

971,356.

F. E. BUXTON.
PULLEY.
APPLICATION FILED SEPT. 16, 1908.

Patented Sept. 27, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

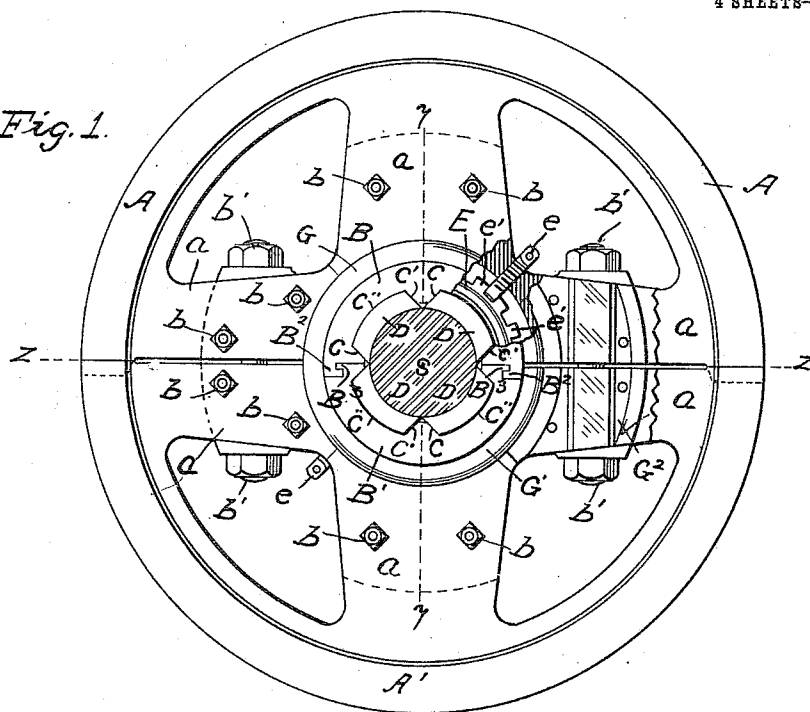
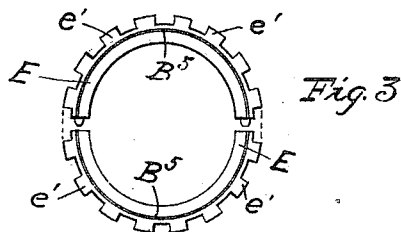
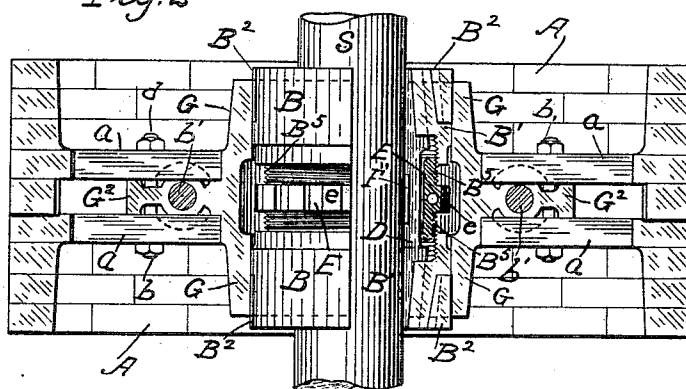


Fig. 2.



WITNESSES:
A. R. Buxton
V. M. Buxton

INVENTOR
F. E. Buxton
BY Robert W. Hanell

ATTORNEY

F. E. BUXTON.
PULLEY.

APPLICATION FILED SEPT. 16, 1908.

Patented Sept. 27, 1910.

4 SHEETS—SHEET 3.

971,356.

Fig 6

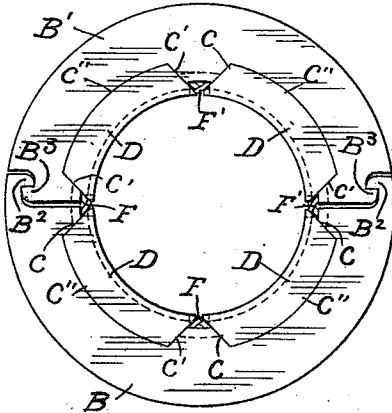


Fig 7

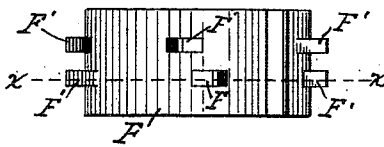


Fig 8

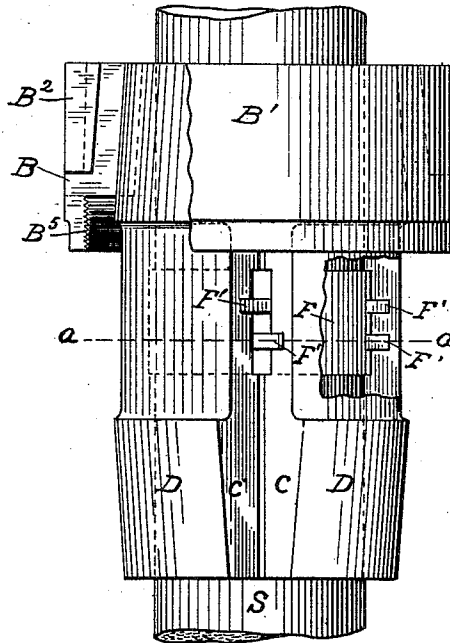
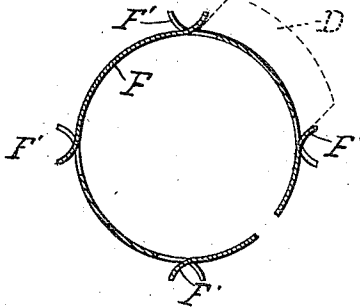


Fig 9

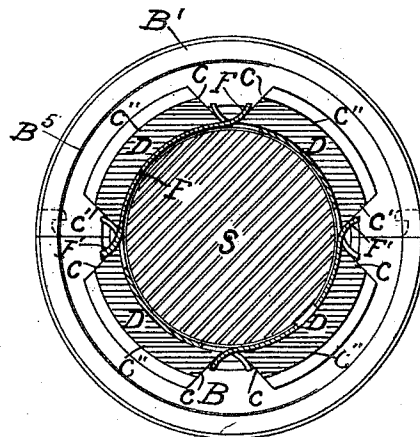


Fig 10

WITNESSES:

A. R. Buxton
V. M. Buxton

INVENTOR

BY *F. E. Buxton*
Robert H. Kanell
ATTORNEY

F. E. BUXTON.
PULLEY.

APPLICATION FILED SEPT. 16, 1908.

Patented Sept. 27, 1910.

4 SHEETS-SHEET 4.

971,356.

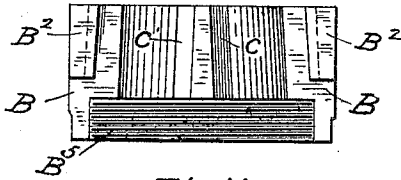


Fig. 11

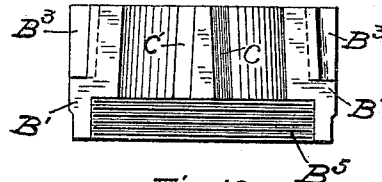


Fig. 12

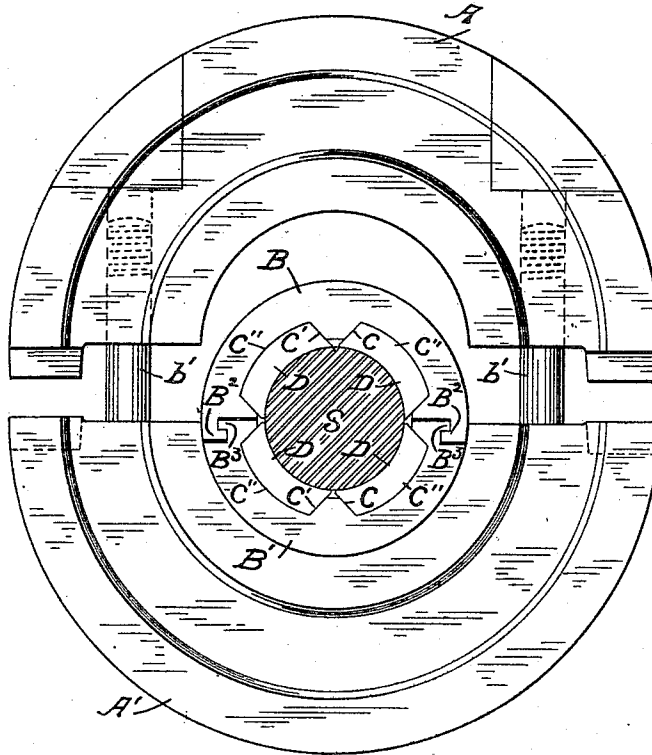


Fig. 13

WITNESSES:

A. R. Buxton
J. M. Buxton

INVENTOR

F. E. Buxton

By *Robert H. Hande*

ATTORNEY

UNITED STATES PATENT OFFICE.

FRANCIS ELLSWORTH BUXTON, OF LOCKINGTON, OHIO.

PULLEY.

971,356.

Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed September 16, 1908. Serial No. 453,269.

To all whom it may concern:

Be it known that I, FRANCIS ELLSWORTH BUXTON, a citizen of the United States, residing in Lockington, in the county of Shelby and State of Ohio, have invented certain new and useful Improvements in Pulleys, of which the following is a full, clear, and accurate specification, being such as will enable others to make and use the same with absolute exactitude.

My present invention relates to pulleys, and more particularly to, so called, split-pulleys, and to means for securing same to a round shaft or the like in such manner that they may not work loose or become inadvertently displaced.

Wood pulleys now in common use are more or less defective, particularly in the fact that they are inclined to work loose and get out of alinement with the shaft, being dependable on draw-bolts alone for the necessary compression or grip upon the shaft. These defects I have overcome in the construction herein shown and described.

The object of my present invention, broadly speaking, is to provide a pulley which will be strong and durable in construction, mechanically correct in its several parts, efficient in operation, positive in action, easily operated and controlled, and which can be manufactured and sold at a comparatively low price.

A further object is to combine in a medium price pulley a combination of materials, such as wood and metal, where an all wood pulley is unsatisfactory and metal is too expensive and heavy.

Another important object is to provide a pulley so constructed that when power is applied to revolve the pulley the tension on the shaft is increased, the ratio of contact increasing with the pull. But more particularly my object is to provide a construction of simple mechanical instrumentalities whereby the contact with the shaft will be equal in pressure at all points therearound, and in which the peripheral contact upon the shaft by means of my improvements will be combined with the usual draw-bolt compression, thereby insuring a positive connection between the pulley and the shaft. And finally my object is to provide a pulley mechanism adapted to grip upon a shaft and operate as a fixed pulley, and at same time having means whereby the pulley may be operated as a loose pulley when desired,—in

other words: to provide a construction which may be used as a "loose" or as a "fixed" pulley, at the option of the operator. In this instance I have provided an interior gripping mechanism constructed in such manner as to form a unitary structure, with means whereby this interior mechanism may first be attached to the shaft and the pulley proper be afterward positioned, thereby reducing to a minimum the time required to place the pulley in position and by which the labor involved will be practically *nil*.

Probably a better understanding of the possibilities of my invention may be had from an inspection of the accompanying drawings, forming a part of this specification, in which—

Figure 1 shows an end elevation of my invention complete and in operative position, certain of the parts being shown fragmentary and others being shown broken away in order to show certain details and the relative positions of certain of the parts. Fig. 2 is a central cross section of certain of the parts, as taken on the line *z—z* of Fig. 1, and certain other parts being shown in plan view. Fig. 3 shows an end elevation of the inner tension ring, which is divided diametrically into two equal sections, in order to facilitate the assembling, *et cetera*. Fig. 4 shows an enlarged view, partly in section as taken on the line *y—y* of Fig. 1, showing certain details of construction and arrangement. Fig. 5 is an end view, partly dismantled, of certain of the parts shown in Fig. 4, certain of the parts being removed. Fig. 6 is an elevation showing the two-part or companion sleeves, the joints thereof extended as by action of the tension ring shown in Fig. 3. Fig. 7 shows a side elevation of the inner ring-spacer; and Fig. 8 is a cross sectional view of the same, as taken on line *x—x*. Fig. 9 is a plan view, partly in section, showing the application of the spacer-ring with relation to other parts, and also showing certain other details of construction and relation of parts. Fig. 10 is a view, partly in section, as taken on line *a—a* of Fig. 9, showing the arrangement of the segmental bearings and the spacer ring with relation to other parts. Figs. 11 and 12 show the interior arrangement of the two members of each of the two sleeves. And Fig. 13 is a side elevation of a slightly modified form of construction, especially as to the pulley proper.

Similar indices denote like parts throughout the several views.

In order that the construction of my invention may be fully comprehended I will now take up a detail construction thereof in concrete detail, specifying that which I have found by experience to be the most practical in actual use, and describing the operation as briefly as I may.

In this instance the rim is built up of a plurality of interlacing members of wood, and having four pairs of inwardly projecting segmental arms *a*, the members of each pair of said arms being spaced apart. Said wheel or pulley proper is divided centrally in an axial direction into two complementary sections, designated A A', and they are adapted to be detachably secured together by the two bolts designated *b*'.

The indices G and G' denote the members of the hub formed, preferably, of metal and divided centrally in an axial direction into two complementary members, and having four outwardly projecting arms G², each of which is adapted to fit between a pair of said arms *a*, and securable thereto by the various bolts *b*, substantially as indicated in Fig. 1.

The indices B and B' designate the two members of each of the companion sleeves, the members of each sleeve being adapted to be interlocked, it being understood that when locked together they may be moved apart a limited distance, there being clearance spaces formed between the tongues B² and B³ thereof, as shown in Fig. 6, the interior of said sleeves being shown in Figs. 11 and 12. Said clearance spaces are for the purpose of allowing a limited lateral movement of the members with relation to each other as suggested. Said clearance spaces are arranged parallel with the plane which separates the members A and A'. It is to be understood that there are two of said sleeves, they being of construction identical with each other, but in practice they are oppositely disposed with relation to each other. The inner end of each of said sleeves is recessed and threaded as shown at B⁵ in Figs. 9, 11 and 12, in order to receive therein the respective threaded ends of the tension ring E as shown in Fig. 2. Said tension ring E is connected to the respective sleeves by right and left threads, whereby if the tension ring be rotated in one direction it will force the sleeves apart, while if rotated in the other direction it will draw the sleeves toward each other. Said tension ring E is divided diametrically into two equal sections, the members being retained together by dowels, as shown in Fig. 3 in order to facilitate the assembling or dismembering of the mechanism. Extending inward, that is laterally, from the reverse or outward ends of said sleeves B and B' are a plurality

(preferably four) of relatively wide channels or slide-ways which terminate in said cut-away portion of the opposite end of the sleeves. The two sides, *c* and *c'*, of each of said slide-ways are parallel, while the face *c''* of each is disposed at an angle with relation to the axial direction, thereby forming the larger portion of each pair of sleeves tapering, same being smaller at the outer terminals of the sleeves. It is to be understood that by rotating the ring E the two sleeves may be drawn toward or forced away from each other. Located within the interior of the combined sleeves and tension ring are the compression segments D, one for each of said slide-ways. Said segments D are of a length such as to extend, approximately, from end-to-end of the hub, as indicated in Fig. 4. The interior of the combined compression segments D is circular to correspond with the periphery of the shaft S, as shown in Fig. 1. Formed circumferentially and centrally around in the inner faces of said segments D are recesses which register with each other, in which is located the band or spacer F, as shown in Fig. 4, which surrounds the shaft S. Said band or spacer F is shown most clearly in Figs. 7 and 8, and consists of an open spring ring having a plurality of spring ledges or teeth F' extending out therefrom, formed integral therewith, same being formed by three incisions and the tongue thus formed is bent outward somewhat, as indicated. In practice the segments D are placed in position, one in each of said guide-ways of the sleeves, and located between said ledges F', and the segments are thereby retained in alinement and in proper relations to each other, the expansive tendency of the band F normally holding the segments D from engagement with the shaft thus leaving them free to be acted upon by the operation of the sleeves. As indicated in Fig. 6, and elsewhere, the two members of each of the sleeves are detachably locked together by companion tongues B² and B³, being constructed in such manner as to allow them to expand and contract on lines parallel to that of the draw-bolts *b*' which connect the members A and A', and in such manner as to allow the two members of each sleeve to be separated only by moving the members longitudinally beyond each other.

It will be apparent that by applying a spanner wrench (not shown) to the gear *e'*, formed peripherally around the center of the ring E and rising above the periphery thereof, that a direct pull will be exerted on the segments whereby if the said ring be turned in a direction to draw the sleeves toward each other it will force the segments against the shaft. This last movement will, of course, exert an expansive pressure to separate the members of the sleeves, and

by reason of the clearance space between the tongues this operation will produce a slightly contorted or oblong shape to the sleeves in cross section. The compression on the segments will manifestly be parallel to the compression of the bolts b' which connect the members G and G' of the hub.

The letter e denotes keys, there being one or more, preferably two, threaded through the hub between the arms thereof and at right angles to the shaft, and when inserted their inner ends enter in the notches of the gear e' , as shown in Fig. 1, in order to lock the ring E in connection with the hub G—G' as indicated.

Operation: In assembling the device I first place the open spring band F around the shaft S, at the point where the pulley is to be located. I then place the several segments D in position between the ledges F' so that they may bear closely and in perfect alinement to the shaft S. I then place over the assembled segments D, intermediate their ends, the tension ring E. I then couple the members of each of the sleeves together around the shaft on either side of said parts and bring the sleeves toward each other over the segments until they are in contact with the ring E. I then turn the ring E to draw the sleeves toward each other, using a suitable wrench for that purpose, engaging the wrench on the gear e' , and turning same in the direction the belt will pull on the pulley. By the above I form a central unit of said parts, and the movements of the sleeves toward each other manifestly forcing the segment into close frictional contact with the shaft. I now place over this central unit the hub G—G' and the sections A—A', locating them in such manner that the sections register on the same line. I now tighten the bolts b' and then screw in the eyes e' , thereby connecting the ring E with the pulley proper. I now turn the pulley in same direction as it would be turned by the belt thereon, this of course will turn the band E thereby forcing the segments still tighter against the shaft. By the above it is seen that no matter what additional pressure is applied to revolve the pulley, in its normal direction, it will only act to increase the tension or tractive tendency of the segments upon the shaft. If I should desire to employ this construction as a loose pulley it is evident that I have only to turn the pulley in the opposite direction, thereby causing the band E to force the sleeves apart thereby releasing the segments from the shaft, and then by releasing the keys e , I allow the pulley to be revolved without connection with the shaft.

Having now fully shown and described my invention, what I claim and desire to secure by Letters Patent of the United States, is—

1. A pulley comprising a separable wood rim having inwardly directed pairs of arms, a separable metal hub having outwardly directed single arms each one of which is adapted to fit between a pair of the first named arms, means for detachably connecting the arms of the rim with the arms of the hub, and a mechanism located in the hub for locking the pulley to a shaft, said means including means by which the power applied to revolve the shaft will increase the grip of the pulley thereon.

2. A mechanism for securing a pulley to a shaft, comprising a pair of sleeves, a ring connecting the sleeves, a plurality of bearing segments located in the sleeves and adapted to be moved convergently by the rotation of said ring to lock the mechanism on the shaft as a unitary structure, all substantially as shown and described.

3. In combination with a shaft, a separable pulley disposed therearound, a mechanism carried in the pulley hub and disposed around the shaft, said mechanism comprising a pair of two-part oppositely directed sleeves having centrally directed tapering slide-ways formed therein, a tension ring connecting the sleeves, a plurality of segmental bearings extending from end-to-end of the combined sleeves and operable in said slide-ways, said mechanism affording means whereby the pulley may be rigidly connected to the shaft or by which it may be used as a loose pulley and revolve independent of the shaft, substantially as set forth.

4. A pulley comprising, a two-part rim, a two-part hub to which the rim is detachably connected, a pair of oppositely disposed two-part sleeves located in the hub aperture, a tension ring connecting the sleeves and adapted to move the sleeves endwise opposite to each other, a plurality of segment bearings located within the sleeves and adapted to be moved convergently toward each other at right angles to the operation of said sleeves when the sleeves are moved toward each other, and means for moving said segments apart when the sleeves are moved apart.

5. A pulley comprising a separable sectional wood-rim and arms, said arms being inwardly directed and arranged in pairs, a metal sectional hub having outwardly directed single projections each of which is adapted to fit between the pairs of arms of the rim, suitable means for securing the arms of the rims to the projections of the hub, a mechanism located within the hub with means for adjustably compressing certain members thereof upon a shaft, said mechanism comprising a plurality of segmental bearings slidably mounted in a pair of sleeves and the oppositely disposed sleeves having guide-ways therein for said bearings

and means for detachably connecting said mechanism to the hub, all substantially as set forth.

6. In combination with a shaft, a separable pulley disposed therearound, a mechanism carried in the central aperture of the hub and disposed around the shaft, said mechanism comprising a plurality of two-part oppositely directed sleeves having centrally directed tapering slide ways formed longitudinally thereof and located on the interior walls thereof, a tension ring connecting the sleeves by right and left threads, means whereby said ring may be rotated, a plurality of bearings having their peripheries formed tapering to correspond with and operate in said slide-ways, means for retaining said bearings in the slide-ways and tending to release said bearings from connection with the shaft.

7. A pulley comprising a separable wood rim having inwardly directed pairs of arms, a separable metal hub having outwardly directed single arms each one of which is adapted to fit between a pair of the first named arms, means for detachably connecting the arms of the rim with the arms of the hub, and a mechanism located in the hub for locking the pulley to a shaft, said mechanism including means by which the power applied to revolve the shaft will increase the grip of the pulley thereon, all substantially as shown and described.

8. A mechanism for securing a pulley to a shaft comprising, a tension ring, a pair of sleeves overlapping the tension ring, a plurality of bearing segments located in the sleeves, an open spring band carried within the bearing segments and adapted to be contracted by the rotation of said tension ring to lock the mechanism on the shaft, all substantially as shown and described.

9. In combination with a shaft, a separable pulley disposed therearound and comprising in combination a mechanism carried in the pulley hub and disposed around the shaft, said mechanism including a pair of two-part oppositely directed sleeves each pair having a plurality of centrally directed tapering guide-ways formed therein, a separable tension ring connecting the sleeves, a plurality of bearing segments extending from end-to-end of said sleeves and operable in said guide-ways, said segments having their inner central portion recessed and a one piece open spring band positioned therein affording means whereby the pulley may be rigidly connected to the shaft or by which it may be used as a loose pulley and revolved independent of the shaft, all substantially as set forth.

10. A pulley comprising a two part rim, a two part hub to which the rim is detachably connected, a pair of oppositely disposed two-part sleeves interlocked together and lo-

cated within the hub aperture, a tension ring connecting the sleeves and adapted to move the sleeves endwise opposite to each other, a plurality of bearing elements located within the sleeves with their central inner portions secured therein to permit the engagement of an open band therein to rotate free of the said shaft when said sleeves are moved together and adapted to move said segments against the shaft, and means for moving said segments radially apart when the sleeves are moved apart for the purpose set forth, all substantially as shown and described.

11. A pulley comprising a separable sectional wood-rim and arms, said arms being inwardly directed and arranged in pairs, a metal sectional hub having outwardly directed single projections, each of which projections is adapted to fit between the arms of a pair of arms of the rim, means for securing the arms of the rims to the projections of the hub, a mechanism located within the hub, a separable bearing body comprising a plurality of bearing segments disposed around a shaft with their exterior ends reduced in size and mounted in a pair of oppositely disposed sleeves having guide-ways to fit over the conical portions thereof, an inner spring band positioned centrally within the bearing portions, a tension ring, having right and left threads, positioned within the overlying end portions of said sleeves and meshing therewith for compressing certain members upon a shaft.

12. In combination with a shaft, a separable pulley disposed therearound, a mechanism carried in the central aperture of the hub and disposed around the shaft, said mechanism comprising a plurality of two-part oppositely directed sleeves having centrally directed tapering guide-ways formed longitudinally thereof and located on the interior walls thereof, said sleeves having on their adjacent side-margins tongues and recesses that slidably interlock, said sleeves overlying a tension ring having threaded portions meshing, right and left, with portions of the said sleeves whereby said ring may be rotated, a plurality of bearing members having their peripheries formed tapering to correspond with and to operate in said guide-ways, means for retaining said bearing members in the guide-ways and tending to release said bearing members from frictional contact with the shaft, all substantially as set forth.

13. A pulley comprising a separable sectional wood-rim and arms, said arms being inwardly directed and arranged in pairs, a metal sectional hub having outwardly directed single projections each of which is adapted to fit between a pair of arms of the rim, suitable means for securing the arms of the rim to the projections of the hub, means

for securing together the sections of the hub, a mechanism located within the hub comprising a plurality of bearing segments having their side margins parallel and their outer end portions formed as reversed cones their inner central portions being recesses to permit the engagement of an open spring band therein said band having formed on its periphery a plurality of oppositely disposed spring ledges to engage the side margins of said segments, a plurality of oppositely disposed sleeves slidably engaging said sleeves, a ring connecting the sleeves and affording means for drawing the sleeves together and for radially adjusting the segments around a shaft, substantially as set forth.

14. A mechanism for securing a pulley to a shaft, comprising a pair of sleeves slidably mounted within the central aperture of a pulley-hub, said sleeves having a plurality of interlocking sections with their inner

flanged end portions threaded right and left and overlying a sectional tension ring having its exterior side portion threaded and engaged thereto, said sleeves having formed on their interior walls a plurality of oppositely disposed guide ways, an open spring band carried centrally within the said bearings the same being free to contract by the radial action of the bearing segments provided by rotation of the said tension ring to lock the mechanism on the shaft as a unitary structure whereby it may be revolved loose on a shaft when said frictional contact is released.

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

FRANCIS ELLSWORTH BUXTON.

Witnesses:

E. B. KLINE,
V. M. BUXTON.