June 1, 1926. 1,586,880

E. K. DEGENER

CUSHION COUPLING

Filed Jan. 17, 1924 2 Sheets-Sheet 1

Fig. 1.

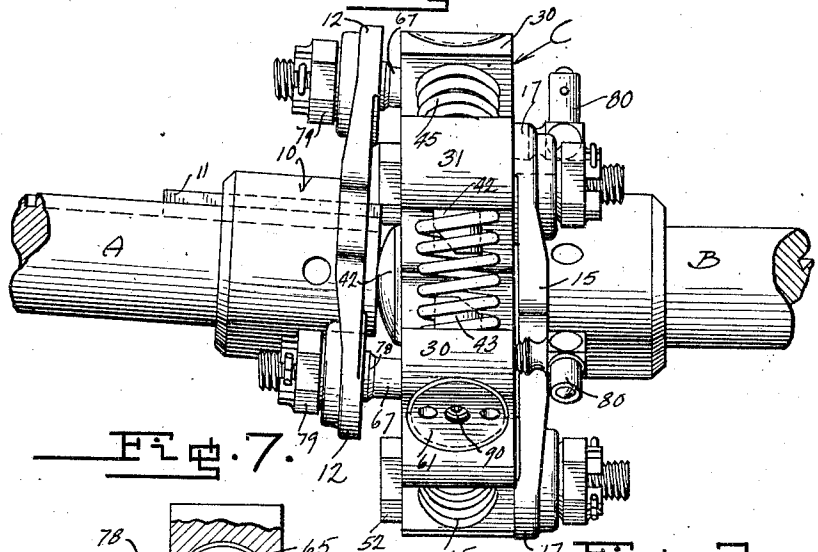


Fig. 7.

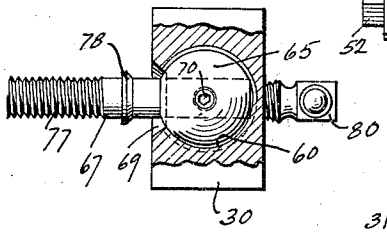


Fig. 2.

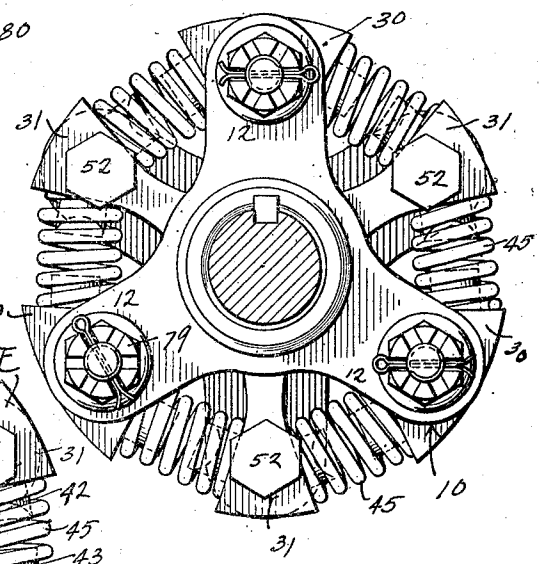
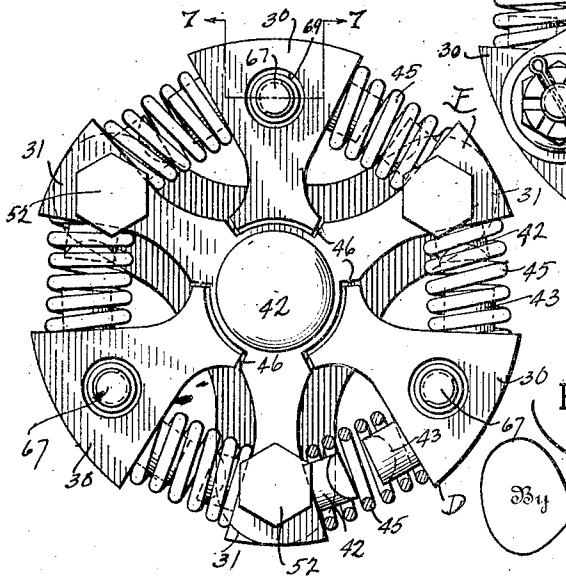


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

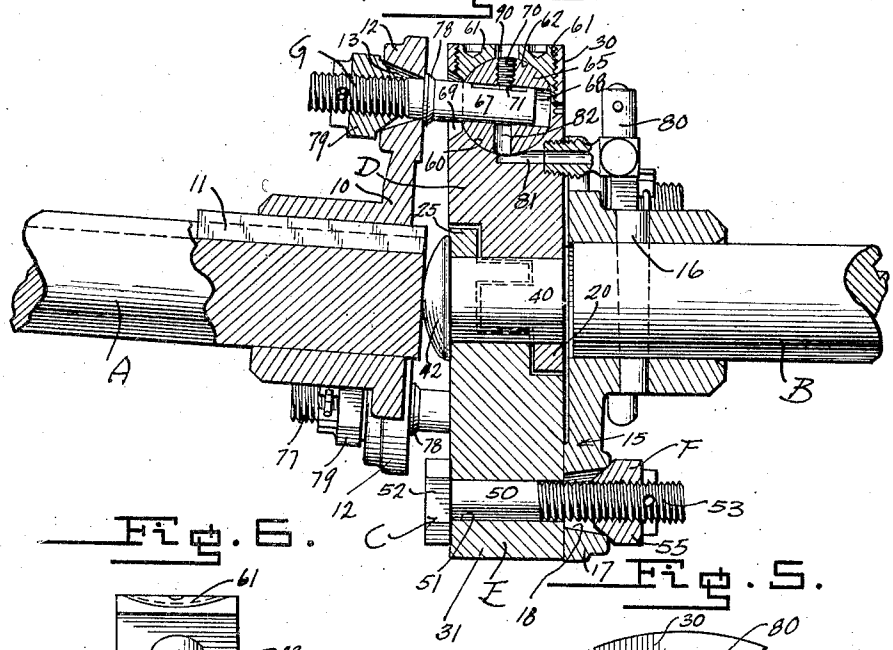


Fig. 6.

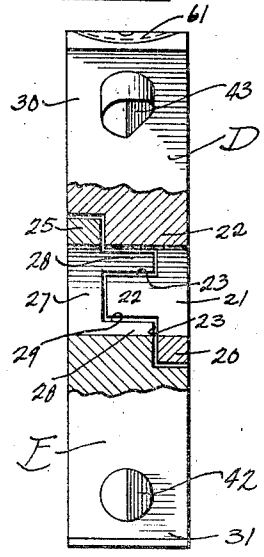


Fig. 5.

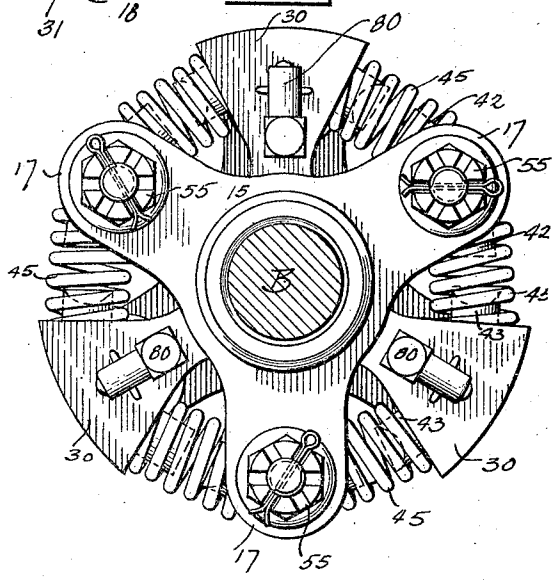
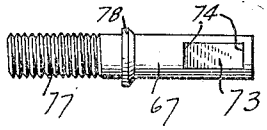


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDWARD K. DEGENER, OF SANTA ANA, CALIFORNIA.

CUSHION COUPLING.

Application filed January 17, 1924. Serial No. 686,915.

This invention relates to an improved flexible or cushion coupling.

The primary object of this invention is the provision of an improved cushion coupling of the type adapted for use between drive and driven shaft sections, primarily adapted to displace the ordinary fiber coupling used for such purpose.

A further object of this invention is the provision of a cushion coupling of the above mentioned character which will transmit power from one shaft section to another with a cushioning effect, preventing shock, strain, and jerking, and at a predetermined point of power application providing a positive and rigid driving connection.

A further object of this invention is the provision of an improved cushion coupling for drive and driven shafts, of such a nature as to insure a proper relation of the shafts at all times, and embodying durably connected parts which will permit of no lost motion such as ordinarily results with the use of the conventional fiber couplings.

A further object of this invention is the provision of a cushion coupling which is particularly desirable for use for shafts adapted to receive excessive driving power and load, which provides an effective cushioning action for forward and reverse driving.

A further object of this invention is the provision of a cushion coupling adapted for use with drive and driven shafts, embodying a buffing feature which will permit of the ready and easy starting of the drive shaft to overcome the inertia of the load thereon without destruction of parts or excessive strain thereon.

A further object of this invention is the provision of a novel driving connection between drive and driven shafts.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views:—

Figure 1 is a side elevation of the improved cushion coupling.

Fig. 2 is an end elevation of the improved cushion coupling, showing the device from the drive shaft end of the same.

Fig. 3 is an end elevation of the improved device, showing the drive shaft connection removed therefrom to expose the cooperating parts thereof.

Fig. 4 is a longitudinal cross sectional view taken through the improved cushion coupling, showing the attachment of drive and driven shaft sections thereto.

Fig. 5 is an end elevation of the improved device, taken from the driven shaft end of the same.

Fig. 6 is a cross sectional view taken through interconnected members of the improved cushion coupling.

Fig. 7 is a cross sectional view taken substantially on the line 7—7 of Figure 3.

Fig. 8 is a side elevation of a detail used in the universal joint connection between the drive and driven shafts.

In the drawings, wherein for the purpose of illustration is shown but the preferred embodiment of the improved cushion coupling, the letters A and B may respectively designate drive and driven shafts, which are connected by means of the improved cushion coupling C. The cushion coupling C preferably includes the interconnected and relatively movable members D and E, which are respectively connected by means G and F to the drive and driven shaft sections A and B.

The drive shaft A for the conventional automotive vehicle is directly connected to the engine clutch mechanism, and has the conventional attaching spider 10 keyed, as at 11, upon the outer end thereof. The spider 10 preferably provides the triadically disposed arms or extensions 12 having tapered openings 13 therethrough. Similarly the driven shaft B is provided with an attaching spider 15, which is keyed or otherwise secured thereto, as at 16, and which provides the triadically disposed arms 17 having the tapered openings 18 therethrough. The driven shaft B is, of course, in the conventional automotive construction connected to the differential mechanism.

The members D and E are interfitting, and are of spider formation. The spider or member D preferably provides a circumferential hub portion 20 having an opening 21 therethrough, and provided with the relatively spaced laterally extending fingers 22 providing spaces 23 therebetween. Similarly, the spider member E provides the

circumferential hub portion 25 having the opening 27 therethrough, and provided with the relatively spaced extensions or fingers 28 with spaces 29 therebetween. The member D preferably provides the radially extending arms 30, triadically arranged about the circumferential portion, and the member E provides the triadically disposed radially extending arms 31.

The members D and E are adapted for interfitting, and when so disposed the fingers 22 of the member D are movably received in the recesses 29 between the fingers 28 of the member E, with the fingers 28 disposed in the recesses 23 provided between the fingers 22 of the member D. Accommodation is made in the members D and E for receiving the circumferential hub portions 20 and 25 of the members D and E, and in this position the openings 21 and 27 of the members D and E respectively are in aligning relation, and adapted to receive a pin 40 therethrough. When in this interconnecting relation the side surfaces of the members D and E are in a flush relation, and the arms 30 of the member D are alternately arranged with respect to the arms 31 of the member E, substantially as is illustrated in the drawings.

Lugs 42 are carried by the arms 31 of the member E on the sides thereof which face the arms 30 of the spider member D. Similarly the sides of the arms 30 of the member D which face the arms 31 are provided with lugs 43 disposed in aligning relation with the lugs 42. The outer ends of the lugs 42 and 43 are in a spaced relation, and compressed spiral springs 45 are disposed between the adjacent arms 30 and 31 of the members D and E respectively, receiving the lugs 42 and 43 therein. These springs 45 maintain the arms 30 and 31 of the members D and E respectively in a resiliently spaced relation. Suitable spaces 46 are provided between the hub surfaces of the members D and E, to permit limited relative movement of the members D and E. This movement is also limited by the spaces between the facing edges of the lugs 42 and 43, as can readily be understood.

Referring to the means F for connection of the driven shaft B to the member E, bolts 50 mainly comprise this means F, and are disposed through passageways of openings 51 provided through the arms 31 of the member E; the heads 52 of said bolts resting against the outer surface of the arms 31 at one side thereof, so that the screw threaded shanks 53 of said bolts extend through the tapered openings 18 of the attaching spider 15, to receive nuts 55 thereon, which are adapted for adjustment into the tapered openings 18 of the spider arms 17 whereby to rigidly and fixedly connect the spider 15 to the member E. It is to be noted that the spider members D and E are assembled prior to such connection of the attaching spider 15, so that when the attaching spider 15 is connected to the member E, the members D and E are affixed in a connected relation. The driven shaft B, of course, only extends up to the members D and E, and does not extend into the aligning openings 21 and 27 thereof.

The pin 40 has a snug bearing and detachable mounting in the aligning openings 21 and 27 of the members D and E, and relatively supports said members so that all surfaces of said members D and E are free of relative contact. In this manner the members D and E are maintained in a true connected relation against radial movement, and the pin 40 receives strain thereon incident to lateral thrust. The pin 40 provides a segmental head 42 with an arcuate surface thereon, which extends laterally of the flush side surfaces of the members D and E, and upon which the drive shaft A may bear for a rocking action as will be subsequently mentioned.

Referring to the means G for connection of the drive shaft spider 10 to the member G, each spider arm 12 is connected to an arm 30 of the spider member D with an adjustable universal pivoted connection. Each arm 30 of the member D is provided with a pocket 60 therein, opening upon the outer marginal edge of its arm 30, through a screw threaded opening 61 which receives therein an adjustable plug 61 having a recess 62 arcuated inwardly of the inner surface thereof, and which together with the pocket 60 provides a socket for rotatably receiving a ball or spherical shaped member 65 therein. A coupling shank or extension 67 is provided for each ball or spherical member 65 and is adapted for radial sliding adjustment within the opening or passageway 68 diametrically provided through the ball or member 65. The shank or extension 67 for each ball 65 extends outwardly through a tapered opening 69 provided through the arm 30 and its nut 61; these extensions 67 being adapted for a rigid connection with the spider attaching member 10 of the drive shaft A, as will be subsequently described. Due to the provision of the adjusting plugs 61, the sockets for receiving the balls 65 may be elongated sufficient to permit some play of the balls 65 in their sockets to permit a proper sliding action of the shanks 67, and compensate for universal rocking action of the members D and E with respect to each other.

While each shank 67 is slidable within its respective ball or sphere 65, it has a limited sliding movement therein. This connection is effected by means of a screw member 70 which is radially adjusted through the sphere or ball 65 from the outer surface

thereof, and which provides an inner end 71 adapted to seat within a recess 73 longitudinally provided in the shank 67; the shoulders 74 provided at the edge of the recess 73 being adapted to abut the end 71 of the screw 70 to limit inward and outward movement of the shank 67 as the same slides within the ball 65. It is thus apparent that the shank 67 and its ball 65 have a universal jointed connection within their respective arms 30 of the member D.

Each shank 67 is provided with a screw threaded end 77, and just inwardly of the screw threaded end 77, and intermediate the ends of the shank, an annular shoulder or rib 78 is rigidly formed on the shank 67, against which the attaching spider 10 rests. There are three of the shanks 67 provided upon the member D, and each of the same is adapted for disposal through an opening 13 of the attaching spider 10, and a castle nut 79 is provided therefor whereby to clamp the arms 12 of the attaching spider 10 in a rigid and fixed relation upon the shanks 67, against the shoulders 78 thereof, and as is illustrated in Figure 4 of the drawings.

Means for lubricating the improved cushion coupling is provided, which contemplates the provision of a grease cup 80 for each of the universal joint balls 65; these grease cups 80 having communication with passageways 81 which communicate in the pocket 60. Radial passageways 82 may be provided in each ball 65 for feeding lubricant into the passageway 68 to permit easy sliding of the shank 67 therein.

Referring to the operation of this invention, it is first to be noted that the drive shaft A may be axially disposed at an obtuse angle with respect to the shaft B. Notwithstanding this feature, the drive shaft A may transmit power to the driven shaft B, by reason of the universal joint connection of the spider 10 with the arms of the member D. Normally the end of the drive shaft A abuts against the head 42 of the pin 40, and has a fulcrum point thereon, so that during rotation of the shaft A the shanks 67 will reciprocate within the passageways 68 of the balls 65; and the balls 65 will slide relative in their sockets in the member D. The head 42 of the pin 40 not only limits movement of the drive shaft and its attaching spider toward the other details of the improved coupling A, but provides a fulcrum point which will permit the easy action of the universal joint provided by the balls 65 and their shanks 67. Upon the application of power to the shaft A, the springs 45 absorb any abruptness of power application, and overcomes the inertia of the driven shaft B and its connected parts, prior to the rigid connection in the coupling taking place, so that shock is not transmitted to the differential parts, or to the clutch or engine details. During driving, the parts D and E have a rigid metal contact, both at the hub portions thereof, and at the lugs 42 and 43 thereof.

The limit of angular alignment of the shafts A and B may be varied, by adjustment of the nuts 61 to increase or decrease the diameter of the socket within which the balls 65 operate. This adjustment of the nuts 61 is effected by first removing the shank 67 from the ball 65; the limiting screw 70 being adjustable through an opening 90 provided in each nut 61, so that the stop end 71 thereof may be removed from the recess 73 to permit withdrawal of the shank 67. Upon such withdrawal the nuts 61 may of course be adjusted, so that the width of the ball socket may be adjusted, and which will consequently permit the more acute rocking of the shank 67 with respect to the member D.

Various changes in the shape, size, and arrangement of parts may be made to the form of the invention herein shown and described, without departing from the spirit of this invention or the scope of the claims.

I claim:—

1. In combination with a pair of shaft sections, a pair of members, means resiliently connecting said members together, means rigidly connecting one shaft section to one of said members, and means universally pivoting the other shaft section to the other of said members.

2. In combination with a pair of shaft sections, a pair of spider members providing outwardly extending arms thereon, spring means compressed intermediate adjacent arms of said members to resiliently space said members, means connecting one shaft to one of said members, and means universally pivoting another of said shafts to the other of said members.

3. In combination with a pair of shaft sections, a pair of members, means resiliently connecting said members, means rigidly connecting one shaft section to one of said members, elements freely movable in the other of said members, and means connecting the other of said shaft sections to said elements for universal jointed connection of said last mentioned shaft section with that member which carries the freely movable elements.

4. As an article of manufacture a universal joint detail comprising a ball shaped head having a passageway therethrough, an attaching shank, slidable in said passageway, and means carried by the ball for limited sliding movement of the shank radially thereof.

5. In combination with a pair of shafts, a pair of members having hub openings therethrough, means resiliently connecting said members, a pin for disposal through the hub openings of said members to receive the

members in supported relation thereon, means connecting one of said members with one of said shafts, and means universally pivoting the other of said members to the other of said shafts.

6. In combination with a pair of shaft sections, a spider member providing arms thereon, a second spider member providing arms thereon and having sockets therein, means fixedly connecting the first mentioned spider member to one of said shafts, balls mounted in said sockets for oscillative movement therein, shanks slidably carried by said balls in outwardly extending and movable relation with said spider member having the sockets therein, means connecting said shanks with the other shaft, and means resiliently connecting said spider members.

7. In combination with drive and driven shafts having spiders on adjacent ends thereof, a pair of members having outwardly extending arms thereon, means connecting said members with the arms thereof in alternate arrangement, compression springs between the adjacent arms of said members to resiliently mount said members, means attaching the spider of one shaft to one of said members, shank extensions universally pivotally mounted on the arms of the other member, and means connecting said shanks in a rigid relation with the spider of the other shaft.

8. In a flexible coupling of the class described the combination of a pair of members, a shaft connected to each member, an intermediate member, spring means resiliently connecting one of said first members with said intermediate member to permit a certain amplitude of movement therebetween, means universally pivoted with said intermediate member, and shanks carried by the other of said first mentioned members slidably extending into said last mentioned means.

9. In a flexible coupling the combination of a pair of shaft connected members, an intermediate member, means yieldably connecting the intermediate member with one of the shaft connected members to permit a limited amplitude of relative movement so that said shaft connected members and intermediate member may engage after such relative movement has taken place, and means connecting the other shaft connected member with said intermediate member with a universal jointed connection to permit a universal jointed movement of the shaft connected members with respect to each other.

10. In a flexible coupling the combination of a shaft connected member of spider-shaped formation providing a plurality of arms thereon, an intermediate spider-shaped member including arms arranged alternately between the arms of said first mentioned member, springs between the arms of the first mentioned member and said intermediate member whereby to resiliently connect said members for limited movement, a second shaft connected member, means providing a fulcruming pivot of the second shaft connected member with respect to the first mentioned shaft connected member and intermediate member, and universal pivoting means connecting the second mentioned shaft connected member with said intermediate member whereby said first and second shaft connected member will have a universal pivoted movement with respect to each other.

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