W. J. FRANCKE.

FLEXIBLE COUPLING.

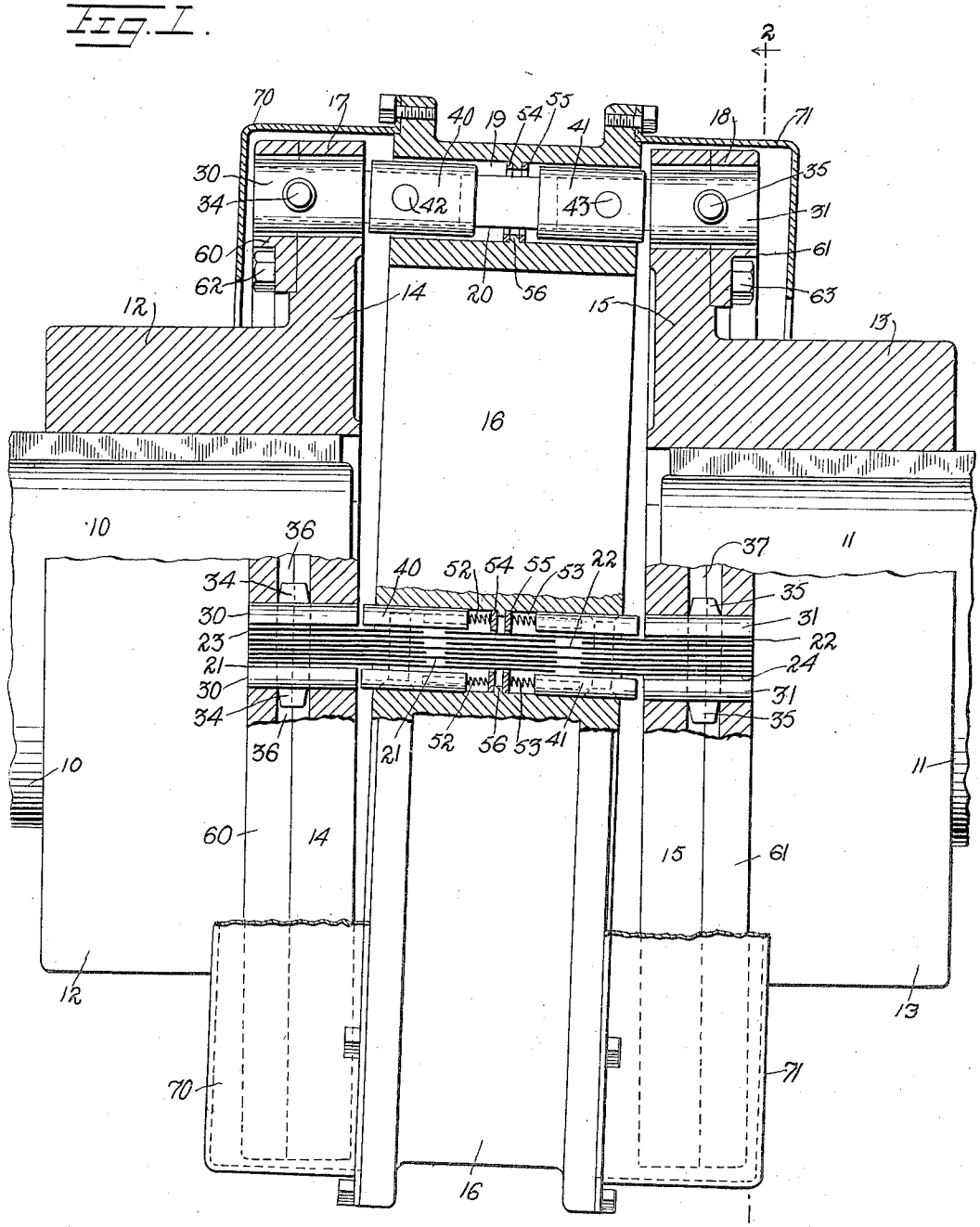
APPLICATION FILED JAN. 17, 1920.

**1,358,537.**

**Patented Nov. 9, 1920.**

2 SHEETS—SHEET 1.

Fig. 1.




WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

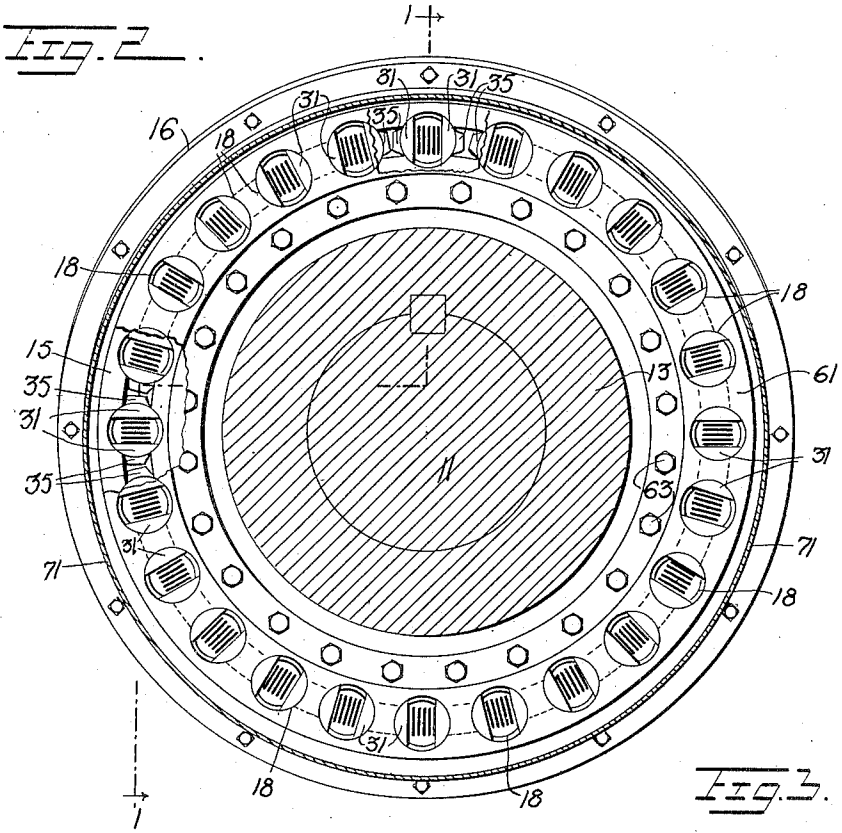



Fig. 3.

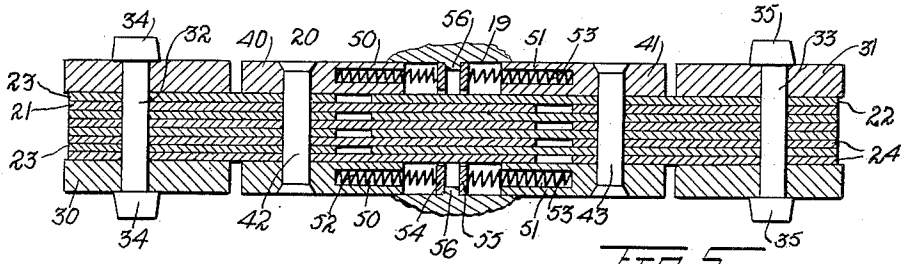



Fig. 4.

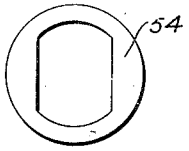



Fig. 5.

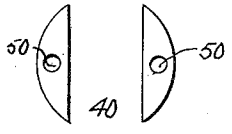
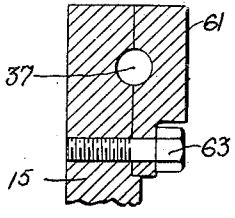



Fig. 6.




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# UNITED STATES PATENT OFFICE.

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## FLEXIBLE COUPLING.

1,358,537. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed January 17, 1920. Serial No. 352,006.

*To all whom it may concern:*

Be it known that I, WILLIAM J. FRANCKE, a citizen of the United States, and a resident of Highland Park, in the county of Middlesex and State of New Jersey, have invented a new and Improved Flexible Coupling, of which the following is a full, clear, and exact description.

The invention relates to flexible couplings such as shown and described in the Letters Patent of the United States, No. 1,155,227, granted to me on September 28, 1915.

The object of the present invention is to provide a new and improved flexible coupling arranged to compensate for misalinement of the shafts by the use of flexible connecting members and a floating member. Another object is to equally distribute the pressure in the floating member and thus reduce wear of the flexible connecting members to a minimum. Another object is to normally retain the floating member in central position between the coupling members and against its tendency to float over toward one or the other of the coupling members.

With these and other objects in view, the invention consists of certain novel features of construction as hereinafter shown and described and then specifically pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal central section of the flexible coupling on the line 1—1 of Fig. 2;

Fig. 2 is a reduced transverse section of the same on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional plan view of one of the connecting members and part of the floating member;

Fig. 4 is a face view of one of the abutment collars for the springs used for holding the floating member in central position;

Fig. 5 is a face view of the inner ends of the members of one of the inner keepers; and

Fig. 6 is a sectional side elevation of a portion of one of the coupling members and the ring for holding the outer ends of the flexible connecting members against endwise movement.

On the adjacent ends of the two shafts 10 and 11 to be coupled together are keyed or otherwise fastened the hubs 12 and 13 of two coupling members 14 and 15 spaced apart for receiving a floating member 16 between them. The coupling members 14 and 15 and the floating member 16 are provided with sets of registering bores 17, 18 and 19, respectively. The bores 17 are arranged in a circle on the coupling member 14, the bores 18 are arranged in a circle on the coupling member 15, and the bores 19 are arranged in a circle on the floating member 16, it being understood that the centers of the several circles coincide with the axis of the corresponding members 14, 15 and 16. Into each set of registering bores 17, 18 and 19 fits a flexible connecting member 20 to flexibly connect the coupling members 14 and 15 with each other and with the floating member 16.

Each of the flexible connecting members 20 comprises two sets of flat steel springs 21 and 22 held spaced apart by interposed reinforcing and spacing springs 23 and 24 extending from the outer ends of the main springs 21 and 22 to within a distance of the inner ends of the said main springs 21 and 22 and which inner ends of the main springs are arranged alternately in overlapping relation, as plainly indicated in Figs. 1 and 3, the overlapping portions being practically at the middle of the corresponding bore 19 of the floating member 16.

The outer ends of the main springs 21 and their spacing and reinforcing springs 23 are held in a two-part keeper 30, and the outer ends of the main springs 22 and their reinforcing and spacing springs 24 are held in a similar two-part keeper 31. A pin 32 extends through the keeper 30 and the springs 21 and 23 to fasten the same together, and a similar pin 33 extends through the keeper 31 and the springs 22, 24. The ends of the pins 32 and 33 are provided with heads 34, 35, of which the heads 34 project into an annular groove 36 arranged in the coupling member 14, and the heads 35 project into an annular groove 37 formed in the coupling member 15. By the arrangement described the two sections of each connecting member 20 are held against endwise movement in their coupling members 14 and 15.

In addition to the outer keepers 30 and 31, each connecting member 20 is provided

with inner two-part keepers 40 and 41 fitting opposite sides at the inner ends of the spacing and reinforcing springs 23 and 24, and rivets 42, 43 extend through the keepers 40 and 41, the inner ends of the springs 23 and 24 and the main springs 21 and 22, as will be readily understood by reference to Fig. 3. The parts forming the auxiliary or inner keepers 40 and 41 are provided at their inner ends with recesses 50, 51 in which are seated coil springs 52, 53 abutting against rings 54, 55 seated on opposite sides of shoulders 56 formed integrally on the wall of the corresponding bore 19 approximately at the middle of the floating member 16. The springs 52, 53 tend to hold the floating member 16 normally in a central position relative to the coupling members 14 and 15, it being understood that the floating member 16 has a tendency to float over toward one or the other retaining member 14 or 15.

By reference to Fig. 1, it will be noticed that the inner springs 40 and 41 slidingly fit into the bore 19, and the said springs project inwardly beyond the inner ends of the springs 23 and 24 and which inner ends are spaced from the inner ends of the corresponding main springs 22 or 21, as will be readily understood by reference to Fig. 3. By the arrangement described the overlapping ends of the main springs 21 and 22 are spaced from the inner ends of the spacing springs 22 and 21 to allow ready flexing of the main springs in case of misalinement of the shafts and when transmitting the torque from one shaft to another.

In order to permit of making the grooves 36 and 37 in the coupling members 14 and 15 in a simple and inexpensive manner the following arrangement is made: The coupling members 14 and 15 are provided with rings 60 and 61 fastened in place by bolts 62, 63 or other fastening devices. One half of the groove 36 is formed in the ring 60 and the other half in the contacting face of the coupling member, and the groove 37 is similarly formed in the contacting faces of the coupling member 15 and its ring 61. The two sections of each flexible connection 20 are placed in position in the registering bores 17, 19 and 18, 19 at the time the rings 60 and 61 are detached from the coupling members 14 and 15 to permit of fitting the heads 34 and 35 into the half grooves on the outer faces of the coupling members 14 and 15. When this has been done the rings 60 and 61 are placed in position to engage with their half grooves the heads 34 and 35, and the rings are then fastened in place by the bolts 62 and 63. It will be noticed that by the arrangement described the two sections of each flexible connecting member 20 are free to slide independently one of the other in the floating member 16 but are held against endwise movement in the coupling members 14 and 15. It is understood that when the shafts 10 and 11 are misalined the floating member 16 assumes an angular position relative to the coupling members 14 and 15, as indicated in Fig. 1. It will also be noticed that by making the flexible connecting members 20 in the manner described, the pressure incident to the transmission of the power and exerted against the walls of the bore 19 is equally distributed to reduce the wear of the keepers 40 and 41 against the walls of the bores 19.

The faces of the floating member 16 are provided with hoods 70 and 71 inclosing the coupling members 14 and 15 thus protecting the same against dust or other extraneous matter. The hoods 70 and 71 also retain the oil in case the flexible coupling is run in oil.

It is understood that by the use of the spacing and reinforcing members 23 and 24, the main springs 21 and 22 of each flexible connecting member 20 are reinforced at the coupling members 14 and 15, that is, at the points where the power is transmitted. By the use of the floating member and the sectional flexible connecting members connecting the coupling members with the floating member, the desired flexibility is obtained especially by allowing the floating member to assume a tilting position on the transmission of power from one shaft to the other.

The inner keepers 40 and 41 relieve the flat springs of undesirable corner pressure as the said keepers bear against the wall of the bore 19 in opposite directions thus distributing the pressure and thereby equalizing or relieving corner pressure. The light coil springs 52 and 53 prevent the floating member 16 from assuming a tilted position on the slightest provocation but do not prevent the floating member from assuming a tilted position when under real stress incident to the transmission of heavy power especially on misalinement of the shafts.

The overlapping inner ends of the main springs 21 and 22 allow a desired floating or sliding movement of the shafts in their bearings when the shafts are used in generators, motors and like machines.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, and flexible connecting members connecting the said coupling members with each other and extending slidingly through the said floating member.

2. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling

members, and flexible connecting members each made in two sections secured at their outer ends to the coupling members and extending slidingly through the said floating member.

3. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, and flexible connecting members, each made of two sets of flat springs attached at their outer ends to the coupling members and extending slidingly into the said floating member, the inner ends of the two sets of flat springs being arranged alternately in overlapping relations.

4. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, and flexible connecting members each made of two sets of main flat springs and reinforcing and spacing flat springs interposed between the said main flat springs at the outer portions thereof, outer keepers connecting the outer ends of the said main flat springs and the said reinforcing and spacing flat springs with each other, the said outer keepers being attached to the said coupling members, inner keepers slidingly engaging the said floating members and connecting the said main flat springs with the inner ends of the said reinforcing and spacing flat springs, the inner ends of the said two sets of main flat springs being arranged alternately in overlapping relation within the said floating member.

5. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, the said coupling members and the said floating members having sets of registering bores, and flexible connecting members each engaging one of the said sets of registering bores, each flexible connecting member being made in sections secured at their outer ends in the bores of the coupling members, the inner ends of the said sections being arranged in overlapping relation within the corresponding bore of the floating member.

6. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, the said coupling members and the said floating members having sets of registering bores, flexible connecting members each engaging one of the said sets of registering bores, each flexible connecting member being made in sections secured at their outer ends in the bores of the coupling members, the inner ends of the said sections being arranged in overlapping relation within the corresponding bore of the floating member, and coil springs held in each bore of the floating member and engaging the sections of the corresponding flexible connecting member to normally hold the floating member against floating toward either of the said coupling members.

7. In a flexible coupling, the combination of coupling members adapted to be secured to the adjacent ends of two shafts, a floating member intermediate the said coupling members, flexible connecting members each made of two sets of main flat springs and reinforcing and spacing flat springs interposed between the said main flat springs at the outer portions thereof, outer keepers connecting the outer ends of the said main flat springs and the said reinforcing and spacing flat springs with each other, the said outer keepers being attached to the said coupling members, inner keepers slidingly engaging the said floating members and connecting the said main flat springs with the inner ends of the said reinforcing and spacing flat springs, the inner ends of the said two sets of main flat springs being arranged alternately in overlapping relation within the said floating member, and coil springs held on the floating member and engaging the said inner keepers to normally hold the floating member against floating toward either of the said coupling members.

8. In a flexible coupling, a coupling member provided with bores and with a groove intersecting the said bores, a retaining ring detachably secured to the coupling member and provided with a groove registering with the said coupling member groove, and a flexible member having a keeper fitting into the said bore and having lugs engaging the said registering grooves.

9. In a flexible coupling, a flexible member, comprising two sets of main flat springs having their inner ends alternately in overlapping relation, two sets of spacing flat springs interposed between the outer portions of the said main flat springs, keepers engaging the outer ends of the said main and spacing flat springs, and keepers engaging the said main flat springs and the inner ends of the said spacing flat springs.

WILLIAM J. FRANCKE.