W. R. FOX.

FLEXIBLE SHAFT COUPLING.

APPLICATION FILED APR. 24, 1920.

1,371,750. Patented Mar. 15, 1921.

Fig.1.

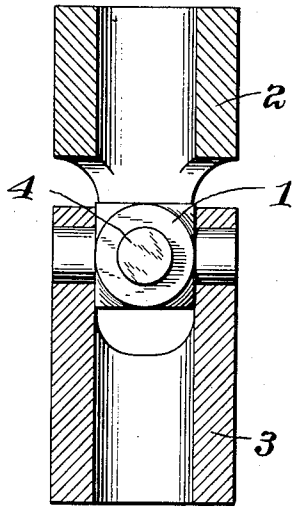


Fig.2.

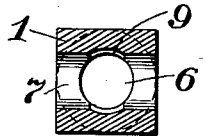


Fig.14.

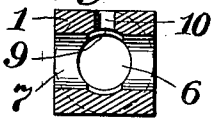


Fig.3.

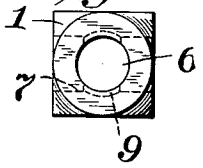


Fig.4.

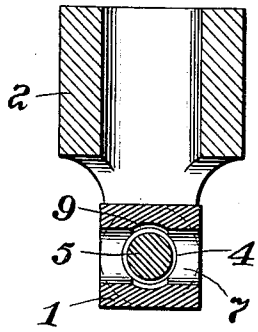


Fig.5.

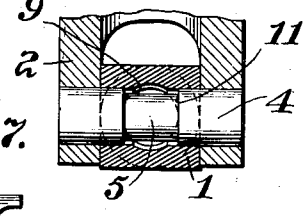


Fig.6.



Fig.7.



Fig.8.

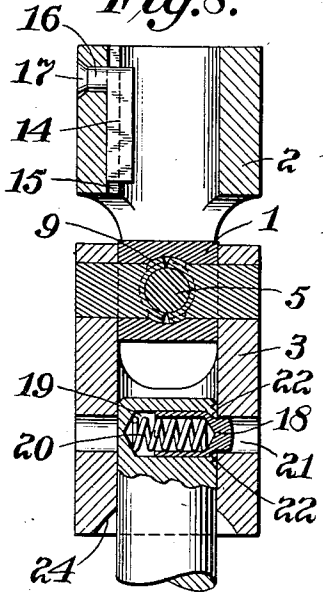


Fig.10.

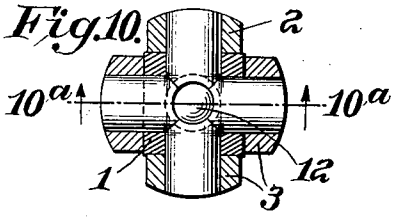


Fig.11.

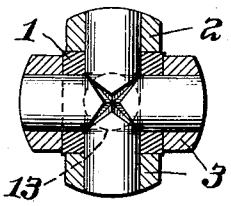


Fig.10a.

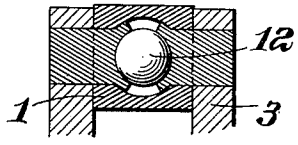


Fig.12.

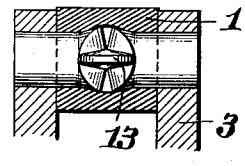
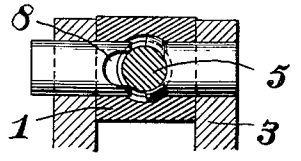


Fig.13.



Fig.9.



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UNITED STATES PATENT OFFICE.

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FLEXIBLE SHAFT-COUPLING.

1,371,750. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed April 24, 1920. Serial No. 376,341.

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, a citizen of the United States, and a resident of Jackson, county of Jackson, and State of Michigan, have invented certain new and useful Improvements in Flexible Shaft-Couplings, of which the following is a specification.

The invention relates to that type of flexible shaft coupling in which the coupling members or forks are pivotally mounted on pins projecting from a center block.

One object of my invention is to provide a coupling which can be made at a low cost and which will be inseparable as to its various parts once they are assembled.

In the acompanying drawings:—

Figure 1 is a view of a shaft coupling of the form to which my invention belongs;

Fig. 2 shows a sectional view of the center block;

Fig. 3 is a side view of the center block;

Fig. 4 is a sectional view with the long pin in place and in section;

Fig. 5 is a sectional view of the center block taken a quarter turn from Fig. 4 with the long pin shown in elevation;

Fig. 6 is a view of the long pin;

Fig. 7 shows one of the short pins;

Fig. 8 is a sectional view of the coupling along the axis of the short pins;

Fig. 9 is a sectional view showing one short pin positioned and the other short pin in the act of being positioned;

Fig. 10 shows a coupling with four short pins and a spreader member at their inner ends in the form of a ball;

Fig. 10^a is a view on line 10^a—10^a of Fig. 10;

Fig. 11 is a view similar to Fig. 10, but with a bevel disk form of spreader for the inner ends of the pins;

Fig. 12 is a view at a quarter turn from Fig. 11; and

Fig. 13 is a view of an implement which may be used for disconnecting a shaft section from the coupling.

Fig. 14 is a view of a modified form of center block.

In these drawings 1 is the center block, 2 is one fork and 3 the other. These forks are pivoted on pins held in the center block. One of these pins may be a long one 4, as shown in Fig. 6, having a reduced central part 5 and the other pins may be of the form shown in Fig. 7. The forks are solid. The pins are of one diameter. The coupling is assembled by placing the fork 2 with the opening in its ends in line with the openings 6 in the block, then inserting the long pin 4. The other fork is similarly placed in relation to the other openings 7 of the center block and then the two short pins are inserted through the fork and into the block with their recessed ends 8 directed to the reduced central portion of the long pin and then by forcing these short pins into place so that their outer ends will be flush with the outer faces of the fork arms their inner ends will be spread into the condition and form shown in Fig. 8 by the cylindrical surface of the reduced part of the long pin which acts as a spreader for the bifurcated end of the short pins. The recess of the block is enlarged at 9 on a curve concentric with the cylindrical surface of the long pin to receive the spread ends of the short pins and to thus form the interlock between the parts. All of the pins can be of the same diameter at their outer ends which form the pivots for the forks, and the forks can be of like formation as both will have the same size opening to receive the pins and any of the forks can be used in assembling the coupling with either the long pin or the short pins. The forks can be solid as the pins are all inserted by first placing the forks in position with their arms embracing the block and the pins are then inserted into place.

It will be noticed in the form of the invention just described the short pins interlock with the shoulders 11 defining the reduced part of the long pin and that the long pin itself acts as a spreader. While this is a construction presenting material advantages in constructing the parts, in assembling, and in simplicity of construction as well as durability, I do not limit myself to this particular form. For instance, I may employ four short pins, as shown in Fig. 10 and Fig. 10^a. The inner ends of these pins are spread by a ball 12. This block has its recess enlarged at 9, as before described. The spread parts of the pins enter these enlargements of the central recess.

In Figs. 11 and 12 the spreading of the inner ends of the pins is done by forcing their split ends onto the disk 13 which is of conical form on each face. In this form also the spread ends of the pins enter the enlargements 9 of the central recess.

The above construction presents advan-

tages in connection with the hardening process to which the parts are subjected. The parts can be drilled, machined, pack hardened, and then put back in the heating receptacle or box and heated to the proper temperature and hardened before they are assembled. This makes the hardening process much more economical, as instead of heating one complete joint at a time, a number of them can be put in the box and heated and hardened. Another important point is that in hardening them in quantities in this way they can be kept from the air, and there is less scale on the hardened parts.

After the parts are hardened, they can be properly cleaned and the bearings polished if necessary, and then the parts put together making the complete joint.

In putting the small pins in, it might be necessary to anneal the ends where they are expanded around the center pin, ball or other device. This is an operation which could be quickly performed. This makes the whole process of manufacture a simple one and reduces the cost to the minimum and increases the efficiency of the joint to the maximum.

Provisions may be made whereby the pins may be brazed together at their inner portions or ends and for this purpose the center block may be provided with an opening as at 10, Fig. 14, for the introduction of the spelter. This brazing may be used with any of the forms shown. The form of the invention first described, however, is of advantage because in that case the pins are hardened previous to insertion into place, and will retain their predetermined size, whereas in the form last mentioned, in which the pins are brazed together, a hardening is necessary after the parts are assembled.

I have also provided improved means for holding the forks to the spindle as now will be described.

In connecting the fork members with the shaft sections, it is customary to use a taper pin extending through the fork and spindle or shaft. This form of fastening is not reliable, because the pin is apt to loosen or to be sheared off. Further, in order to remove the joint, it is necessary first to take out the pin and this is difficult to do where the joints are located under the head of the drill press.

In my present construction I employ a key 14 seated in a key slot 15 within the base of the fork member, wherein it is held by its projection 16, riveted at 17. This will connect the spindle to the fork in a manner to make a durable and effective drive, the key presenting an extended wearing surface and a long body of metal to take the driving strains.

In order to retain the coupling and the spindle in proper relation against relative displacement axially of the parts I provide a retaining clutch member 18 in a transverse socket 19 in the spindle or shaft, pressed by a spring 20 to engage the wall of opening 21 in the fork member. The clutch pin is retained in the spindle by upsetting the metal around the opening by the indents at 22.

It will be seen from the above that because of the key and the keyway construction the parts will be connected to transmit power from one to the other by simply slipping them into connection and that because of the spring clutch construction, the relative axial position of the coupling member and the spindle will be determined and they will be retained in position though readily detachable by the use of a suitable tool, Fig. 13, in the general form of a pair of pliers which can be used to depress the clutch sufficiently to allow separation of the parts without exerting extra pressure.

It will be understood that while I have shown the key at one coupling fork and the spring pressed pin or clutch member at the other fork, both of these connections are used at each fork. The clutch pin has preferably a conical face to facilitate its entrance into or disengagement with the opening 21 in the fork shank. This shank may be beveled at 24 to facilitate the entrance of the spindle with the clutch pin into the shank of the fork, the spring pin riding on this incline, and thus receding into its socket until the opening 21 comes opposite the pin when it is pressed out by its spring into the opening.

I claim as my invention:—

1. In a flexible shaft coupling the combination of a fork, a block and pivot pins extending through the fork into the block, the inner ends of said pins being spread to engage the block, thereby to be retained in the block, substantially as described.

2. In a flexible shaft coupling the combination of a fork, a block, a pivot pin extending through the fork arms into the block and having its inner portion spread to a larger dimension than the diameter of its cylindrical part to engage the block and be held in place thereby.

3. In a flexible shaft coupling the combination of a fork, a block, a pivot pin for the fork extending through the fork arm into the block and having its inner end bent into holding engagement with the block, substantially as described.

4. In a flexible shaft coupling the combination of a center block, forks, pivot pins extending through the forks and seated in the center block, one of said pins being held by its inner end bent by engagement with another of said pins, substantially as described.

5. A flexible shaft coupling comprising forks, a center block, pins extending through the forks and seated in the center block, a pair of said pins having their inner ends spread by engagement with another pin, substantially as described.

6. A flexible shaft coupling comprising forks, a center block, pins extending through the forks and seated in the center block, a pair of said pins having their inner ends spread by engagement with another pin, said last mentioned pin having a reduced central portion to be engaged by and to spread the ends of the pair of pins into locking engagement with the center block, substantially as described.

7. In combination in a flexible shaft coupling, a center block, a pair of forks, a long pin passing through one of the forks and seated in the center block, said long pin having a reduced central portion and a pair of short pins passing through the arms of the other fork, seated in the center block and having their inner ends engaging the reduced central portion of the long pin and bent thereby into interlocking contact with the block.

8. In combination in a flexible shaft couling, a center block, having a recess with enlargements and a pair of pivot pins, said pins being inserted through the fork arms into the block, and means at the inner ends of said pins which spread the same into the enlargements of the recess and into locking engagement with the center block, substantially as described.

9. In combination in a flexible shaft coupling, a center block, a forked member and pivot pins for the forked member inserted through the arms of the fork into the block and means for holding the pins at their inner ends within the block, said means including a member between the pins and in line with their axes, substantially as described.

10. In combination in a flexible shaft coupling, a center block, a forked member having its arms integral with its body portion and pivot pins for the forked member, said block having openings for receiving the pins, permitting their insertion only from the outside through the fork arms and into the block toward the center thereof, said pins being held to the block at their inner ends by interlocking contact of said inner ends with said block, substantially as described.

11. In combination in a flexible shaft coupling, a center block, a forked member with its arms embracing the block and pivot pins for the said forked member, a second forked member, a long pin in the center block, the ends of which form the pivots for the second forked member, the said long pin being engaged on its exterior surface by the ends of the pins first mentioned, and spreading said ends to hold the said pins within the block, substantially as described.

12. In a flexible shaft coupling the combination of a center block, a fork embracing the same and a pivot pin for the fork extending through a fork arm and having its inner end deformed and thereby held within the block.

13. In a flexible shaft coupling the combination of a center block a pair of forks embracing the same, a long pin providing pivots for one fork and a pair of short pins forming pivots for the other fork, said short pins having their inner ends bent by contact with the long pin, substantially as described.

14. In a flexible shaft coupling the combination of a center block, a fork embracing the same, a pair of pins forming pivots for the fork said pins being inserted through the fork and with their inner ends within the block and a member within the block which bends a portion of the inner end of the pins to retain the latter in place, substantially as described.

In testimony whereof, I affix my signature.

WILLIAM R. FOX.