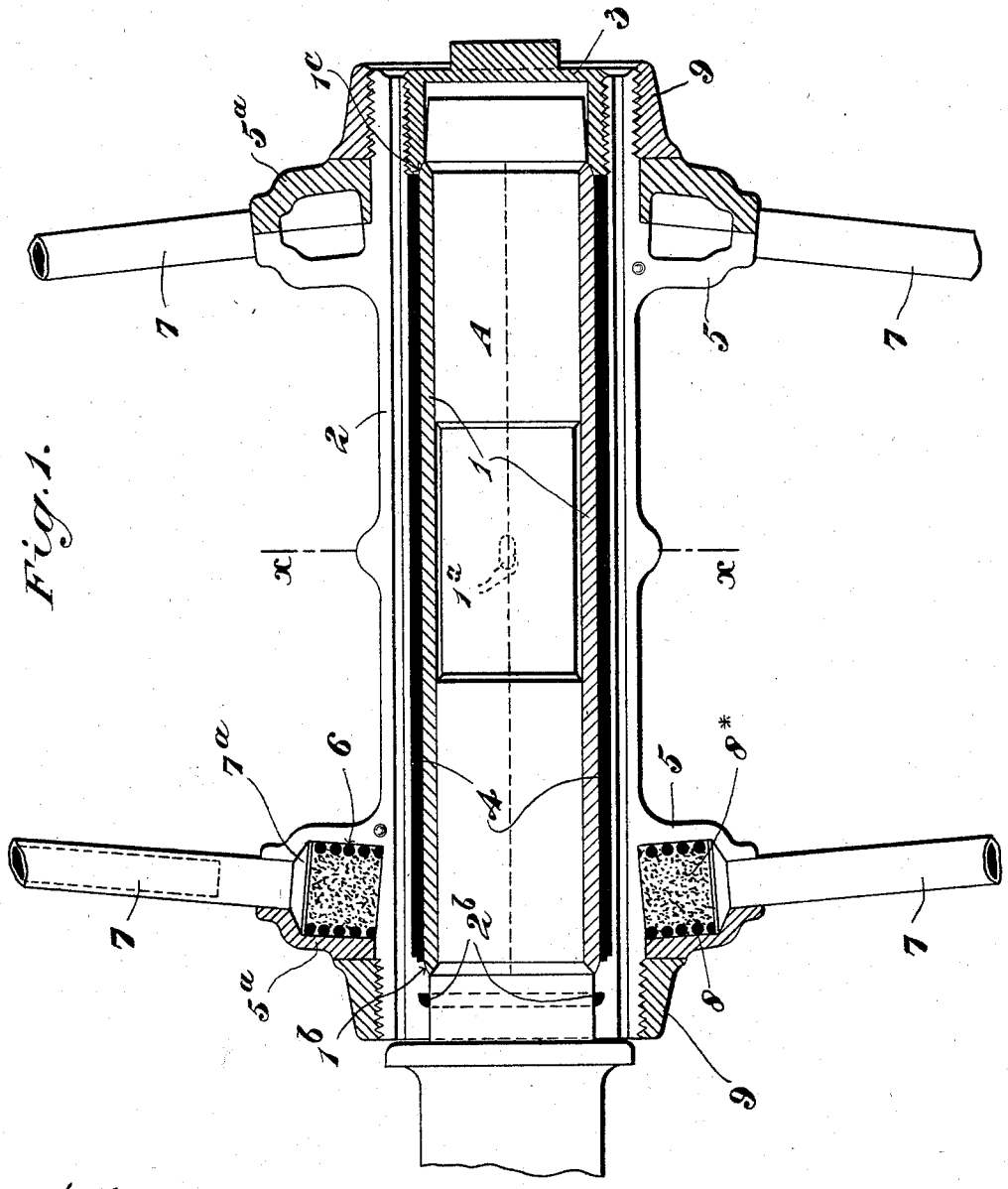


Fig. 1.

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Frank C. Barry

Inventor
Isaac Davis
per E. C. Duffy
Attorney

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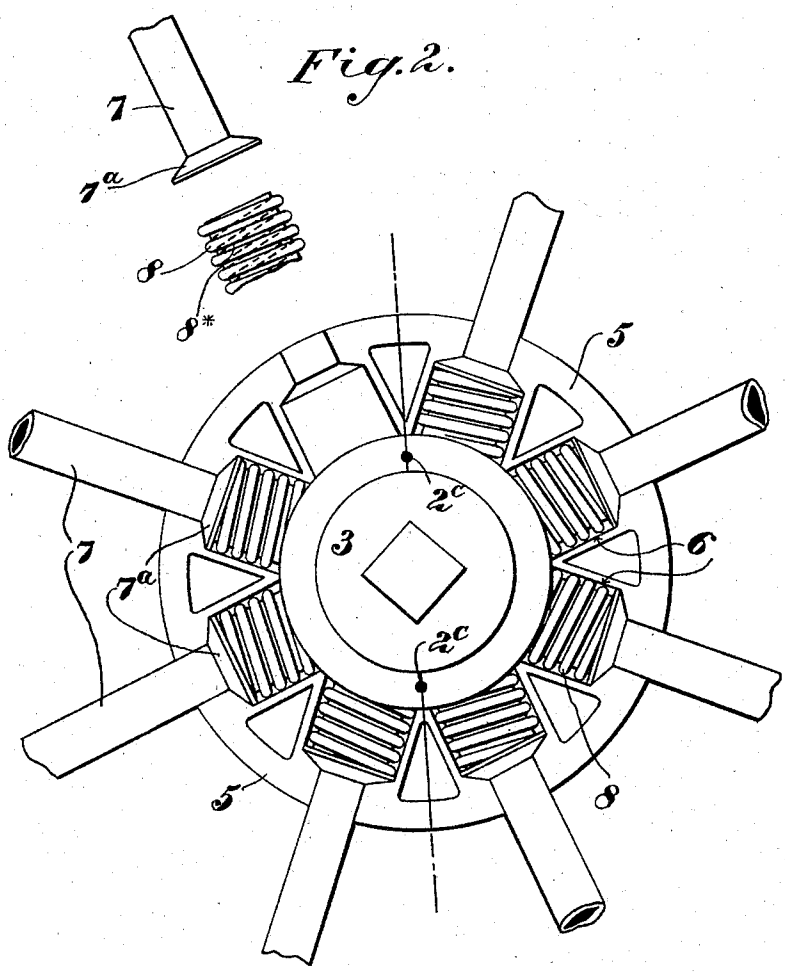
(No Model.) 4 Sheets—Sheet 2.

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METALLIC WHEEL.

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Fig. 2.



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I. DAVIS.

METALLIC WHEEL.

No. 589,961. Patented Sept. 14, 1897.

Fig. 3.

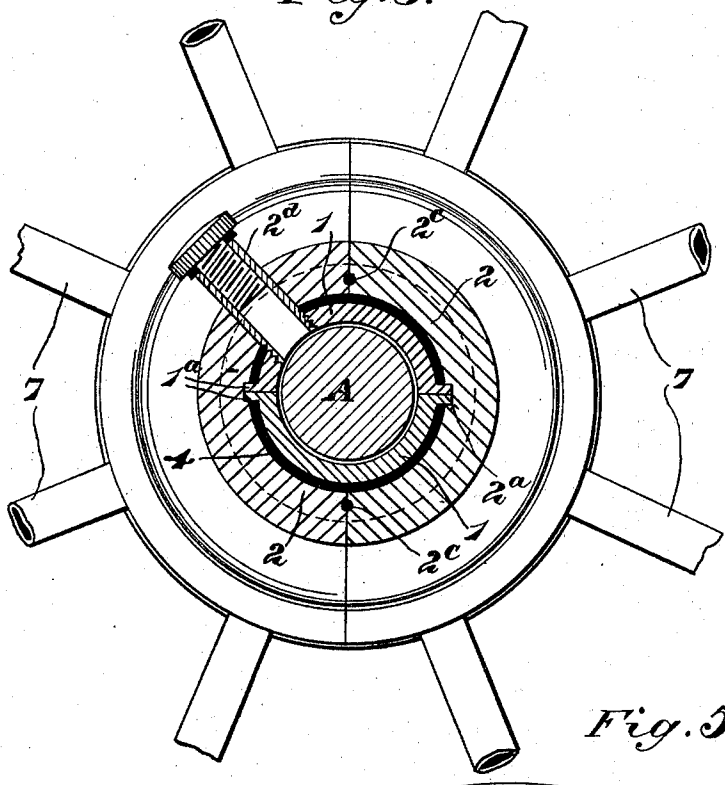


Fig. 4.

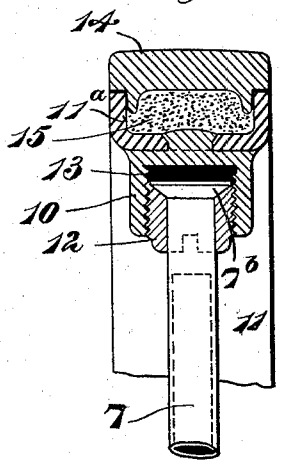
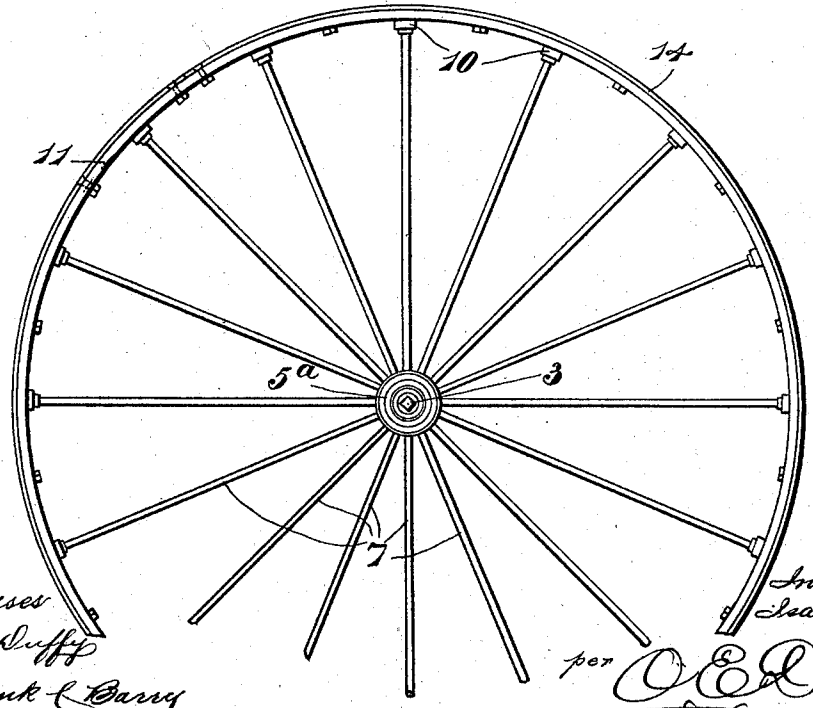


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

I. DAVIS.

METALLIC WHEEL.

No. 589,961. Patented Sept. 14, 1897.

Fig. 6.

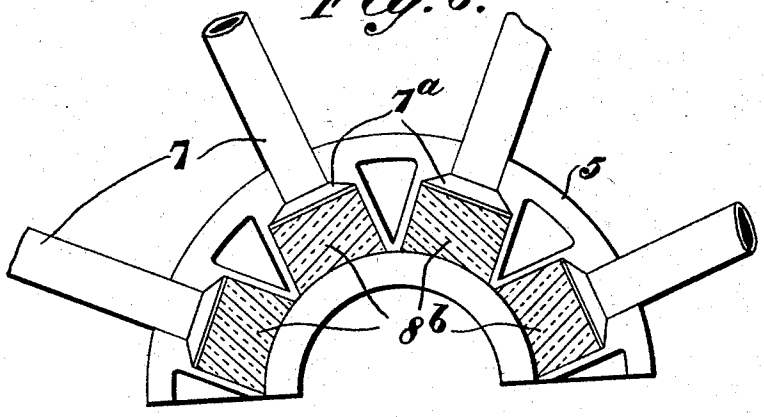
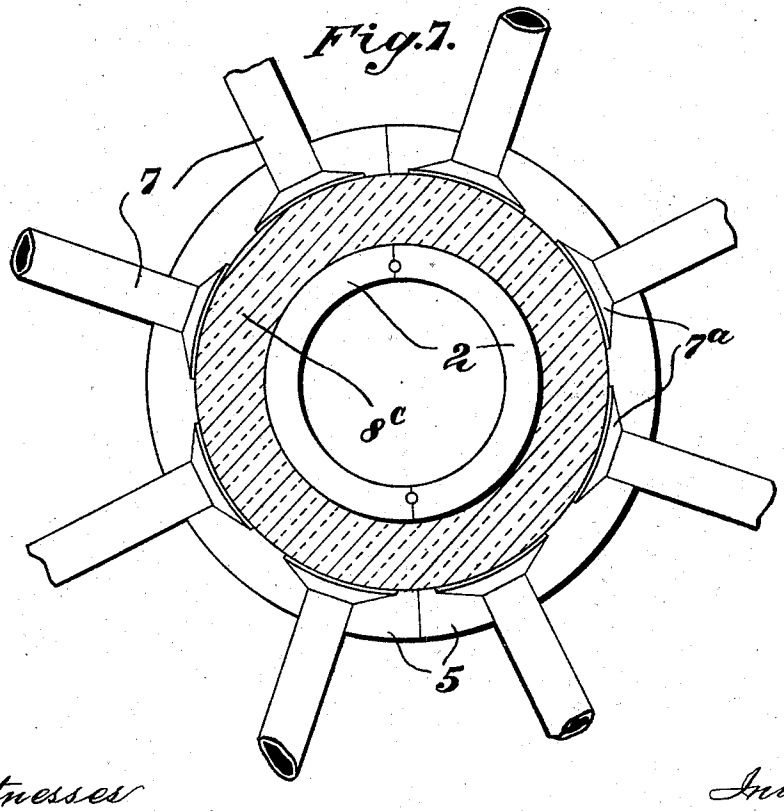


Fig. 7.



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UNITED STATES PATENT OFFICE.

ISAAC DAVIS, OF LONDON, ENGLAND.

METALLIC WHEEL.

SPECIFICATION forming part of Letters Patent No. 589,961, dated September 14, 1897.

Application filed August 19, 1896. Serial No. 603,209. (No model.) Patented in Victoria March 3, 1896, No. 12,930; in England June 8, 1896, No. 12,564; in France August 1, 1896, No. 258,561; in New South Wales December 31, 1896, No. 7,164; in South Australia December 31, 1896, No. 3,510; in New Zealand January 5, 1897, No. 9,167, and in Canada January 19, 1897, No. 54,663.

To all whom it may concern:

Be it known that I, ISAAC DAVIS, a subject of the Queen of Great Britain and Ireland, residing at Fleet Street, in the city of London, England, have invented Improvements in Metallic Wheels, (for which I have obtained Letters Patent in Canada, dated January 19, 1897, No. 54,663; in France, dated August 1, 1896, No. 258,561; in New South Wales, dated December 31, 1896, No. 7,164; in South Australia, dated December 31, 1896, No. 3,510; in New Zealand, dated January 5, 1897, No. 9,167; in Victoria, dated March 3, 1896, No. 12,930, and in Great Britain, dated June 8, 1896, No. 12,564,) of which the following is a specification.

This invention of improvements in metallic wheels relates more particularly to that class of wheels which have a divided hub and axle-box; and the improvements consist mainly in means for securing the spokes to the hub and to the rim in such a manner that the rigidity of a fixed metal to metal connection is avoided, as I shall now explain by reference to the accompanying drawings, wherein—

Figure 1 is a longitudinal section through the axle-box hub and adjacent parts of my improved wheel, which is shown applied to one end of an axle. Fig. 2 is a part end elevation of the hub and attached parts, and Fig. 3 is a central cross-section on the line $x\,x$ of Fig. 1. Fig. 4 is a cross-section through the rim and tire of my improved wheel, showing how the wheel-spokes are secured to the former. Fig. 5 shows to a smaller scale my improved wheel in side elevation. Figs. 6 and 7 are similar views to Fig. 2, showing modified ways of connecting the inner ends of the wheel-spokes to the hub.

Referring to Figs. 1 to 3, inclusive, 1 is the axle-box divided longitudinally into two parts that are held in position in the longitudinally-divided hub 2 by small lugs 1^a on the former entering corresponding recesses 2^a in the latter, as described in the specification of Letters Patent No. 544,664. Each end of the axle-box is coned, as shown at 1^b 1^c, the inner coned end 1^b being arranged to rest against a similarly-shaped bearing formed in the hub 2, while the outer coned end 1^c fits against the inner coned end of a cone-shaped cap 3, which is screwed into the outer end of the hub and serves for adjusting the position of the parts of the axle-box 1 upon the end of the axle A. The exterior of the axle-box 1 and the interior of the hub 2 between the said coned ends are so relatively shaped as to form between them, when together, a space in which is placed a divided tube or sleeve 4 made of suitable yielding or cushioning material, such as leather, for the purpose of reducing metallic contact between the hub and axle-box as far as possible and so reduce the transmission of shock from one to the other, and also for preventing escape of lubricant from the divided axle-box. The bearing-surfaces within the axle-box are lubricated by means of lubricant admitted from a dust-proof lubricator 2^d, passing through the hub 2, sleeve 4, and axle-box 1, as shown in Fig. 3.

2^b is a ring of material, such as leather, let into an annular recess in one end of the hub 2, so as to surround the end of the wheel-axle A, to which the wheel is fitted, and prevent entry of dust to the axle-box bearing at this point, the screw-cap 3 serving to effectually exclude dust at the other end of the bearing.

2^c are lengths of leather, cord, or the like placed in recesses in the adjacent longitudinal edges of the two sections of the hub to prevent the passage of dust to the bearing at these parts and also the escape of lubricant at these parts.

By the construction described dust is effectually prevented from passing to the bearing-surfaces and lubricant is effectually prevented from escaping therefrom.

Near each end of and at the exterior of the hub 2 there is provided a flange 5, which has formed therein a number of recesses or sockets 6, which are or may be of semicircular form in plan and are adapted to receive and retain the inner ends of the tubular spokes 7, these ends being enlarged, as, for example, by providing them with a flange or enlargement 7^a, as shown, or by one or more lateral

pins or projections, so as in any case to limit outward movement of the spoke ends. The inner end of each stroke rests against an elastic bearing, which in the arrangement now being described is a coiled metal spring 8 surrounding, it may be, a block 8^a of material such as india-rubber.

5^a are removable rings or annular flanges, each furnished with a number of semicircular recesses corresponding to those in the flanges 5 and adapted to fit the spoke ends 7^a and their elastic supports 8 and inclose and hold both in place. The removable flanges 5^a may conveniently be secured in the operative position shown by coupling-rings 9, screwed onto the ends of the hub 2, and which, besides securing the flanges 5^a in position, also serve to secure the two halves of the hub together around the axle-box 1. The elastic bearings for the inner ends 7^a of the spokes 7, instead of being in the form of coiled metal springs 8, may, as shown in Fig. 6, consist of disks or short cylinders 8^b, of hard rubber, compressed cork, or like material, or, as shown in Fig. 7, of a ring 8^c of such material which is held in a corresponding annular recess, formed by ·d between the hub end, its fixed flange 5, -able flange 5^a. The enlarged inner ends 7^a of the spokes 7 serve to effectually limit, in conjunction with the flanges 5 5^a, outward movement of the said spoke ends.

The outer or rim end of each spoke 7 has a solid collar or extension 7^b formed thereon, and such end is fitted into a socket 10, which is riveted or otherwise secured to the metal wheel-rim 11. Each socket 10 is furnished with an internal screw-thread to receive a tubular nut 12, which is fitted on the spoke before the collar or extension 7^b is formed thereon and which fixes the latter in place. This nut acts directly or positively against the enlarged end of the spoke, so that when it is tightened up it will exert a longitudinal strain on the spoke and draw the enlarged inner end 7^a of the spoke tightly against the adjacent surface of the rings 5 5^a, between which it is held, but so, nevertheless, that the spoke can move radially inward against the action of the elastic or yielding support by flexure of the wheel-rim. Between the outer end of each spoke and the bottom of each socket is a washer 13, of suitable elastic or yielding material, such as hard rubber or leather, to serve as an outer cushion for the spoke end.

The wheel-rim 11 is preferably made of channel-section, as shown in Fig. 4, and may be built up in segments or sections or may be made as a divided ring with its ends connected together or as an endless ring, as may be desired. In the channel 11^a of the rim and under the tire 14 is placed a packing 15 of material, such as a cork, in order to form a yielding bed or cushion for the tire and relieve it of any jarring action.

By constructing metallic wheels in the manner described all rigidity of the parts, such as obtains with metal to metal connections, is avoided, with the result that the wheel will not be subjected while in use to shocks, such as would otherwise result in rapid destruction of the wheel. Such wheels serve to prevent in a very efficient manner the transmission of shock to the wheel-axle and consequently to the vehicle to which they are applied, while at the same time they are sufficiently strong for all practical purposes.

What I claim is—

1. In a wheel, a combined sectional axle-box and hub of the kind herein referred to provided with a layer of material such as leather arranged between the exterior of the axle-box and the interior of the hub, substantially as described and shown for the purposes specified.

2. In a wheel, a hub divided longitudinally and provided near each end with a pair of flanges 5, 5^a having formed within and between them a series of recesses, or an annular recess, and elastic or yielding material arranged within said recesses or recess and against which the enlarged inner ends of the wheel-spokes bear, the outer flange of each pair being made removable and coupling-rings adapted to hold the removable flanges in place and also to hold the parts of the divided hub together, substantially as herein described.

3. In a metallic wheel, the combination of a hub provided near each end with a pair of similar flanges 5, 5^a having formed within and between them a series of recesses or an annular recess 6 and a series of radial holes leading outward therefrom the outer flange of each pair being made removable, a wheel-rim, a series of spokes connected to said rim, adapted to work radially and independently of each other through said radial holes and formed at their inner ends with enlarged parts that are normally rigidly held in an outward direction directly against the corresponding pair of flanges, means for putting said spokes in tension, elastic or yielding material located in said recess or recesses and between the enlarged inner ends of said spokes and the bottom of the recess or recesses, and means for securing the movable flange of each pair in place, substantially as described.

4. In a wheel, a combined sectional axle-box and hub of the kind herein referred to provided with a layer of flexible material between the axle-box and hub, a ring of flexible material let into an annular recess in the axle-box so as to surround the adjacent part of the wheel-axle to which the wheel is fitted, and lengths of flexible material located in recesses in the adjacent longitudinal edges of the two sections of the hub, substantially as described for the purposes specified.

5. A wheel having its hub and rim tied together by a series of tension-spokes formed with enlarged inner and outer free ends, the enlarged inner ends of said spokes bearing in a non-elastic manner and in an outward

direction against the hub but free to move in an inward direction independently of each other, and the enlarged outer ends of the spokes bearing in a non-elastic manner and in an inward direction against the rim but free to move outward relatively thereto, and elastic or yielding material located between the inner or central portion of the hub and the inner end surfaces of the spokes and upon which the latter are bedded so that their inward movement is resisted by such material, substantially as described.

6. A metallic wheel having its spokes enlarged at their inner and outer ends, the inner ends being arranged to bear in an outward direction against a rigid part of the wheel-hub and in an inward direction against elastic or yielding material carried by said hub, and the outer ends of said spokes being arranged to bear in an inward direction directly against tightening-up devices and in an outward direction against layers of cushioning material, substantially as described.

7. A metallic wheel comprising a hub provided with pairs of flanges, one of the flanges of each pair being removable, elastic or yielding material held between each pair of flanges, a wheel-rim having sockets each provided with a tightening-up nut and with a layer of cushioning material, and two series of spokes each having enlarged inner and outer ends, the inner ends being each held between and directly against one of the pairs of flanges by the elastic or yielding material and the outer ends of the spokes being held between the nuts and layers of cushioning material in the sockets and bearing directly against said nuts, substantially as described for the purpose specified.

8. A metallic wheel comprising a combined sectional axle-box and hub provided with pairs of flanges 5, 5^a with interposed elastic or yielding material, a wheel-rim having attached to its inner periphery internally-screw-threaded sockets 10 fitted with layers 13 of cushioning material and nuts 12, and spokes 7 having enlarged inner ends located between said pairs of flanges, bedded on the elastic or yielding material held between the same and strained in an outward direction against the flanges, the outer end of said spokes being enlarged and bedded against the cushioning material in the sockets and forced radially outward by direct contact therewith of said nuts, substanially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ISAAC DAVIS.

Witnesses:
PERCY E. MATTOCKS,
WM. O. BROWN.