No. 728,376. PATENTED MAY 19, 1903.

E. C. DAVIS.

INTERCHANGEABLE HUB.

APPLICATION FILED AUG. 2, 1902.

NO MODEL.

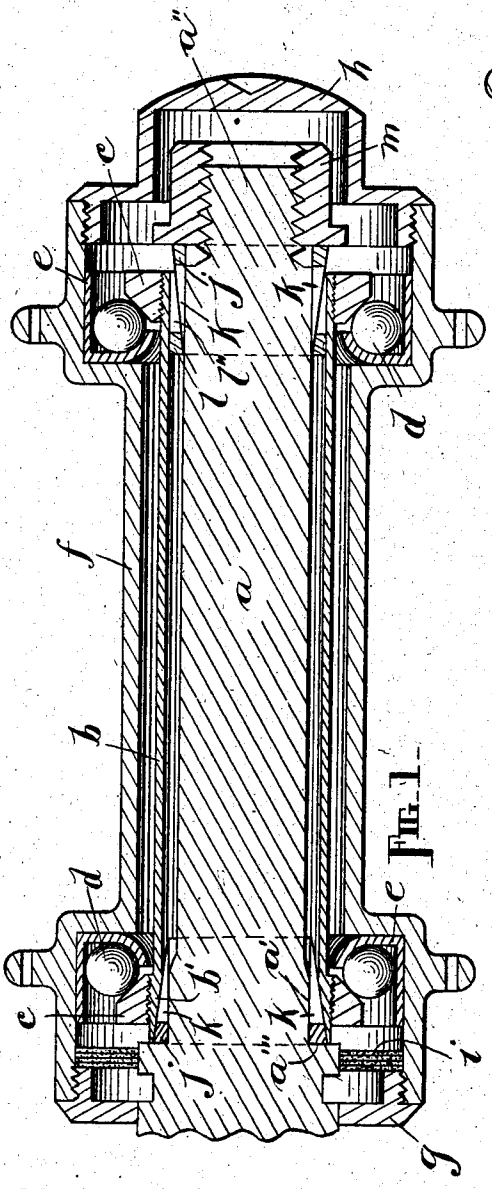

FIG. 1.

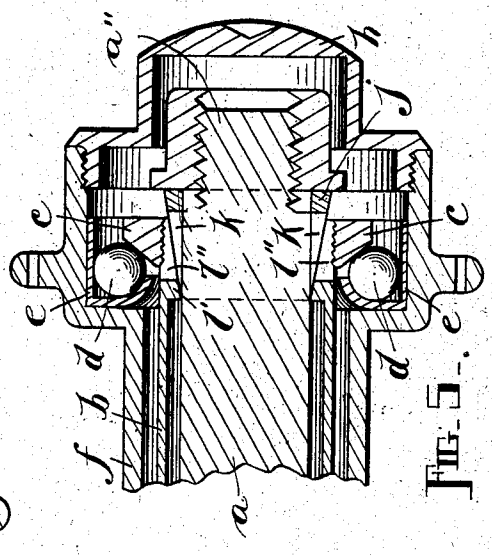

FIG. 5.

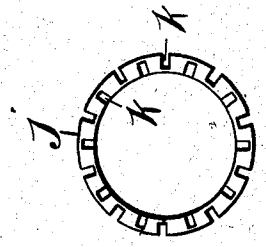

FIG. 4.

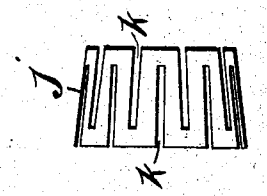

FIG. 3.

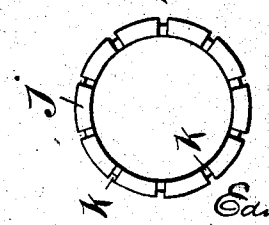

FIG. 2.

Witnesses

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No. 728,376. Patented May 19, 1903.

UNITED STATES PATENT OFFICE.

EDWIN C. DAVIS, OF ELYRIA, OHIO.

INTERCHANGEABLE HUB.

SPECIFICATION forming part of Letters Patent No. 728,376, dated May 19, 1903.

Application filed August 2, 1902. Serial No. 118,115. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. DAVIS, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented a new and useful Interchangeable Hub, of which the following is a specification.

My invention relates to improvements in hubs adapted to fit axles of different sizes in which taper bushings or collets slotted from both ends are employed with other hub members, all as hereinafter fully described and especially claimed; and the object of my improvement is to provide practical, efficient, durable, and inexpensive means for securely fastening a ball-bearing hub to an ordinary axle, such means rendering the same hub adaptable to various sizes of axles and to axles which have become worn from use, so that difference in size has to be met.

Another object of my invention is to do away with set-nuts for the ball-cones.

Ordinary axles vary in diameter and sometimes taper a little. Hence it has heretofore been difficult to construct a hub of one size which was applicable to any but the corresponding size of axle. This difficulty I overcome by introducing resilient collets of peculiar construction into the device to produce in reality a self-adjusting hub. If the axle is of much larger diameter at one end of its hub-carrying part than at the other, as is usually the case, the two collets used may differ from each other somewhat in shape and size, but materially they are substantially alike. Although a single collet for each hub might be employed in some instances, such an arrangement would not be as effective as one in which two are used.

I attain the above-mentioned objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section through a rubber-tired-wheel hub and end of an axle, showing a construction embodying my invention; Fig. 2, a view of the thick end of the bushing or collet; Fig. 3, a side view of said collet; Fig. 4, a view of the opposite end of the same; Fig. 5, a sectional view of parts of a hub and axle, showing a slightly-modified form of construction.

Similar letters refer to similar parts throughout the several views.

That part of the axle *a* which is shown—namely, the hub-bearing—is of ordinary construction, with an enlargement *a'* at the inner end and a screw-threaded projection *a''* at the outer end of less diameter than the major portion of said bearing part. A sleeve *b*, of the same general diameter throughout except that its inner end is tapered at *b'* on the inside, fits loosely over the axle *a*, considerable clearance being left between said sleeve and even the axle enlargement *a'*. The ends of the sleeve *b* are externally screw-threaded to receive ball-cones *c*, which hold the balls *d* in the cups *e*, the latter being pressed tightly into enlarged parts of a shell *f*. The shell *f*, which is the outside member of the hub, is of usual form and has internally-screw-threaded ends to receive dust-caps *g* and *h*. *i* is a felt dust-protector inside of the cap *g*.

With the exception of the sleeve *b* the parts just described are old, and I do not seek to claim them except in combination with the new features of my device.

The slotted and tapered resilient bushing or collet used at each end to rigidly attach the hub to the axle will next be described. As before stated, two are used, by preference; but it is to be understood that no material difference exists between them and that they may be variously modified to meet other conditions besides those shown. These collets may be tapered or not inside, as desired, but are always tapered considerably on the outside. Any inside taper would be very slight, unless the collets were to be used with other than an ordinary axle. The normal inside diameters of the collets correspond with those of the medium sizes of the parts to which they are to be applied, and their peculiar construction enables them to expand for the larger sizes and to contract for the smaller sizes.

The collets *j j*, one of which encircles the enlargement *a'* and the other the smaller end of the axle *a*, are externally tapered and slotted at *k*. The slots *k* are cut deeply into the collet alternately from opposite edges or ends, and the inner terminals of adjacent slots extend well past each other or beyond the circumferential center, as shown in Fig. 3. The right-hand or outer collet *j* is necessarily smaller than the other. Each collet may taper down to a sharp edge at the small end, as shown, or one

or both may have the edge of the small end somewhat thickened or widened. An internally-tapered collar *l* is introduced between the collet on the small terminal of the axle and the sleeve *b* to compensate for the difference in diameter between said end and the enlargement *a'*; otherwise said collet would need to be too thick for practical purposes. The outer tapered surface of the left-hand collet *j* is contiguous with the tapered part *b'* of the sleeve *b*, and the large end of said collet bears against the axle-shoulder *a'''*. The outer tapered surface of the smaller collet is contiguous with the tapered surface of the collar *l*. The thin or sharp edges of both collets are directed toward each other, and the large end of the right-hand collet projects beyond the sleeve and adjacent parts to be engaged by a nut *m*, threaded to the axle projection *a''*. It will now be readily seen that when the nut *m* is screwed onto the projection *a''* and after contacting with the adjacent collet *j* it forces said collet tightly between the axle and collar *l* and draws the parts together, so as to crowd the other collet into the tapered end of the sleeve *b*, both collets expanding or contracting when necessary to whatever extent is required in order to fit contiguous internal and external surfaces. The force exerted in seating the parts is great enough to expand the sleeve *b* sufficiently to hold the cones *c* in place without the lock-nuts required in other forms of construction. The outer end of the sleeve *b* is expanded in this manner, as well as the opposite end, even though the compensating collar *l* is used, because the thinner portion of said collar is within the circumference of the adjacent cone *c* and does not offer enough resistance to prevent the entering collet from expanding both collar and sleeve. The expansion necessary to lock the cones to the sleeve is very slight, and the expansive force exerted by the collets as they are caused to approach each other is considerable—sufficient, in fact, to accomplish the desired result. The force exerted by the collets is also adequate for the purpose of binding the parts firmly and securely together and forming a solid and rigid connection between hub and axle. The collets in their frictional contact with contiguous surfaces grip the axle firmly and tightly hold the sleeve thereto, and about this foundation the ball-bearing is built up.

In place of the collar *l* a reinforcing or compensating internal flange *l'* may be used, as shown in Fig. 5. The flange *l'* is tapered like the collar *l* and serves the same purpose. Either the collar *l* or the flanged part *l'* of the sleeve *b* may be slotted, as shown at *l''*, if found necessary, in order to insure enough expansion of the parts to lock the cones in place; but ordinarily it will not be necessary to split or slot such members for this or any purpose.

Although a rubber-tired-wheel hub has been illustrated, it will be understood that my invention may be used with any ball-bearing hub.

Minor changes in construction other than those hereinbefore pointed out may be made without departing from the nature of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in an interchangeable hub, with an axle having an enlargement *a'*, of a sleeve encircling said axle and interiorly tapered around said enlargement, the inner end of the sleeve abutting a shoulder on the axle, a tapered and two-way slotted collet interposed between the enlargement and the tapered portion of said sleeve, a ball-cone mounted on the sleeve around that portion of the same which is around said collet, and balls on said cone, substantially as set forth.

2. The combination, in an interchangeable hub, of an axle, a sleeve encircling said axle, an interior internally-tapered compensating part at one end of said sleeve, a tapered and two-way slotted collet interposed between said part and the axle, a ball-cone mounted on the sleeve around that portion of the same which surrounds the compensating part, and balls on said cone, substantially as set forth.

3. The combination, in an interchangeable hub, with an axle, of a sleeve, a ball-cone and balls mounted thereon, a tapered and two-way longitudinally-slotted collet interposed between said axle and portions of said sleeve which are surrounded by said ball-cone, and means to force said collet into such operative engagement with adjacent members that the ball-cone is locked in place, substantially as set forth.

4. The combination, in an interchangeable hub, with an axle having an enlargement *a'* and a screw-threaded projection, of a sleeve substantially uniform throughout except being internally tapered at one end around said enlargement, ball-cones and balls mounted on opposite terminals of said sleeve, a tapered and two-way slotted resilient collet interposed between said enlargement and tapered end of the sleeve, an interior internally-tapered compensating part or member at the other end of the sleeve, a second collet similar to the first interposed between said part or member and the axle, the thin ends of the collets being directed toward each other, and a nut threaded to the axle projection, adapted to bear against one of the collets and force both into operative engagement with adjacent parts, said ball-cones being locked in position by the action of said collets on the sleeve, substantially as shown and described.

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

EDWIN C. DAVIS.

Witnesses:
J. H. S. PARKE,
WM. COURTEMANCHE.