April 7, 1925. 1,532,464

I. C. WOODWARD

CLUTCH

Filed Sept. 21, 1923

Fig. 1.

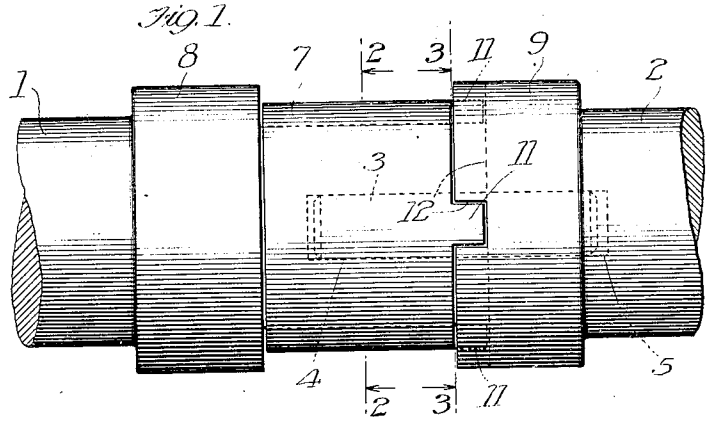


Fig. 2.

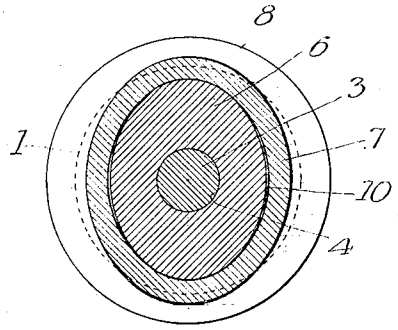


Fig. 3.

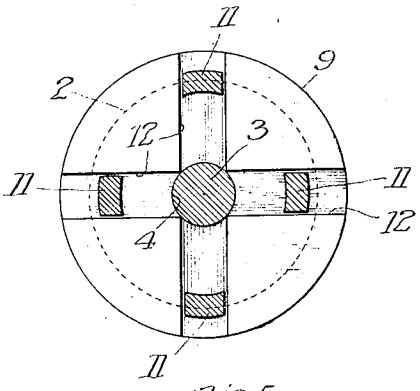


Fig. 4.

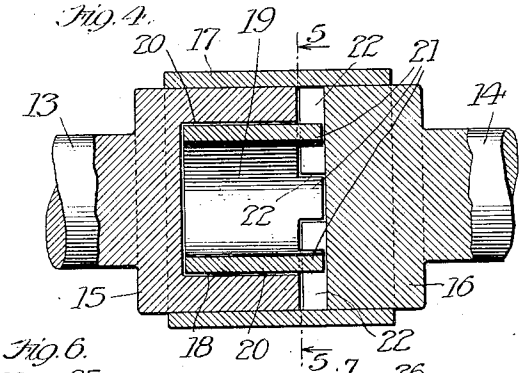


Fig. 5.

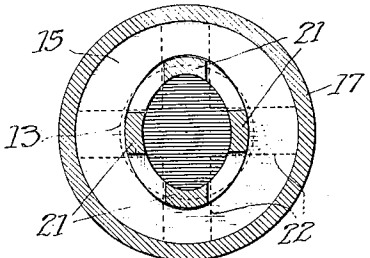
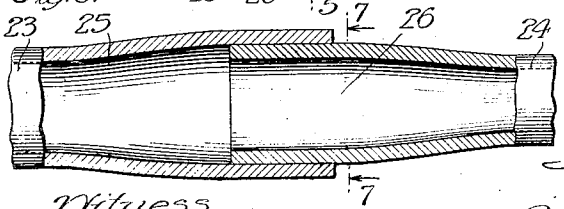


Fig. 6.



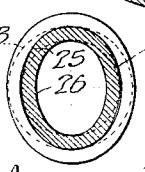


Fig. 7.

Witness

Wm. E. Anderson.

Inventor

Irving C. Woodward,

By Rummler & Rummler, Atty's

Patented Apr. 7, 1925. 1,532,464

UNITED STATES PATENT OFFICE.

IRVING C. WOODWARD, OF SYRACUSE, NEW YORK.

CLUTCH.

Application filed September 21, 1923. Serial No. 663,988.

To all whom it may concern:

Be it known that I, IRVING C. WOODWARD, a citizen of the United States of America, and a resident of Syracuse, county of Onondaga, and State of New York, have invented a new and useful Improvement in Clutches, of which the following is a specification.

This invention relates to clutches or couplings.

The main objects of this invention are to provide an improved form of clutch for normally resisting relative turning between two rotating members, wherein the resistance is obtained through the forced change in relative distortion of a resilient part; to provide improved means for positively connecting the resilient part with one of the rotatable members irrespective of the distortion of said part; and to provide a clutch of this kind having an improved arrangement of the resilient part and the other of said rotatable members whereby the change in distortion of said resilient part will be effected through a relative rotation of said members.

Illustrative embodiments of this invention are shown in the accompanying drawings, wherein—

Figure 1 is a side elevation of one form of clutch to which this invention is applied, only part of the driven members being shown, and certain parts being shown in dotted outline.

Fig. 2 is a transverse section taken on the line 2—2 of Figure 1.

Fig. 3 is a transverse section taken on the line 3—3 of Figure 1.

Fig. 4 is a longitudinal section of a modified form of clutch.

Fig. 5 is a transverse section taken on the line 5—5 of Figure 4.

Fig. 6 is a longitudinal section of another modified form of clutch to which this invention is applied.

Fig. 7 is a transverse section taken on the line 7—7 of Figure 6.

In the embodiments herein illustrated this invention involves the use of a pair of telescoping parts of normally different cross-sectional shapes, one of which is resilient and distorted by its assembly with the other part, and both of which parts are respectively connected to certain coaxially arranged rotatable members, the relative rotation of which is resisted by the resilience of the distorted part.

In the embodiment shown in Figures 1, 2 and 3, the improved coupling is applied to a pair of coaxial rotatable members 1 and 2, which, as illustrated, are retained in axial alinement by a pin 3 loosely supported in recesses 4 and 5, respectively, formed in the opposed ends of said members.

The improved coupling comprises a rigid part 6 of non-circular cross section, and a resilient part 7 of normally circular shape, telescopically arranged and connected to the respective members 1 and 2, which are thereby yieldingly clutched together so as to be capable of relative rotation only when the coupling is subjected to its maximum load. The resilient part 7 is distorted so as to fit around the part 6. In the form shown, the part 6 is integral with the member 1, and forms a hub which is oblong in cross section. The resilient annular element 7 forms a sleeve which embraces the rigid hub part 6 and bears between enlargements 8 and 9 formed on the members 1 and 2, respectively. The resilient sleeve 7 is of slightly greater cross sectional area than the hub 6, so as to provide spaces 10 between the telescoping parts for a film of oil. Formed on one end of the resilient element 7, is a plurality of projections or lugs 11, which form clutch teeth for engaging radially disposed slots 12 formed in the opposed end of the member 2, whereby said member and element are positively clutched together so as to rotate as a unit. The relative arrangement of the lugs 11 and slots 12 permits a limited radial movement of the sleeve 7 relative to the member 2, which is necessary during any relative rotation of the element 7 and rigid part 6, due to the non-circular shape of said part.

In the construction shown in Figures 4 and 5, the resilient element is telescopically arranged within the rigid non-circular part. Referring to Figures 4 and 5, the improved coupling is applied to coaxial rotatable members 13 and 14 having enlarged hub parts 15 and 16, respectively, on which is

loosely mounted a sleeve 17 for retaining the two members in axial alinement. Formed in the hub 15 is an axial recess 18, of non-circular cross section, in which is fitted the resilient element in the form of a tube 19 of normally circular cross section and distorted to conform to the recess 18. The recess 18 is of slightly greater cross sectional area than the resilient element 19 to provide oil spaces 20. Formed on one end of the resilient element 19, are lugs 21 for engaging radial slots 22 formed in the hub 16 of the rotatable member 14. The slots 22 permit the resilient part 19 to move radially relative to the member 14 during any relative rotation of the two members 13 and 14.

In the construction shown in Figures 6 and 7, the invention is applied to a pair of coaxial, rotatable, hollow shafts 23 and 24 having their inner ends 25 and 26 telescopically arranged. The ends 25 and 26 are suitably treated to make them resilient, while the other portions of the shafts 23 and 24 are of rigid construction. The ends 25 and 26 are of different cross sectional areas so that one or both of said ends must be distorted to fit them in telescopic relation. They are preferably of slightly different cross sectional areas so as to provide an oil space 27 between them.

In the operation of the couplings shown in Figures 1 to 5, inclusive, the two shafts are yieldingly secured against relative rotation by the resilience of the distorted element which coacts with the non-circular rigid part. When the maximum load of the coupling is reached, the rigid telescoping part will change the relative distortion of the resilient element, thereby permitting relative rotation of the two shafts which is constantly resisted by the resilience of said element.

In the construction shown in Figures 6 and 7, relative rotation of the two shafts is yieldingly resisted by the resilience of both parts 25 and 26, which resistance is overcome to permit relative rotation of said shafts when the coupling is subjected to its maximum load.

Although but certain specific embodiments of this invention have been herein shown and described, it will be understood that numerous details of the constructions shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A device of the class described comprising a pair of coaxial rotatable members having telescoping parts of normally different cross sectional shapes, one of said parts being of non-circular cross section, the other of said parts being resilient and distorted to conform to said non-circular part whereby said members are normally secured against relative rotation by the resilience of said distorted part.

2. A device of the class described comprising a pair of coaxial rotatable members having telescoping parts of normally different cross sectional shapes, one of said parts being rigid and of non-circular cross section, the other of said parts being resilient and distorted to conform to said non-circular part whereby said members are normally secured against relative rotation by the resilience of said distorted part.

3. A device of the class described comprising a pair of coaxial rotatable members having telescoping parts of normally different cross sectional shapes, one of said parts being of oblong cross section, the other of said parts being resilient and distorted to conform to said oblong part whereby said members are normally secured against relative rotation by the resilience of said distorted part.

4. A device of the class described comprising a pair of members having telescoping parts of normally different cross sectional shapes, one of said parts being rigid and of oblong cross section, the other of said parts being resilient and distorted to conform to said rigid part whereby said members are normally secured against relative rotation by the resilience of said distorted part.

5. A device of the class described comprising a pair of coaxial rotatable members having telescoping parts, one of said parts being rigid and of non-circular cross section, the other of said parts being resilient and normally of circular cross section, said resilient part being distorted to conform to said rigid part whereby said members are normally secured against relative rotation by the resilience of said distorted part.

6. The combination with a pair of coaxial rotatable members, of a resilient element telescopically arranged with respect to a part of one of said members and having interlocking engagement with the other of said members, said part being rigid and of non-circular cross section, said resilient element being normally of circular cross section and distorted to conform to said rigid part whereby said members are yieldingly secured against relative rotation by the resilience of said distorted element.

7. The combination with a pair of coaxial rotatable members, of a resilient annular element telescopically arranged with respect to a part of one of said members, said element and the other of said members having interlocking portions arranged to secure said element and other member against relative rotation while permitting a limited radial movement of said element relative to said other member, said part being rigid and

of non-circular cross section, said resilient element being normally circular and distorted to conform to said rigid part whereby said members are yieldingly secured against relative rotation.

8. A device of the class described comprising a pair of coaxial rotatable members having telescoping parts of normally different cross sectional shapes, one of said parts being rigid and of non-circular cross section, the other of said parts being resilient to conform to said non-circular part whereby said members are normally secured against relative rotation by the resilience of said conforming part.

Signed at Syracuse this 18th day of Sept. 1923.

IRVING C. WOODWARD.