A. J. FISHER.

YIELDING SHAFT COUPLING.

APPLICATION FILED APR. 15, 1918.

1,323,850. Patented Dec. 2, 1919.

Fig. 1.

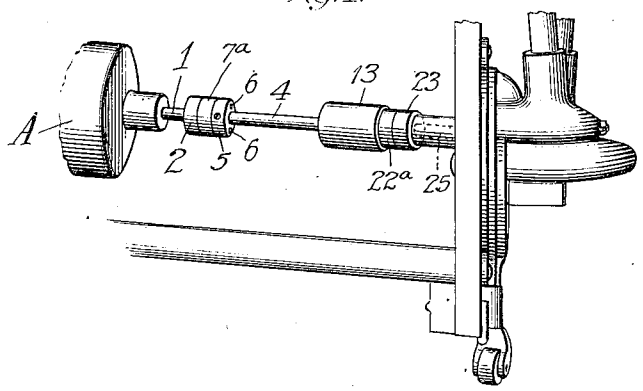


Fig. 2.

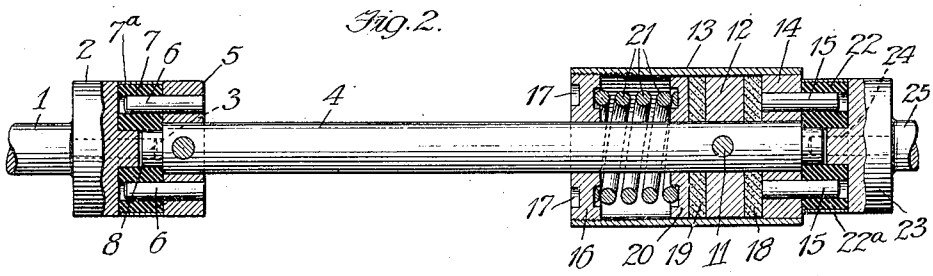
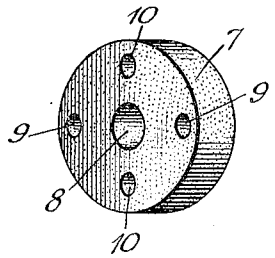


Fig. 3.



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UNITED STATES PATENT OFFICE.

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YIELDING SHAFT-COUPLING.

1,323,850. Specification of Letters Patent. Patented Dec. 2, 1919.

Application filed April 15, 1918. Serial No. 228,550.

To all whom it may concern:

Be it known that I, ALVA J. FISHER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Yielding Shaft-Couplings, of which the following is a specification.

My invention is designed primarily as a safety connection intermediate an electric motor and light machinery operated thereby, as for instance a clothes washing machine, such as are largely coming into use for domestic purposes. In such machines if any overload is imposed on the motor by undue resistance from any cause to the normal movements of the washing or wringing mechanism, the excessive electric current thus occasioned in the motor windings is liable to burn it out. The object of my invention is to interpose intermediate the motor shaft and the machines driven thereby a protective coupling amply sufficient to perform the normal work of the machine but which will yield under excessive strain and permit slippage, thus preventing disastrous results to the motor windings. It is therefore possible for the machine to be operated by persons ignorant of the liability of damage to the motor which would exist with an unyielding connection, without any danger of destroying or damaging the motor. With the foregoing and incidental objects and advantages in view I have designed and invented the coupling hereinafter fully described in detail, the essential elements of my invention being more particularly pointed out and recited in the appended claims.

Of the drawing Figure 1 is a perspective of my novel coupling device connecting an electric motor and portions of a driven mechanism; Fig. 2 is a central longitudinal section of my device, showing also fragmentary portions of the motor shaft and the shaft to which power is imparted by the motor; and Fig. 3 is a perspective of one of the two rubber driving disks which are arranged at opposite ends of the coupling device.

The same reference characters indicate the same parts in all the figures of the drawing.

In order to adapt the motor shaft 1 of an ordinary electric motor A for the application of my invention, such shaft is provided with a rigidly attached disk 2 equipped with a diametrically arranged pair of pins 3—3. To the end of the shaft 4 of the coupling device is secured a disk 5 by means of a cotter pin, or in other suitable manner, the disk 5 being provided with a diametrically arranged pair of pins 6—6 similar to the pins 3—3 and projecting toward them. The opposed ends of the motor shaft and coupling shaft, which nearly touch, or touch each other, are preferably of reduced diameter, and between the disks 2 and 5 is arranged a rubber disk 7 having a central circular opening 8 which receives the reduced ends of the motor and coupling shafts, and two pairs of diametrically arranged holes 9—9 and 10—10, (the four holes being in the present instance, and preferably, equally spaced,) which respectively engage the pins 3—3 and 6—6. A thin metal band or ring 7^a surrounds the rubber disk 7, for the purpose of protecting and supporting the same. In this manner a very efficient, silent and cushioned connection is made between the motor shaft 1 and the coupling shaft 4.

To the opposite end of the coupling shaft 4 is secured, by means of a cotter pin 11 or other suitable means, a metal friction disk 12, which of course rotates with the shaft. Frictionally driven by this disk in a manner which will shortly be explained, is a cylindrical shell 13, one end of which is closed by a metal head 14 to which are secured two pins 15, similar to the pins 3 and 6. The head 14 is tight-fitting and forced into the shell 13 under pressure whereby it is rigidly secured thereto, but is rotatable upon the coupling shaft 4. The opposite end of the cylinder is closed by an adjustable head, consisting of a peripherally screw-threaded metal disk 16 which is also rotatable with respect to the shaft 4, wrench holes 17 for the application of a spanner wrench being provided for adjustment of the disk within the cylinder. Interposed between the head 14 and one side of the friction disk 12 is a friction member 18, which in the device being described consists of a fiber washer, though leather or other suitable material might be employed; and interposed between the opposite face of said disk 12 and the screw-threaded head or disk 16 is a similar fiber washer 19 next to the disk 12, a metal washer 20 next to the fiber washer, and a spring 21 between such metal washer and

the disk 16. Both fiber washers and also the metal washer 20 are free to turn and slide upon the coupling shaft and within the cylinder.

Outside the head 14 the shaft 4 is of reduced diameter, and through a rubber disk 22, surrounded by a metal band 22ª, the cylinder structure is connected to a disk 23 provided with pins 24 and secured to a shaft 25 which forms part of the mechanism driven by the motor. The cushioned connection just mentioned is identical with that at the other end of the shaft 4. It will be understood that the armature of an electric motor of the class used for operating small machines is ordinarily driven at a high rate of speed, say eighteen hundred revolutions per minute, which must be greatly reduced for most purposes, and the shaft 25 therefore rotates the first member of a train of reducing gearing.

With the construction and arrangement of parts above described it is obvious that by adjustment of the threaded disk 16 the spring 21 may be put under any desired tension, with the result that the fiber washers 18 and 19 will be gripped with a corresponding pressure between the head 14 and metal washer 20 against the opposite faces of the friction disk 12. This tension is so adjusted that under maximum normal load the frictional engagement between the parts will be sufficient to cause rotation of the cylinder structure and shaft 4 as one, while under excessive and abnormal load, slippage between the parts will occur and the shaft 4 will be driven faster than the shaft 25, and at sufficient speed to prevent a destructive flow of current through the motor windings. The two cushioned connections afforded by the rubber disks 7 and 22 and the metal disks and pins between which they are interposed, acting as universal joints, enable the motor shaft 1 and driven shaft 25 to be coupled together without loss of efficiency or any objectionable results even if they are somewhat out of alinement, thus rendering accurate and careful adjustment of the position of the motor in the frame of the machine unnecessary.

While I have described my invention with particular reference to a fast running electric motor arranged to operate light machinery through reducing gearing, it is obvious that it may be readily adapted to be used with other prime movers, or in other trains of mechanism or gearing than the particular one hereinabove described.

I claim:

1. A coupling of the character described and comprising a positively-driven shaft, a cylindrical shell having opposite heads slidably and rotatably mounted on said shaft, a friction disk fixed to said shaft and rotatable with respect to said shell arranged within the shell, a friction washer arranged between said disk and one head of the shell, and spring means for pressing said head and disk together against said washer.

2. A coupling of the character described and comprising a positively-driven shaft, a cylindrical shell having opposite heads slidably and rotatably mounted on said shaft, a friction disk fixed to said shaft and rotatable with respect to said shell arranged within the shell, a pair of friction washers arranged one on each side of said disk, and a compression spring arranged intermediate one of said washers and the adjacent head, said head being adjustable to vary the tension of the spring.

3. A coupling of the character described and comprising a positively-driven shaft, a cylindrical shell having opposite heads slidably and rotatably mounted on said shaft, one of said heads being fixed and the other peripherally screw-threaded for adjustment, a friction disk fixed to said shaft and rotatable with respect to said shell arranged within the shell, a friction washer intermediate said disk and the fixed head of the shell, a friction washer adjacent the disk on the other side thereof, a bearing washer adjacent said last-mentioned friction washer, and a compression spring intermediate said bearing washer and the adjustable head of the shell.

4. A coupling of the character described and comprising a positively-driven shaft, a cylindrical shell having opposite heads slidably and rotatably mounted on said shaft, said shell being arranged to be frictionally driven by said shaft and one of said heads being arranged adjacent the end of the shaft and equipped with a plurality of pins projecting parallel with the shaft, a second shaft arranged in alinement with said driven shaft and having rigidly mounted thereon a plurality of pins extending toward and overlapping said first-mentioned pins, and a rubber disk interposed between and engaging both sets of pins.

5. A coupling section arranged to be interposed between a motor shaft or the like and a driven shaft, the ends of the motor shaft and driven shaft being provided with members equipped with pins projecting parallel with such shafts, said section comprising a shaft portion having an end member equipped with pins projecting parallel with the shaft and a concentric portion arranged to be frictionally driven by said shaft portion and equipped with similar pins projecting in the opposite direction, the pins on the opposite ends of the coupling overlapping the pins on the motor shaft and on the driven shaft, respectively, and rubber disks at the opposite ends of the coupling section engaging respectively the two sets of overlapping pins.

6. The combination with a device of the character described and having a pair of rotating members connected frictionally whereby slippage is permitted under overload and a connecting element equipped with pins projecting parallel with the axis of rotation, of a shaft arranged in axial alinement with the device and having its adjacent end equipped with parallel pins overlapping said first-mentioned pins, and a rubber disk interposed between and engaging both sets of pins.

7. The combination with a device of the character described and having a pair of rotating members connected frictionally whereby slippage is permitted under overload and a connecting element equipped with pins projecting parallel with the axis of rotation, of a shaft arranged in axial alinement with the device and having its adjacent end equipped with parallel pins overlapping said first-mentioned pins, and a rubber disk interposed between and engaging both sets of pins, said disk being formed with an axial bore and said connecting element and shaft being both formed with axial hubs engaging said bore.

8. The combination with a device of the character described and having a pair of rotating members connected frictionally whereby slippage is permitted under overload and a connecting element equipped with pins projecting parallel with the axis of rotation, of a shaft arranged in axial alinement with the device and having its adjacent end equipped with parallel pins overlapping said first-mentioned pins, a rubber disk interposed between and engaging both sets of pins, and a metal ring surrounding the periphery of said rubber disk.

ALVA J. FISHER.