F. H. RICHARDS.

FRICTION COUPLING.

APPLICATION FILED JAN. 5, 1901.

924,937.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

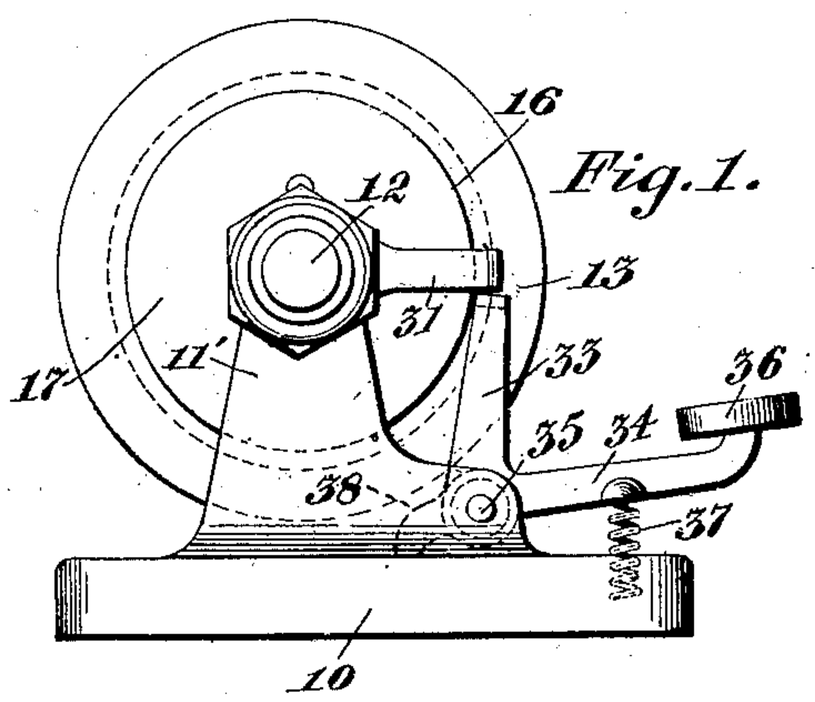


Fig. 2.

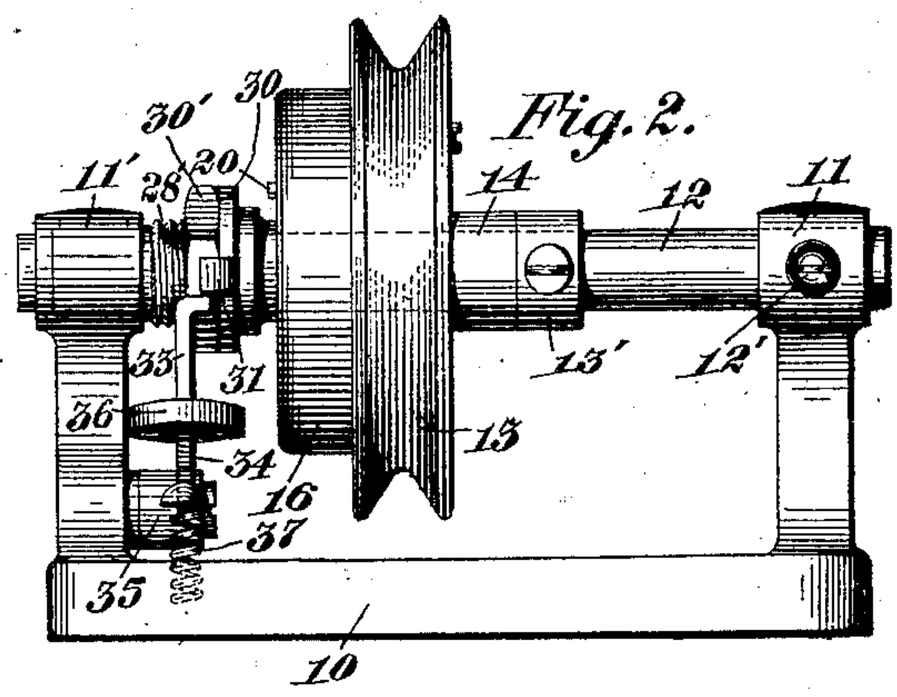


Fig. 5.

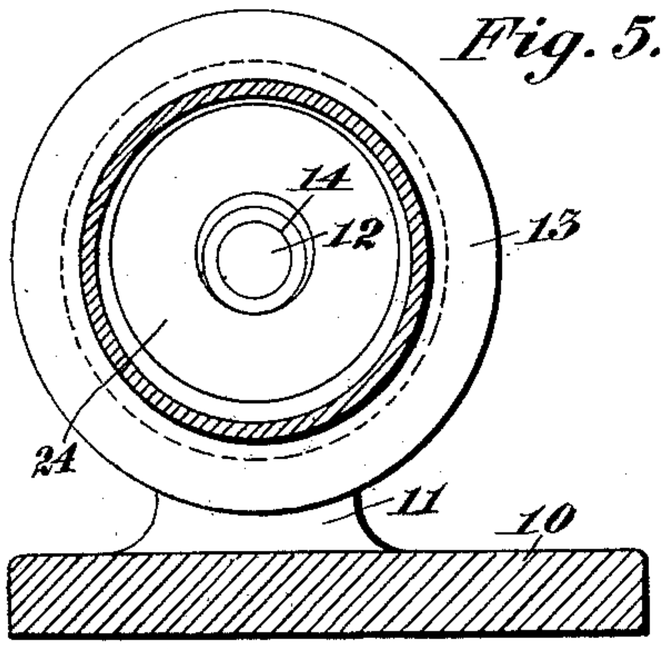
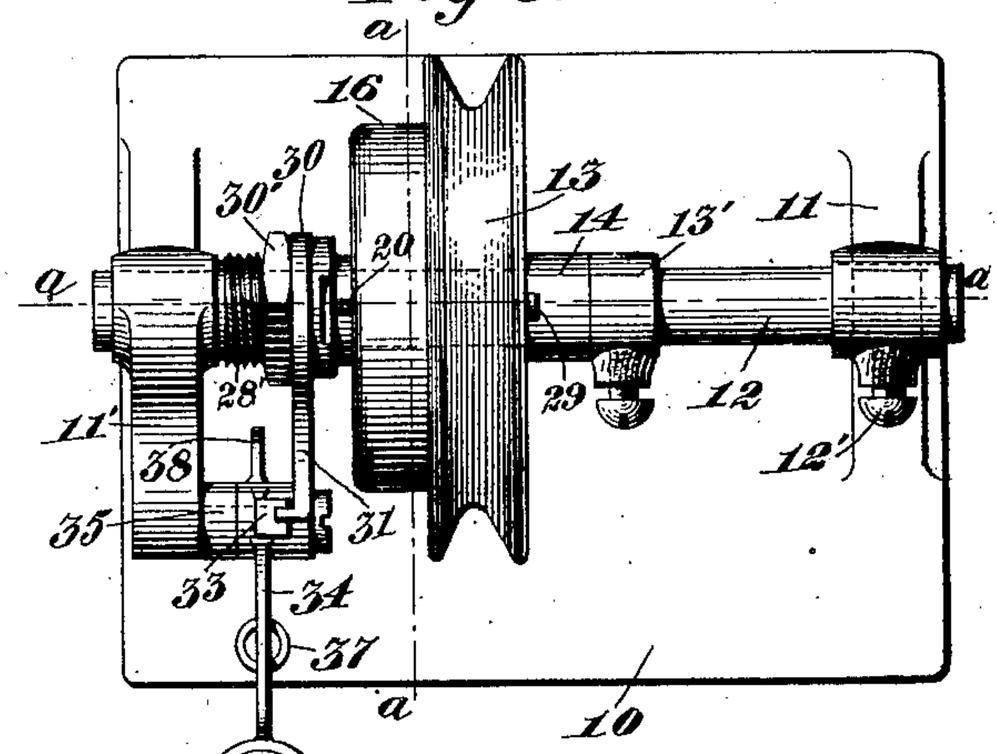


Fig. 3.



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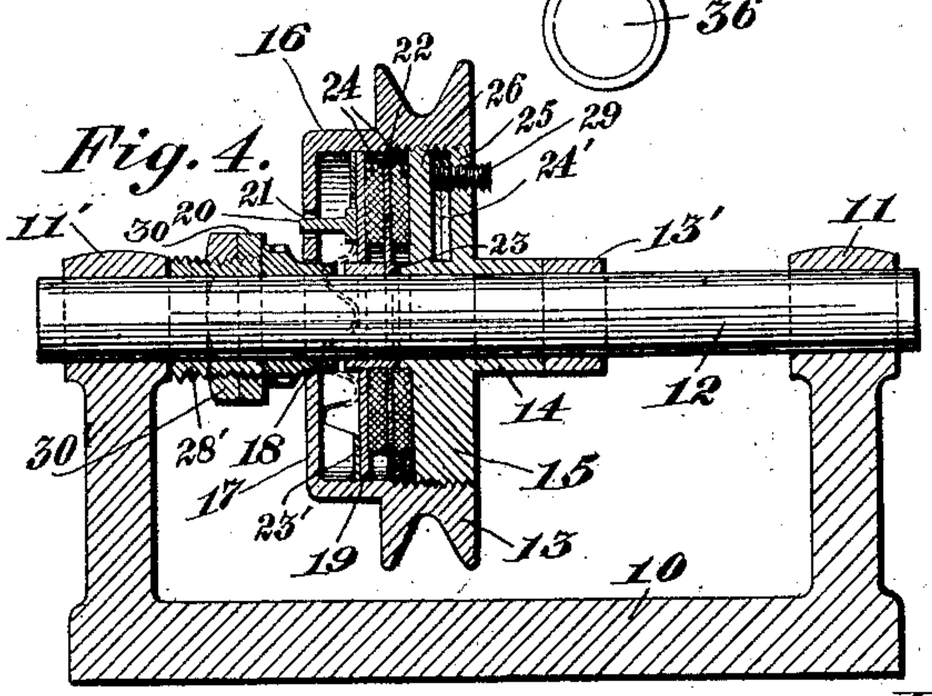

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2 SHEETS—SHEET 2.

Fig. 7.

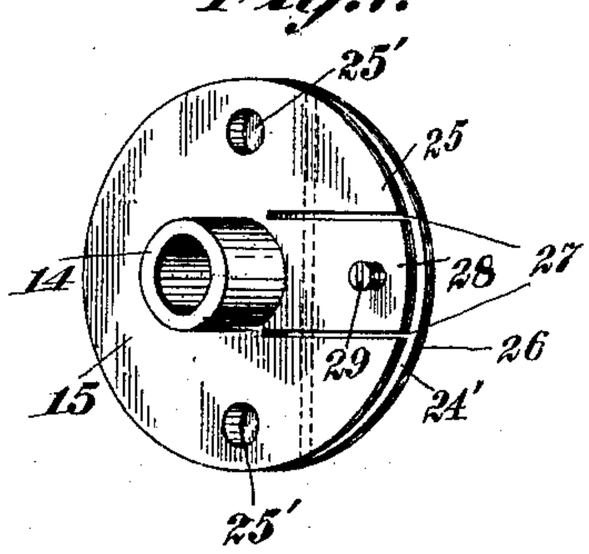


Fig. 6.

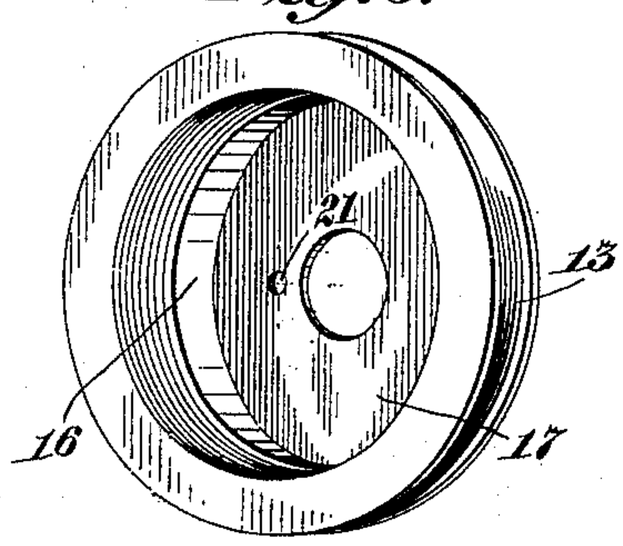


Fig. 13. *Fig. 12.* *Fig. 11.* *Fig. 10.* *Fig. 9.*

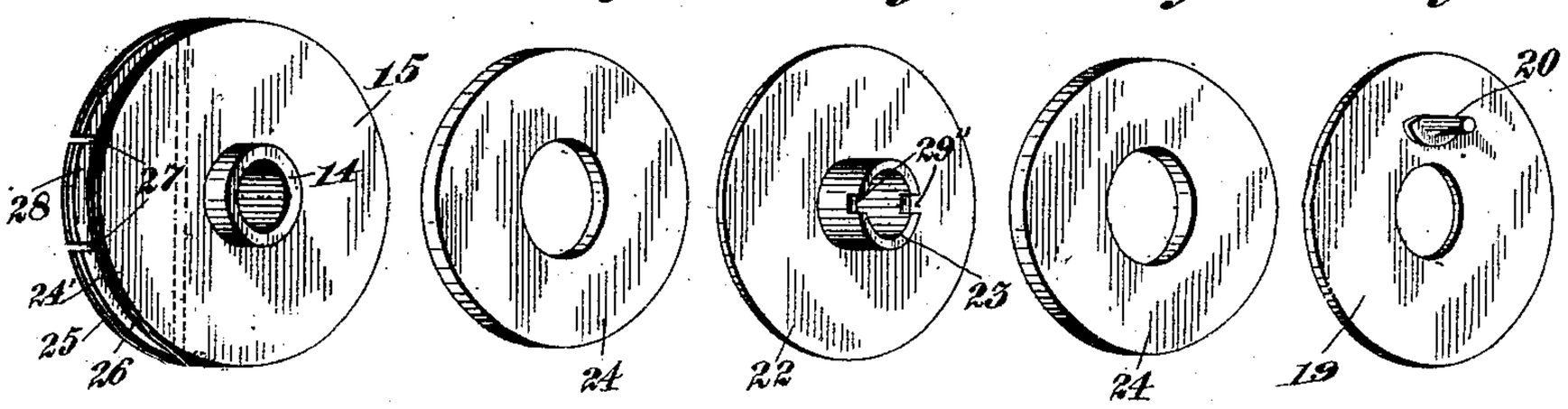


Fig. 8.

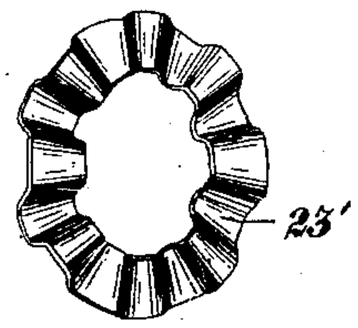
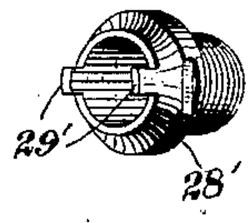


Fig. 14.

Fig. 15.



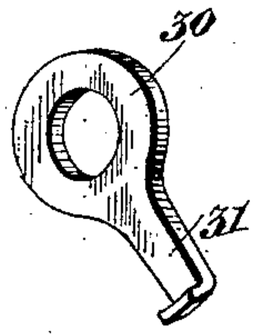


Fig. 16.

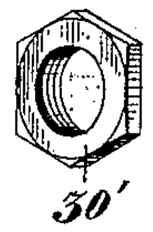
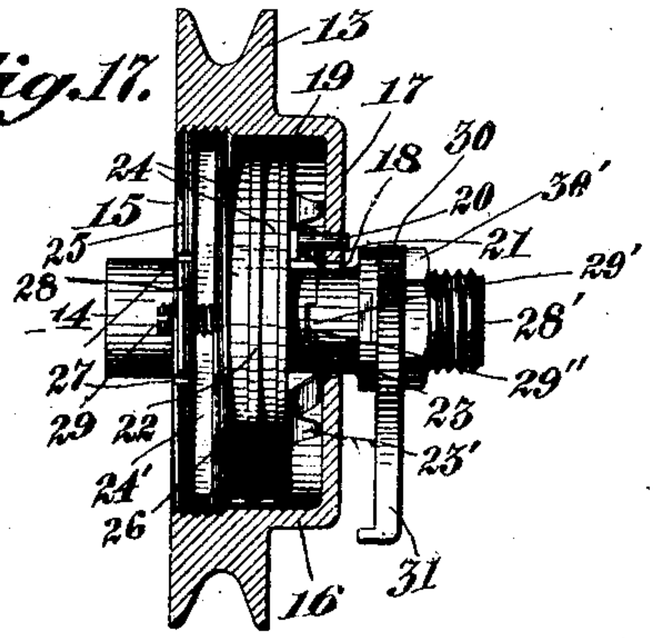


Fig. 17.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

FRICTION-COUPLING.

No. 924,937. Specification of Letters Patent. Patented June 15, 1909.

Application filed January 5, 1901. Serial No. 42,186.

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 Friction-Couplings, of which the following is a specification.

This invention relates to improvements in friction couplings, and more particularly to features of construction of that type adapted for light work in which constant frictional connection is furnished between the driving and driven elements, the coupling slipping when the latter is held against movement but imparting rotation to it when it is released.

In the accompanying drawings, Figure 1 is an end elevation of one form of my invention, showing it in connection with a driven element and a controlling device therefor. Fig. 2 is a side elevation thereof looking from the right in Fig. 1. Fig. 3 is a top plan view. Fig. 4 is a central, vertical, longitudinal section through the coupling and its support. Fig. 5 is a partial transverse section on the line *a*—*a* of Fig. 3. Fig. 6 is a perspective view of the driving element and the inclosing case of the coupling. Fig. 7 is a similar view of a disk at the outer end of said casing. Fig. 8 is a similar view of a spring located at the inner end thereof. Figs. 9, 10, 11, 12, and 13 are perspective views of disks located within the casing taken in the order in which they are placed therein, the last named showing the opposite side of the disk illustrated in Fig. 7. Figs. 14, 15, and 16 are, respectively, similar views of the driven element, a sleeve for connecting it to the friction coupling and a securing nut; and Fig. 17 is a side view of the coupling and the driving and driven elements with the driving element and the casing of the former in section and the remaining parts in elevation.

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

In the particular embodiment of my invention shown herein, the numeral 10 designates some suitable base with standards 11—11′, in which is mounted a shaft or support 12 which in the organization illustrated is a fixed shaft held against rotation by a set-screw 12′ threaded through one of the standards. On this shaft is journaled the driving element, consisting, in this instance, of a pulley 13 supported upon a sleeve 14 surrounding the shaft by a disk 15, which will be hereinafter more particularly described, formed with or secured to said sleeve. From one side of the pulley extends for a short distance a cylindrical portion 16 concentric to the shaft and closed at the outer end by a head or disk 17, preferably formed integrally with the cylindrical portion, this head extending near to the shaft but having a space 18 about the same. These portions 16—17, with the pulley, form a casing for the members of the friction coupling. Within this casing is a disk or plate 19 lying parallel to the head 17, and held to rotate therewith while movable toward and from it by a means, in this instance shown as a pin or projection 20 upon the disk, extending through an opening 21 in the head. Between the disk 19 and the outer disk 15 is a disk or plate 22 provided with a hub or sleeve 23 turning loosely upon the shaft, and having upon each side of it rings 24, of fiber or other suitable material, having their adjacent surfaces contacting with disk 22 and their outer surfaces with the disks 15 and 19 respectively. The openings within the rings are larger than the sleeves 14 and 23 which they surround, and there is a sufficient space about their outer edges so that the inner edges may contact with the sleeves and they may have a certain amount of play laterally about the same.

Between the head 17 and the disk 19 is located a spring to press the rings and disks into frictional engagement, which may conveniently consist of a corrugated metal ring 23′. The fact that this spring extends about the entire circumference of the friction members will result in a practically uniform pressure between them. The outer disk 15 which supports the pulley and casing upon the shaft is preferably removably and adjustably connected with said pulley and casing. This may be conveniently accomplished by threading the edge of the disk and the inside of the pulley for engagement with one another, the last-named thread extending for a sufficient distance to admit some range of movement of the disk, thus allowing the intermediate disks and the rings to be forced more or less strongly toward the head 17 against the tension of the spring. To secure the disk 15 in position it may be split or cut away at 24′ in a plane between its faces into two sections 25—26, the outer section 25 being cut again at 27—27 in planes intersecting that of the first cut, thus leaving a movable or resilient section 28. Through this section 28 is

threaded a screw 29 the inner end of which may be forced against the section 26, thus tending to move the section 28 outward and causing the threads upon its edge to bear against those in the pulley and to secure the disk in place. If desired, holes 25′ may be provided in the disk 15 to receive a spanner to enable it to be readily turned. About the shaft adjacent to the head 17 is shown a sleeve 28′, extending through the opening 18 into the casing, with projections 29′ at or near its end which engage interlocking projections 29′ on the hub of the intermediate disk 22 to couple them together for rotation while allowing separation longitudinally. This sleeve 28′ is adapted to carry the driven element, which is here shown as a hub 30 provided with an arm 31, secured against a shoulder on the sleeve by a nut 30′ upon a threaded portion thereof. Both the driven element and the driving element and coupling are shown as turning freely upon the shaft, being retained against longitudinal displacement thereon by the contact of the sleeve 28′ with the standard 11′ and by a collar 13′ against which the hub of the disk 15 abuts, surrounding the shaft and secured thereto by a set-screw.

Operating in connection with the arm of the driven element is a device to control its rotation. This may consist of a stop portion 33, secured to or integral with a lever 34 conveniently pivoted at 35 to the standard 11′. This lever 34 is provided with a key or finger-piece 36, and may be pressed upward by a spiral spring 37, so that the portion 33 normally projects into the path of arm 31, too great movement in this direction being prevented by a rearward projection 38 from the lever.

In the use of this coupling, it is continuously driven through its pulley by a suitable belt from some source of power and its intermediate disk or member 22 will tend to turn constantly with it because of the frictional engagement between it and the disks 15 and 19 through the friction rings 24. As the hub of this intermediate disk is positively connected with the sleeve of the driven element it will rotate this element with it as long as it is free or does not offer greater resistance than that of the friction within the coupling, but when the arm of the driven element is in contact with the stop, as is shown in Fig. 1, it will be held against rotation and the disk 22 will then slip between the rings. When the key upon the lever 34 is depressed the stop portion 33 will be withdrawn from the path of the arm, so that the wheel is rotated by the frictional engagement of the coupling until the key is released, when the stop portion will be returned into the path of the arm and the rotation of the driven member will be checked, the disk 22 again slipping between the rings.

By the adjustment of the outer disk 19 toward or from the head 17, the tension of the spring may be varied so that the proper pressure will be secured between the disks and the rings to transmit the necessary power to the driven element without the creation of unnecessary friction.

If the rings 24 remained always concentric to the shaft 12 with their possible movement confined to one of rotation about an axis coinciding with the axis of the shaft 12, irregularities in the disks might wear circular grooves in the rings and by the abrasion of the latter, vary the coefficient of friction between the friction surfaces even under the same pressure, thus altering the driving power of the coupling. With the organization herein described, however, the axis or axes of the rings, after the latter move outward to the position of their greatest eccentricity, gradually revolve around the axis of the shaft as the driving pulley continues to rotate. The relation between the contact surfaces is thus constantly changing, the tendency to groove the fiber surfaces is done away with and the driving power of the coupling is kept more uniform.

It will be seen that by organizing the parts of the coupling and the means of connection with the driven element, as herein set forth, any of these parts may be readily removed from the casing for inspection or renewal.

In my copending application, Serial No. 42,185, for driving mechanism, filed January 5, 1901, certain features herein illustrated, namely the orbitally movable friction annuli, are claimed.

Having thus described my invention, I claim—

1. A friction coupling comprising an outer portion provided with a screw-thread, friction members within the same, one of which is split for a portion of its circumference, said split member having a thread upon it engaging that upon the outer portion, a screw threaded through one of the split sections and bearing against the other, and means for connecting one of said friction members with a part to be driven.

2. A friction coupling comprising an outer portion, friction members within the same, at least one of which has engagement therewith, means for expanding one of said engaging members to secure it to the outer portion, and a driver in operative connection with one of said members.

3. The combination with a support, of a driving element and an element to be driven carried thereby, an intermediate member having frictional engagement with the driving member and positive connection with the driven member and capable of movement along the support to release said connection, and a corrugated spring for maintaining contact.

4. The combination with a driving element comprising a casing and a friction member therein provided with projections, of a driven element adjacent to said casing having projections adapted to interlock with those on the friction member.

5. The combination with a driving member, of a driven member, an interposed friction plate from which the driven member is actuated, a follower, a friction annulus interposed between said friction plate and the driving member and between the friction plate and said follower, a spring interposed between said follower and an extension of the driving member, and a part extending through the openings in the annuli and of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part.

6. The combination with a driving member having an overhanging wall forming a recess, of a driven member, an interposed friction plate, a follower having a projecting pin slidably engaged with an opening in said overhanging wall, a friction plate, a friction annulus interposed between said friction plate and said driving member and between said friction plate and said follower, a part extending through the openings in the annuli and of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part, a spring interposed between the overhanging wall of the driving member and said follower, and a releasable detaining device for restraining the driven member from movement.

7. A friction coupling comprising a plurality of members having adjacent surfaces, friction members between the same capable of movement with the surfaces and laterally thereto, and a corrugated spring for producing contact.

8. A frictional coupling comprising a plurality of members having adjacent surfaces, friction members between the same capable of a circumferential and a radial movement, and a corrugated spring for creating contact.

9. A friction coupling comprising a plurality of members, one or more friction rings between the same having contact therewith at their sides and at a point on one of their edges, and a corrugated spring for creating contact.

10. The combination with a driving member, of a driven member, an interposed friction element from which the driven member is actuated and which has a connection with such driven member permitting the element to shift relatively of the latter in the direction of the friction-creating pressure, a follower driven from the driving member, friction rings, and a corrugated annular spring for maintaining a pressure on said rings.

11. The combination with a driving member, of a driven member, an interposed friction element from which the driven member is actuated and which has a connection with such driven member permitting the element to shift relatively of the latter in the direction of the friction-creating pressure, a follower driven from the driving member, a friction ring on each side of said friction plate, and a corrugated annular spring for maintaining a pressure on said rings.

12. The combination with a driving member having an over-hanging wall forming a recess, of a driven member, an interposed friction element from which the driven member is actuated, and which has a connection with such member permitting the element to shift relatively of the latter in the direction of the friction-creating pressure, friction rings, a follower having a pin slidably mounted in an opening in the overhanging wall of the driving member, and a friction creating corrugated annular spring.

13. The combination with a driving member of a driven member, an interposed friction element from which the driven member is actuated and which has a connection with such driven member permitting the element to shift relatively to the latter in the direction of the friction-creating pressure, friction rings, a corrugated annular spring for maintaining a pressure on said rings, and a releasable detaining device for restraining the driven member from movement.

14. The combination with a driving member, of a driven member, an interposed friction element from which the friction member is actuated and which has a connection with such driven member permitting the element to shift relatively of the latter in the direction of the friction-creating pressure, a follower driven from the driving member, friction rings, a corrugated annular spring for maintaining a pressure on said rings, and a releasable detaining device for restraining the driven member from movement.

15. The combination with a driving member, of a driven member, an interposed friction element, from which the driven member is actuated, and which has a connection with such driven member, permitting the element to shift relatively of the latter in the direction of the friction-creating pressure, a follower driven from the driving member, a corrugated annular friction ring on each side of said friction element, a spring for maintaining a pressure on said rings, and a releasable detaining device for restraining the driven member from movement.

16. The combination with a driving member having an overhanging wall forming a recess, of a driven member, an interposed fric-

tion element from which the driven member is actuated and which has a connection with such member permitting the element to shift relatively of the latter in the direction of the friction creating pressure, friction rings, a follower having a pin slidably mounted in an opening in the overhanging wall of the driving member, a friction-creating corrugated spring, and a releasable detaining device for restraining the driven member from movement.

17. In a frictional driving device, a friction annulus combined with a part extending through the opening in the annulus and which is of less diameter than the diameter of such opening, the annulus being free to shift radially until such movement is prevented by the contact of the boundary wall of the opening in the annulus with said part, and a corrugated spring for creating contact.

18. The combination with a driving and a driven member, a friction annulus interposed between and in contact with the adjacent faces of said members, and a part extending through the opening in the annulus, and which is of less diameter than the diameter of said opening, the annulus being free to shift radially until such movement is prevented by the contact of the boundary wall of the opening in the annulus with said part, and a corrugated annulus for creating contact.

19. The combination with a driving member and a driven member, of an interposed friction element from which the driven member is actuated, a friction annulus on each side of said friction element, and a part extending through the openings of the annuli and which is of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part, and a spring for creating contact.

20. The combination with a driving member, of a driven member, an interposed friction plate from which the driven member is actuated, a follower, a friction annulus interposed between said friction plate and the driving member, and between the friction plate and said follower, a corrugated spring, and a part extending through the openings in the annuli and of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part.

21. The combination with a driving member, of a driven member, an interposed friction plate from which the driven member is actuated, a follower, a friction annulus interposed between said friction plate and said follower, a corrugated spring interposed between said follower and an extension of the driving member, and a part extending through the openings in the annuli, and of less diameter than the diameter of each of said openings, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part.

22. A friction coupling comprising an outer portion provided with a screw-thread, friction members within the same, at least one of which has a thread engaging that upon the outer portion, a part of which thread is on a movable section, and means for pressing the thread of the movable section against that of the outer portion.

23. A friction coupling comprising an outer portion provided with a screw-thread, friction members within the same, at least one of which is split for a portion of its circumference, means for adjusting said split portion, said split member having upon it a thread engaging that upon the outer portion, and means for pressing the split sections apart.

24. A friction coupling comprising an outer portion provided with a screw-thread, friction members within the same, one of which is split for a portion of its circumference, said split member having a thread upon it engaging that upon the outer portion, and a screw threaded through one of the split sections and bearing against the other.

25. The combination with a driving member and a driven member, of an interposed friction element from which the driven member is actuated, a friction annulus on each side of said friction element, said annuli having openings, and a part extending through the openings of the annuli, and which is of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part.

26. The combination with a driving member, of a driven member, an interposed friction plate from which the driven member is actuated, a follower, a friction annulus interposed between said friction plate and said follower, said annuli having openings, a spring, and a part extending through the openings in the annuli and of less diameter than the diameter of each said opening, the annuli being free to shift radially until such movement is prevented by the contact of the boundary walls of the openings of the annuli with said part.

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