No. 614,502. Patented Nov. 22, 1898.

F. H. RICHARDS.

SHAFT COUPLING.

(Application filed Jan. 12, 1898.)

(No Model.)

Fig. 1.

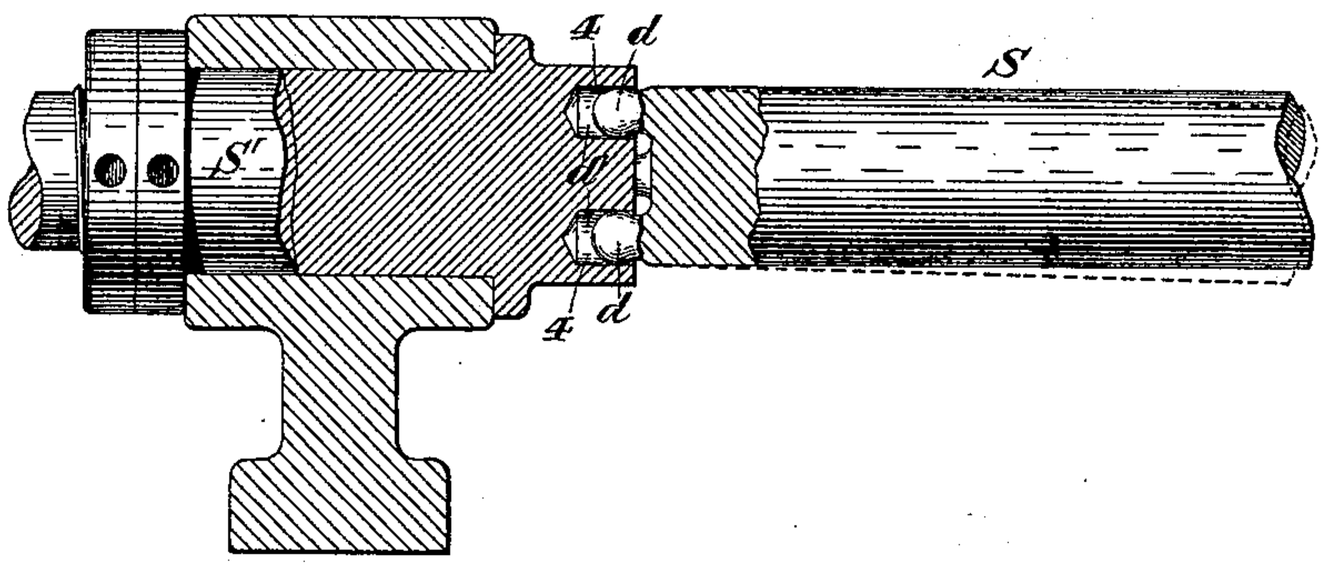


Fig. 2.

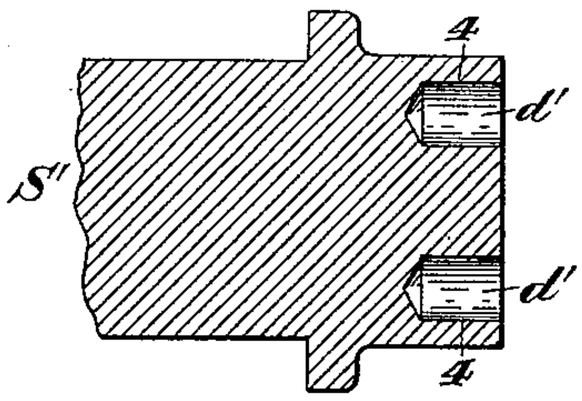


Fig. 3.

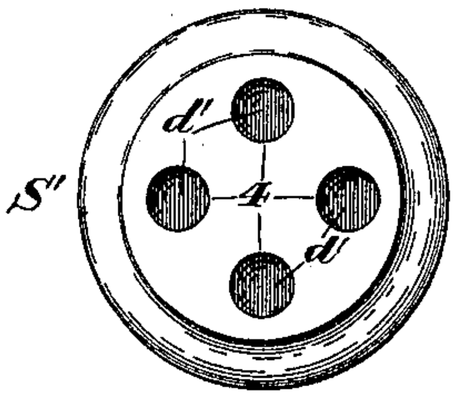


Fig. 4.

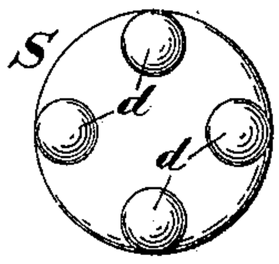


Fig. 5.

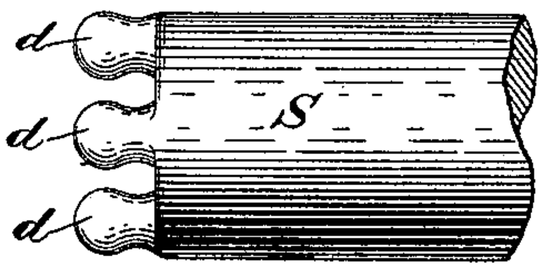
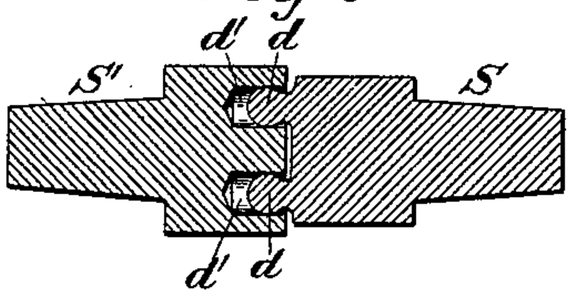


Fig. 6.



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Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

SHAFT-COUPLING.

SPECIFICATION forming part of Letters Patent No. 614,502, dated November 22, 1898.

Application filed January 12, 1898. Serial No. 666,447. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Shaft-Couplings, of which the following is a specification.

This invention relates to couplings, and more particularly to couplings of that class known as "flexible" shaft-couplings.

One object of my invention is to furnish a simple and efficient two-part flexible coupling device comprising two shafts or shaft-sections, one of which has formed in one end thereof a series of cylindrical driver-sockets disposed in parallelism with the axis thereof and the other of which has formed upon one end thereof a series of spheroidal drivers, all wholly located within the circumferential line of said shaft and each driver having a sliding engagement within a tubular socket of the other shaft.

In the drawings accompanying and forming part of this specification, Figure 1 illustrates in a simplified form thereof a flexible coupling embodying my invention, said figure showing in side elevation, partially in section, two shaft members or sections in operative engagement with each other and one of which members is shown supported in a journal box or bearing. Fig. 2 is a longitudinal section of a portion of what I will herein term the "driven" shaft of the coupling. Fig. 3 is an end view of the driven shaft as seen from the right in Fig. 2. Fig. 4 is an end view of the "driving-shaft" as seen from the left in Fig. 5. Fig. 5 is a side view of a portion of said driving-shaft, and Fig. 6 is a longitudinal section of a slightly-modified form of coupling embodying my invention.

Similar characters designate like parts in all the figures of the drawings.

The flexible coupling, in the forms thereof illustrated in the accompanying drawings, comprises two rotative members or shafts, one of which is designated by S and may be herein termed the "driving-shaft," and the other of which is designated by S′ and may be herein termed the "driven" shaft, a series of drivers *d* upon one end of one shaft, as S, and a series of driver-sockets formed in the adjacent end face of the other shaft, as S′, and adapted to receive the drivers on a driving-shaft S.

In the forms thereof illustrated in the accompanying drawings the drivers *d*, which are shown as four in number and arranged in a circuit about the longitudinal axis of the driving-shaft S, are shown of slightly oblong construction, with their longitudinal axes in parallelism with the axis of rotation of the shaft S and preferably extending outward from the inner face of said shaft, with their outer faces disposed wholly within the peripheral line of the main body portion of said shaft. These drivers will in practice have a spherical bearing portion or face 2, intermediate its extreme inner and outer ends, adapted to engage the inner face 4 of the driver-sockets.

The driver-sockets *d′*, which are shown cylindrical, are formed in the inner end face of the driven shaft S′, with their axes in parallelism with and arranged in a circuit about the longitudinal axis of said shaft S′, said sockets being preferably of a depth slightly greater than the length of the drivers *d* and of a diameter greater than the diameter of said drivers.

In the form thereof illustrated most clearly in Figs. 4 and 5 the drivers *d* have substantially spherical or spheroidal outer ends or head portions, which are connected to the end of the driving-shaft S by a base or inner portion of somewhat reduced diameter, which reduced portion permits slight lateral adjustment of the driving-shaft S relatively to the coöperative driven shaft S′ without cramping or binding of the drivers in their respective sockets.

By forming the driver-sockets of slightly greater lengths than those of the shafts the two drivers S and S′ may have a slight longitudinal movement, one relately to the other, without injuriously affecting the driving engagement between said shafts, this construction compensating for any expansion and contraction and permitting slight longitudinal displacement of one shaft relatively to the other.

In practice the driver-sockets *d′*, which will preferably be equidistantly disposed relatively to each other and arranged in a circuit concentric to a common center and wholly

within the circumferential line of the driven shaft S′, may be simultaneously formed in said end face of the shaft S′ by a multiplex or gang drill of any ordinary construction, and the drivers or driving projections *d*, which are similarly disposed relatively to each other and to a common center, may be conveniently formed on the end of the driving-shaft S by milling away portions of the material on the end of said shaft to form cylindrical projections and subsequently "burring" these cylindrical projections to proper finished contour. The construction of the two shafts, with their respective drivers and driver-sockets, is such that they may be produced at an extremely small cost and by well-known appliances in common use, as will be readily appreciated by any ordinary mechanist.

My present improvements are especially adapted for connecting shafts or rotative members wherein rotative rigidity of the connection is required and wherein only a slight lateral adjustment or change of position of one shaft relatively to the other is necessary.

It will be understood that when two solid shafts or shaft-sections of indefinite length are to be connected together, as shown in Fig. 1 of the drawings, the spheroidal or parti-spherical drivers will be formed directly upon the end of one shaft and the cylindrical driver-sockets will be formed directly in the adjacent end of the other shaft, as shown in said figure, but where it is desired to connect two tubular shafts together it will be preferable to form the drivers and driver-sockets, respectively, on and in the adjacent inner ends of two shaft-stubs or two shaft-sections, as illustrated in Fig. 6, the outer ends of which stubs will be diametrically reduced to fit the interior of the tubular shafts to be secured together.

I am not aware that a shaft-coupling has been devised comprising "a shaft-section having a series of equidistantly-disposed spheroidal or parti-spherical driving projections formed integral with and extending outward from one end thereof and located wholly within the peripheral line of said shaft-section, and a complemental rotative member having a series of cylindrical sockets formed in the end face thereof and adapted to receive the driving connections of said shaft-section." This construction of shaft-coupling has material advantages over any flexible shaft-coupling comprising "two shafts, a transverse driving-head fixed to one shaft and having rectangular openings therethrough, sliding blocks fitting said openings, and a transverse head fixed to the other shaft and having pins with globular heads, which fit in corresponding cavities in the sliding block," which I am aware has been heretofore devised, for the reason that the shaft-coupling constituting the subject-matter of this application embodies no driving-heads to be fitted to the shaft-sections and no sliding blocks to be fitted to one of said heads, thus obviating the necessity for assembling and fitting the parts of the coupling. It has no parts projecting beyond the periphery of the shaft. It is of such compact construction that it may be conveniently used in driving mechanisms for geared bicycles and be incased within the side shaft-tube thereof. It has no parts separate from the shaft and rotative member to work loose, and all torsional strains will during rotation thereof be concentrated within the peripheral line of said shaft, thus securing a rigidity not inherent to shaft-couplings having driving connections that extend beyond the periphery of the shaft-sections.

Having described my invention, I claim—

A two-part flexible coupling comprising a shaft-section having a series of equidistantly-disposed elongated parti-spherical driving projections formed integral with one end and located wholly within the circumference of said shaft-section; and a complemental rotative member having a series of cylindrical sockets formed in the face thereof and adapted to receive the driving projections of said shaft-section, said projections engaging directly with the walls of said sockets.

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