F. J. KEEGAN.

MEANS FOR SECURING WHEEL DISKS TO HUBS.

APPLICATION FILED MAR. 12, 1919.

1,329,527.

Patented Feb. 3, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

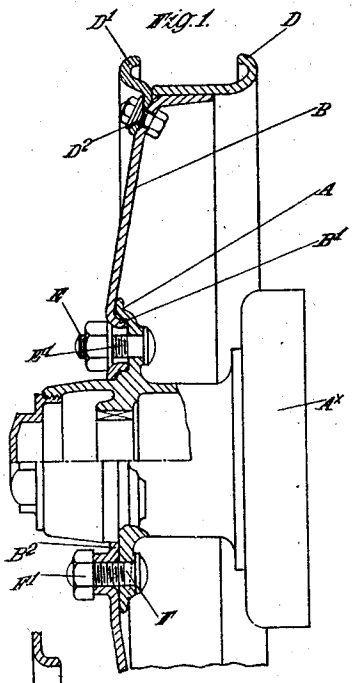


Fig. 2.

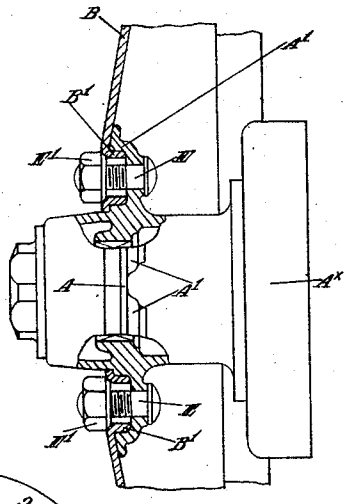


Fig. 1a

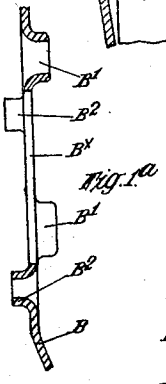


Fig. 1b

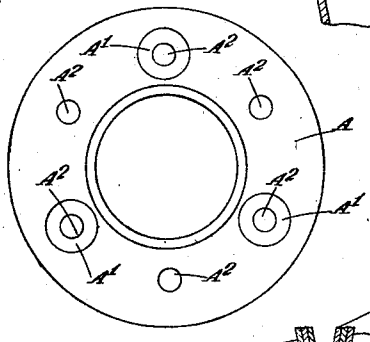


Fig. 5.

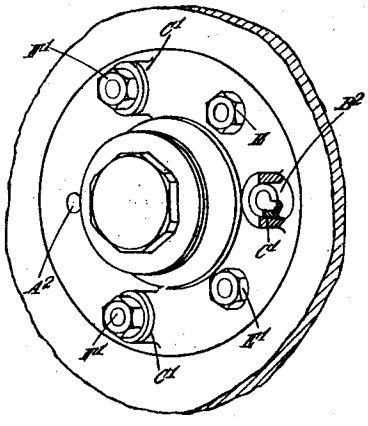
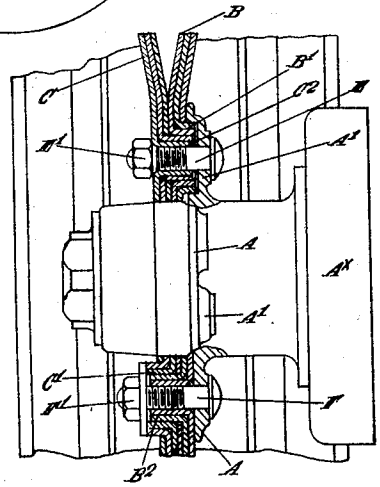


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 4.

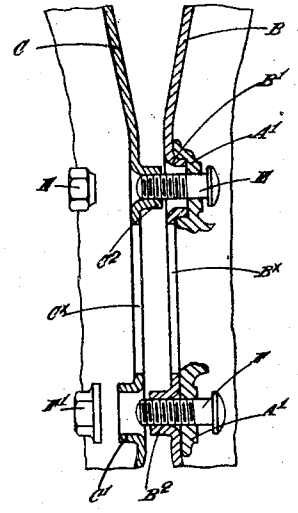


Fig. 3.

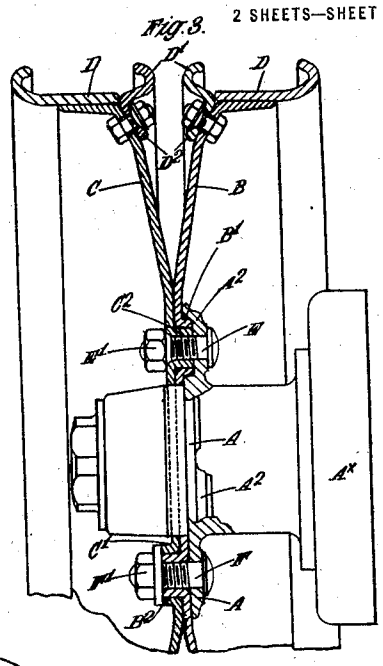


Fig. 1.C

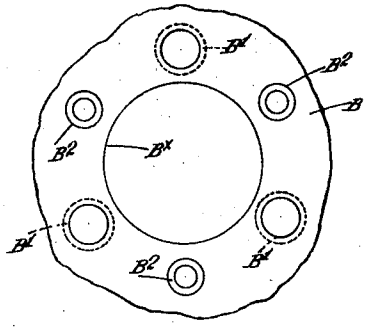


Fig. 7.

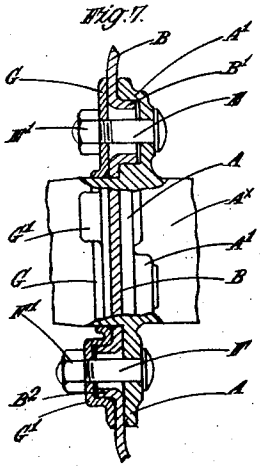
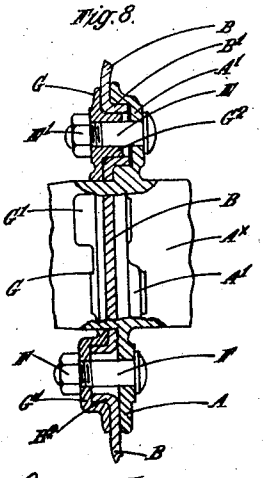


Fig. 8.



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UNITED STATES PATENT OFFICE.

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MEANS FOR SECURING WHEEL-DISKS TO HUBS.

1,329,527. Specification of Letters Patent. Patented Feb. 3, 1920.

Application filed March 12, 1919. Serial No. 282,180.

To all whom it may concern:

Be it known that I, FRANK JOHN KEEGAN, a subject of the King of Great Britain, residing at Alma street, Coventry, in the county of Warwick, England, have invented certain new and useful Improvements in or Relating to Means for Securing Wheel-Disks to Hubs, of which the following is a specification.

This invention relates to coupling or securing means and is especially intended for securing the disks of disk wheels to the wheel hubs, although it is capable of being used for coupling or securing any similar disk or plate-like members together so that they may be rotated as a single unit. In vehicle wheels of the type in which a single disk carrying the wheel rim is bolted or similarly secured to a flange on the hub, it is usual to make the disk thicker at its central part, in order to provide sufficient bearing surface for the disk on the hub, and to afford a reasonable driving surface for the securing bolts which extend through the disk and the hub flange. The chief object of the present invention is to obviate the necessity of providing the thickened central part on the disk and to employ a disk which is comparatively thin at the central part, thereby reducing the weight and effecting economy in the amount of metal employed.

According to this invention all the members to be secured together, which for example in the case of a wheel, may be the disk or disks and the hub flange and if desired a retaining plate or ring, are formed or provided with lateral cylindrical projections, bosses, or recesses which interfit or inter-engage so that when the said members are held against lateral displacement, the said cylindrical projections or the like constitute mutual bearing surfaces to take up torque and rotational strains during the rotation. For example in the case of a single disk wheel the lateral cylindrical projections or bosses are formed or provided on the disk and are adapted to be fitted into corresponding parts forming cylindrical recesses in the hub flange. In the case of a double disk wheel in which each disk may carry a separate rim or tire, each disk may be provided with cylindrical projections or bosses on each side thereof, which cylindrical projections or bosses are so constructed and arranged that those on one side of one disk fit into those on the adjacent side of the other disk. The two disks are then placed on the hub so that the cylindrical projections or bosses extending from one side of the disk adjacent to the hub flange fit into corresponding parts forming cylindrical recesses in the latter, the three members, namely, the two disks and the hub flange then being secured together against lateral displacement by bolts or the like. The ends of the aforesaid cylindrical projections, bosses or the like which are exposed when the various members are placed together may be adapted to be clamped between the head of a bolt extending through the interfitting projections or bosses and a nut on the threaded end of the bolt. In some cases we may provide a retaining or bearing ring which is suitably shaped to bear against the outer surface of the disk of a single disk wheel or the outer disk of a double disk wheel so as to constitute a bearing surface against which the nuts or heads on the securing bolts bear when the various members are secured together. By means of this invention we obviate the necessity of thickening the central part of the disk as the interfitting cylindrical projections, bosses or the like afford ample bearing surfaces which give mutual support to take the radial load and torque strains during rotation, so that we may employ thin disks to reduce the weight and effect economy in metal and we may of course strengthen the thin disks laterally by forming therein circumferential, radial or other suitably arranged corrugations or indentations or in some cases we may employ a laminated structure composed of thin disks.

Although the invention is specially applicable to the securing of disks to wheel hubs as above set forth, it is also applicable in general to the coupling together of disks and similar members. As the interfitting or interengaging cylindrical projections, bosses or the like on the various members form mutual bearing surfaces which afford proper support to take radial loads or torque and rotational strains, the securing bolts are practically relieved of this function and therefore mainly serve to retain the various members against lateral displacement.

Figure 1 is a transverse sectional view of a portion of a single disk wheel according to one embodiment of the invention,

Fig. 1ª is a vertical sectional view of a portion of one form of the disk.

Fig. 1ᵇ is a face or front view of the hub flange.

Fig. 1ᶜ is a face or front view of the central part of the disk shown in Figs. 1 and 1ª.

Fig. 2 is a similar view to Fig. 1 illustrating a modification in connection with a single disk wheel.

Fig. 3 is a transverse sectional view of a double disk wheel constructed according to one embodiment of the invention.

Fig. 4 is a similar view to Fig. 3 showing the two disks separated from each other.

Fig. 5 is a fragmentary perspective view partly in section, looking at the exterior face of the outer disk shown in Fig. 3.

Fig. 6 is a similar view to Fig. 4 illustrating disks of laminated construction or formation.

Figs. 7 and 8 are sectional views showing two constructions of the aforesaid retaining or bearing rings employed in conjunction with the disks.

A represents the hub flange forming part of any suitable or standard hub A^x. B represents the disk in the single disk wheel shown in Figs. 1, 2, 7 and 8, and B, C represent the two disks of the double disk wheel shown in Figs. 3, 4 and 6 the disks being constructed of pressed steel. D is the tire carrying rim secured to or formed on each disk in any appropriate manner and as shown in Figs. 1 and 3 it may be provided with a detachable tire retaining flange D′ secured to the outer circumferential part of the disk B by a suitable number of bolts D^2. The disk B is made dished or conical with a vertical central part which latter is provided with a central aperture B^x to fit over the hub and with a number of cylindrical projections or bosses B′ on the side thereof, and a number of cylindrical projections or bosses B^2 on the other side thereof. Preferably three bosses are arranged at equidistant points on each side of the disk, those B′ on one side being arranged in different radial planes from those B^2 on the other side (see Fig. 1ᶜ). The said bosses may be formed by hot or cold pressing of the metal at the central part of the disk or they may be made separate and attached to the disk by riveting, welding or otherwise. The hub flange A is machined to provide three bosses forming cylindrical recesses A′ equally spaced apart which are adapted to receive the projections or bosses B′ when the central part of the disk is placed adjacent to and in contact with the hub flange. In order to secure the disk B and the hub flange A together, bolts E are provided which extend through holes A^2 in the hub flange co-axial with the recesses A′ and through the bosses B′, the heads of the bolts bearing against a suitably formed surface on the rear or inner side of the hub flange, while the threaded ends of the bolts receive the nuts E′ which are suitably shaped to bear against the circular part of the metal adjacent to the bosses B′. Additional securing bolts F are provided which extend through holes A^2 in the hub flange disposed at points between the aforesaid recesses A′, see Fig. 1ᵇ the said bolts F extending through the bosses B^2 and being adapted to receive nuts F′ which bear against the extremities of the bosses B^2.

In the modification shown in Fig. 2, the disk instead of being provided with bosses on both sides of its central part is provided with suitable number of bosses B′ on one side only, which fit into correspondingly shaped bosses or recesses A′ in the hub flange so as to be secured by retaining bolts E having nuts E′ for bearing against the metal adjacent to the bosses or projections B′.

The interfitting cylindrical bosses B′ and recesses A′ afford ample bearing surface to take the radial load and the bosses project laterally from the disk sufficiently to provide a satisfactory length of bearing to allow for the torque during rotation and to prevent shearing of the bolts.

In the double disk wheel shown in Figs. 3 and 4, the hub flange A and the disk B are similar to the hub flange and the disk described in connection with Fig. 1, inasmuch that the disk is provided with bosses B′ on one side of fitting into recesses A′ in the hub flange and with bosses B^2 on the other side of the central part thereof. It will be observed that the diameter of the bosses B′ is greater than that of the bosses B^2. The second disk C is similar to the disk B and has similar bosses C′ and C^2 at the two sides of its central part respectively. The position of the disk C, however, is reversed so that its inclined or dished portion may be directed in the opposite direction to the corresponding part of the disk B, and its smaller bosses C^2 are adapted to fit into the larger projections or bosses B′ on the disk B, while its larger projections or bosses G^2 are adapted to surround or fit over the smaller bosses B^2 on the disk B. The two disks are shown separated in Fig. 4, while in Fig. 3, they are shown with their central parts in contact and the interfitted bosses B′, C^2 fitted in the recesses A′ in the hub flange, in which position the disks are secured by retaining bolts E extending through the recesses A′ and the interfitting bosses B′ C^2 and having nuts E′ bearing on the metal adjacent to the boss C^2, and also by retaining bolts F passing through holes A^2 in the hub flange and the interfitting bosses B^2 C′ and having nuts F′ which bear against the ends of the bosses B^2 C′. By means of this arrangement the

bosses provide a large bearing surface and each boss gives considerable support to its adjacent boss. The distance through the disks at their bosses, may be as great, or greater than the distance through the usual thickened disks, and while there is a considerable saving in weight, there is no diminution of strength; in fact this type of wheel is stronger, inasmuch as there is no driving or load duty on the bolts, the chief function of the latter being to hold the disks on to the hub. The disks B and C being similar in construction are readily interchangeable.

The modification shown in Fig. 6 is similar as regards arrangement of interfitting bosses to the modification shown in Fig. 3, but instead of employing plain disks, I provide disks which are of laminated structure or formation.

Instead of the nuts E′ and F′ bearing against the outer surface of the disks B (Fig. 1) or the disk C (Fig. 3) I may provide a retaining or bearing ring G (see Figs 7 and 8) which is formed with bosses or recesses G′ that fit over the projections B^2 or C^2, while the portion of the ring adjacent to the bosses B′ may be flat as shown in Fig. 7 to constitute a bearing surface for the nuts F′ or these portions of the ring may be provided with bosses or projections G^2 to fit into the bosses B′, so that the bolts E may pass through the interfitting bosses B′, G^2 as shown in Fig. 8. The use of the ring G materially increases the strength of and imparts rigidity to the construction. The retaining or bearing ring G may be constructed of pressed steel or it may be formed by casting.

What I claim and desire to secure by Letters Patent of the United States is:—

1. Means for coupling disks together so that they may rotate as a unit comprising interengaging, laterally-extending, cylindrical projections and recesses, arranged respectively on overlapping members, and bolts extending through said projections and recesses and preventing lateral separation of the disks.

2. A disk wheel comprising a hub provided with an annular flange, a disk overlapping said flange, said flange and disk being provided with inter-engaging tubular projections and recesses forming relatively elongated, laterally-extending, bearing surfaces to take up torque or rotational stresses during rotation, and bolts extending through said sleeve-like bearings and preventing lateral separation of the hub and disk.

3. A disk wheel comprising a hub provided with an annular flange, a disk overlapping said flange, said flange and disk being provided with inter-engaging projections and recesses forming relatively elongated, laterally-extending, bearing surfaces to take up torque or rotational stresses during rotation, a second disk held against movement radially of the first said disk by engagement of laterally-extending, tubular projections thereon engaging similar projections on the other disk and hub, and means for preventing lateral separation of said parts.

4. A disk wheel comprising a hub, a disk adapted to be attached to the hub and provided with a plurality of laterally-extending, tubular projections on both faces, a second disk provided on both faces with similar projections adapted to engage those on the first said disk, and bolts extending through said engaging projections.

5. A disk for disk wheels having lateral bosses on both sides thereof, those on one side being of greater diameter than those on the other side so that the larger bosses on one side can if desired be fitted over the smaller bosses on an adjacent disk substantially as described.

FRANK JOHN KEEGAN.