No. 730,372. PATENTED JUNE 9, 1903.

R. C. HILLS.

FRICTION CLUTCH.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

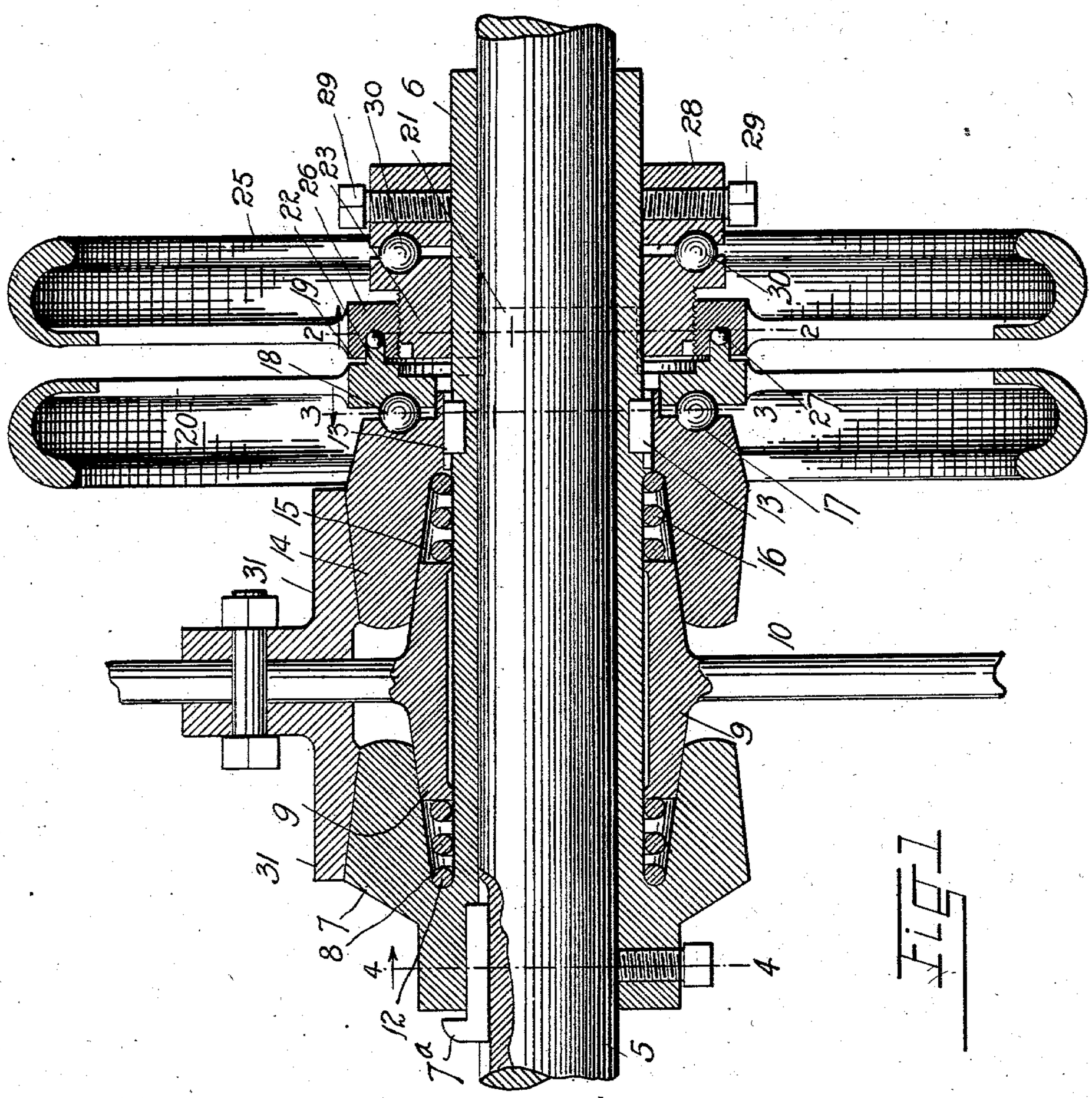

FIG. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

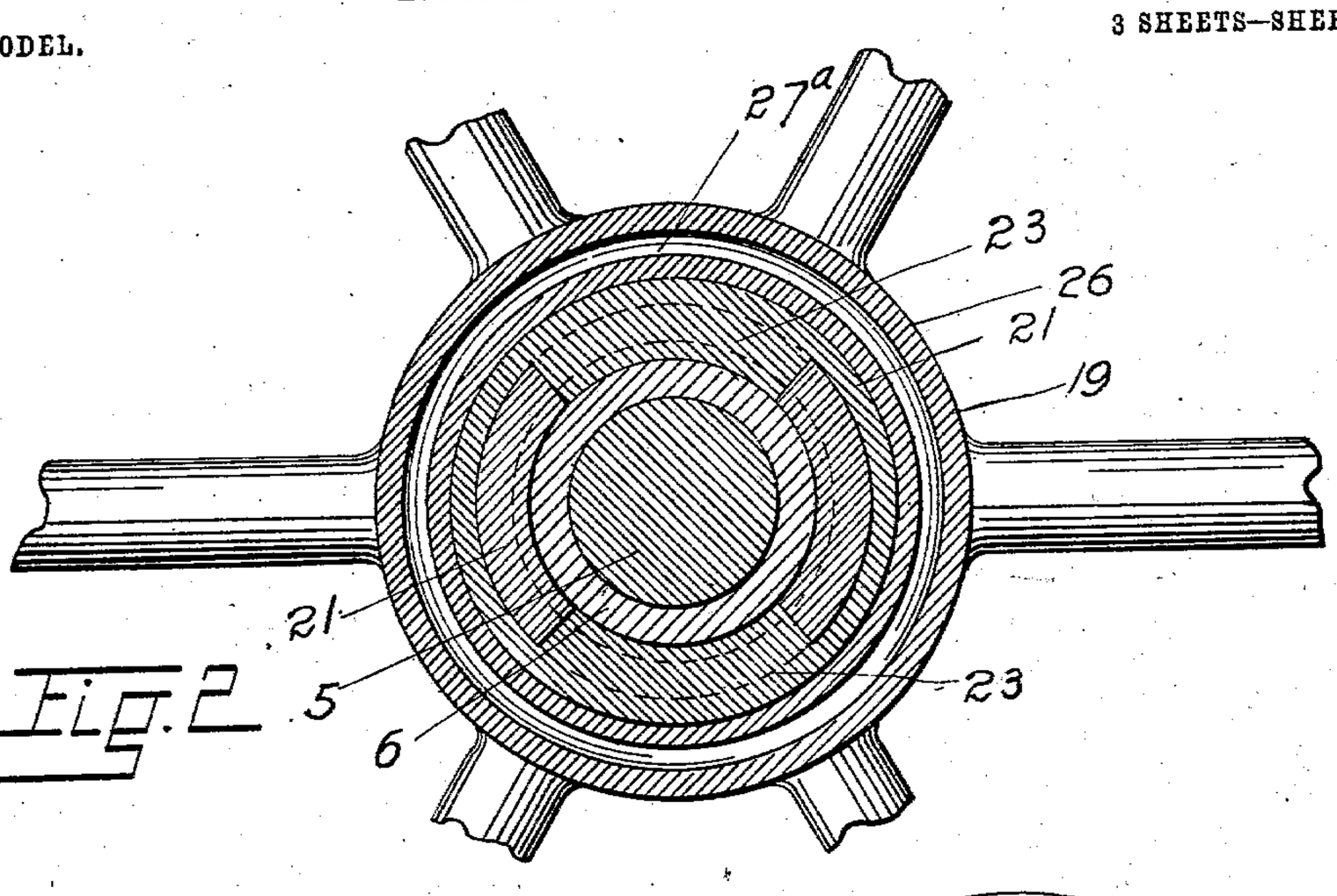

Fig. 2

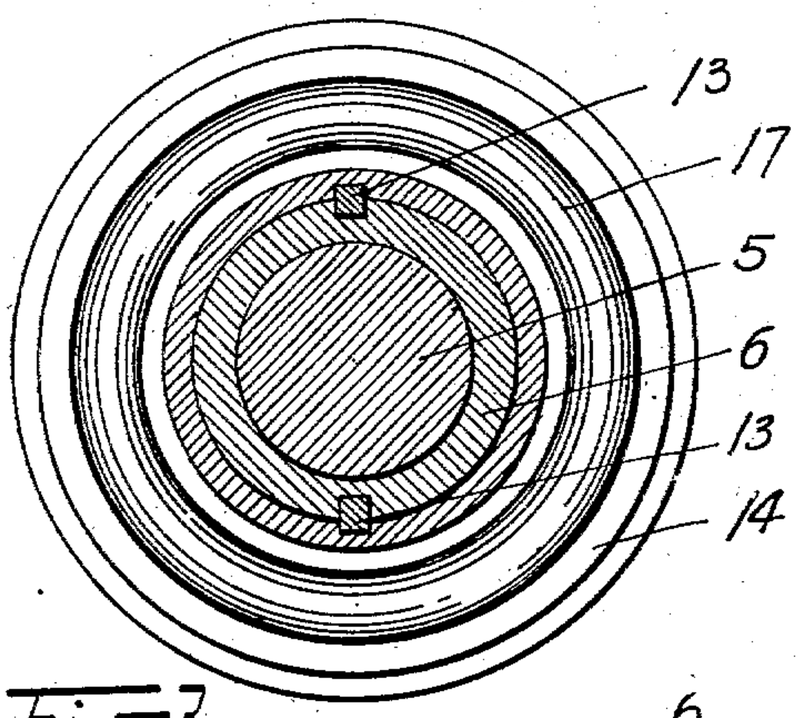

Fig. 3.

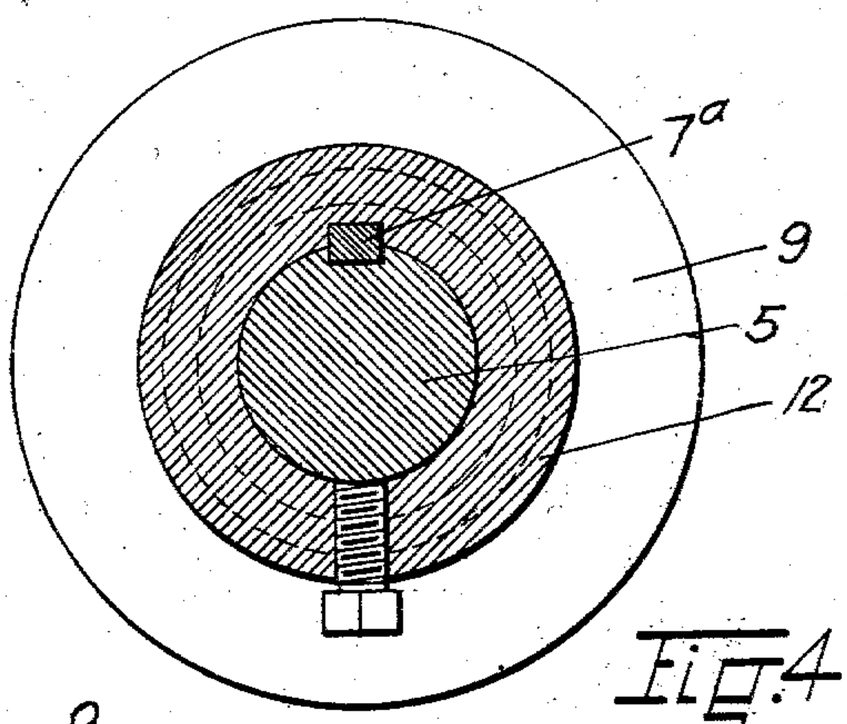

Fig. 4

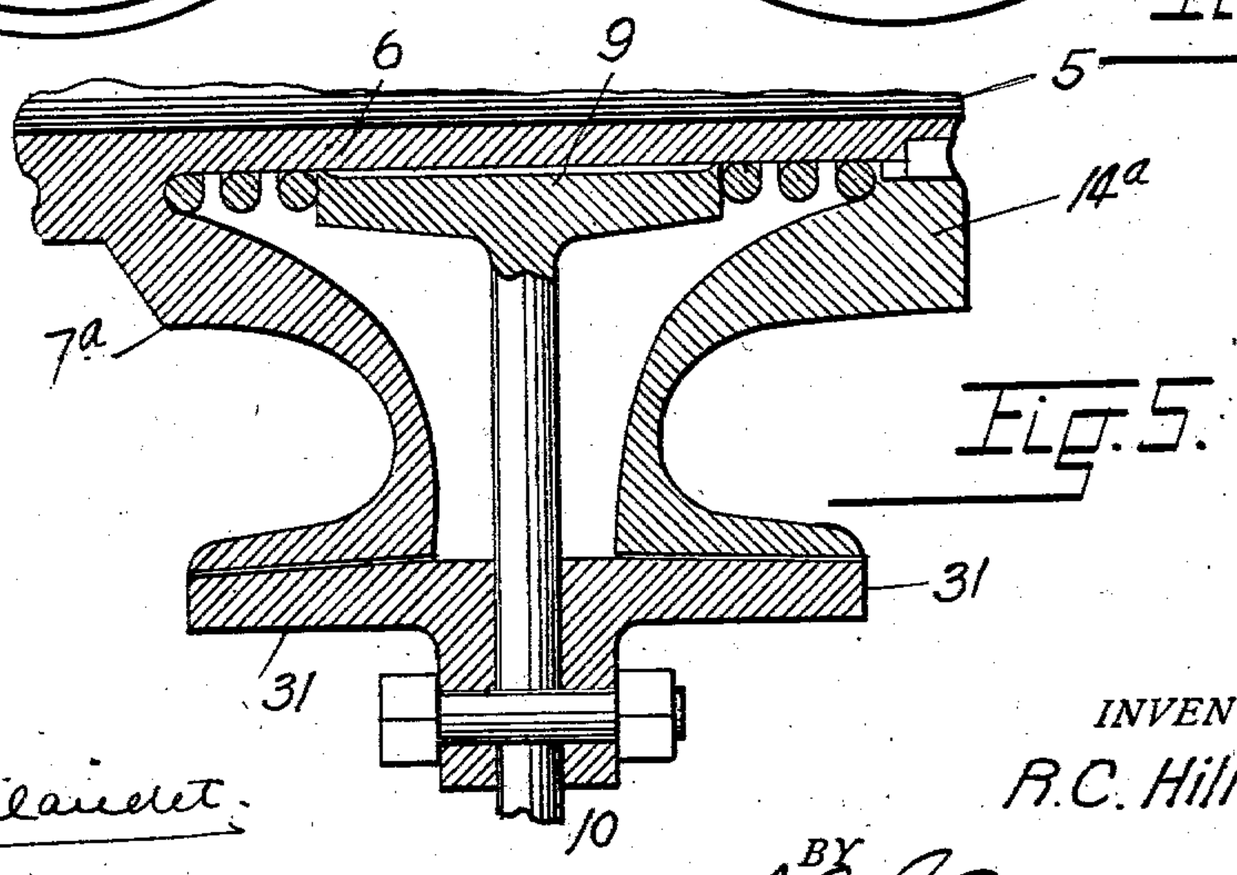

Fig. 5.

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No. 730,372. PATENTED JUNE 9, 1903.

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FRICTION CLUTCH.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

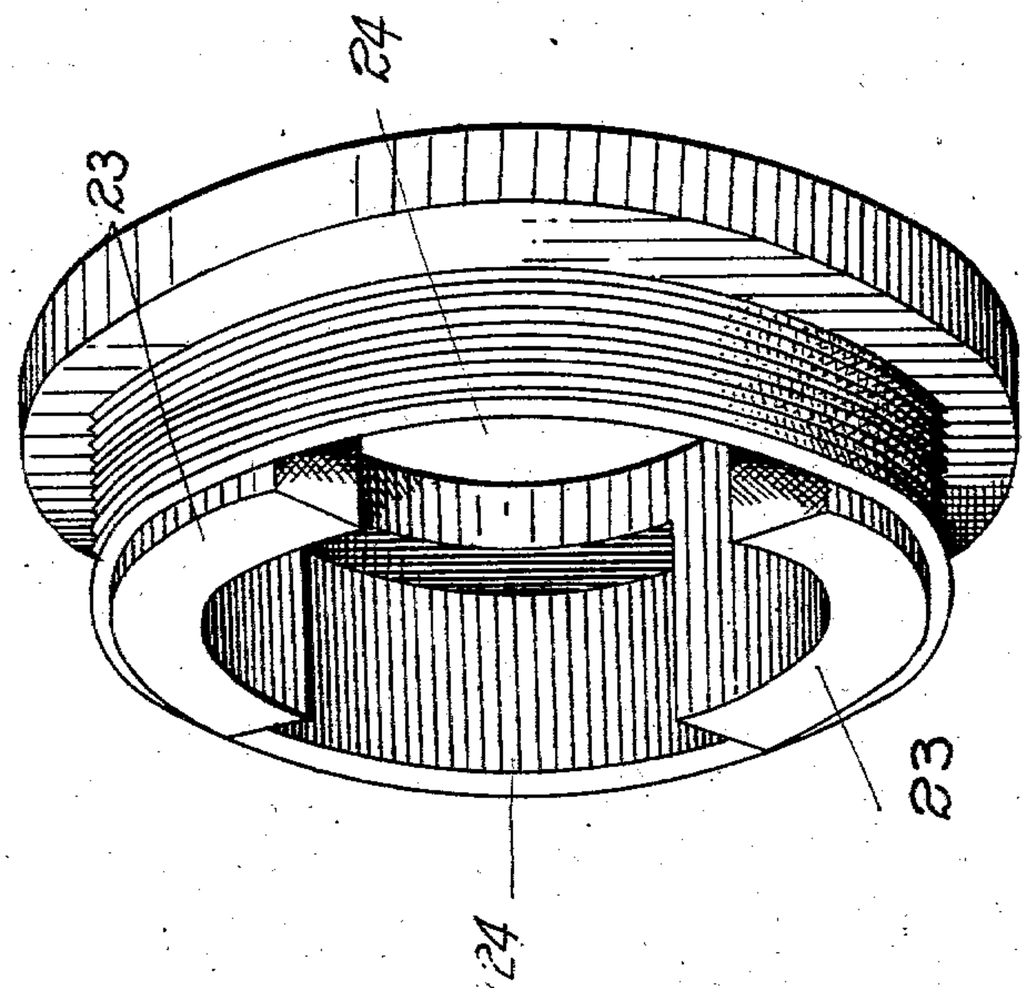

FIG. 7.

FIG. 6.

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No. 730,372. Patented June 9, 1903.

UNITED STATES PATENT OFFICE.

RICHARD C. HILLS, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO CLARENCE H. STEVENSON, OF DENVER, COLORADO.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 730,372, dated June 9, 1903.

Application filed September 22, 1902. Serial No. 124,470. (No model.)

To all whom it may concern.

Be it known that I, RICHARD C. HILLS, a subject of the King of Great Britain, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Friction-Clutches; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in friction-clutches, my object being to provide a device of this class which shall be simple in construction, economical in cost, reliable, durable, and efficient in use; and to these ends the invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a section taken through my improved clutch mechanism applied to a shaft which is shown partly in section. Figs. 2, 3, and 4 are sections taken on the lines 2 2, 3 3, and 4 4 of Fig. 1, respectively. Fig. 5 is a fragmentary sectional view illustrating a modified form of construction. Figs. 6 and 7 are perspective views illustrating the two interlocking parts shown in detail and on a larger scale.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a shaft from which or to which motion is to be transmitted. To this shaft is applied a sleeve 6, which is secured thereon by a key 7^a, whereby the shaft and sleeve are made to rotate together. The sleeve 6 is provided with a collar 7, which, as shown in the drawings, is formed integral therewith. This collar will be referred to as a "clutch member." Between a portion of this collar or clutch member and the sleeve is located a wedge-shaped recess 8, adapted to receive one end of the hub 9 of a wheel 10, which may be either a pulley or sprocket wheel for transmitting motion according as it is desired to use a belt or chain for this purpose. The hub is the counterpart of the recess, whereby as it is forced thereinto it is tightly wedged and made to turn with the shaft. Between the end of the hub and the bottom of the recess 8 is located a coil-spring 12, which is placed under tension by the inward movement of the hub and whose recoil throws the hub outwardly, making it loose on the sleeve as soon as the endwise pressure forcing it inwardly ceases to act. Mounted also to turn with the shaft but slidable thereon, being held in place on the sleeve 6 by keys 13, is a collar 14, forming another clutch member. Between a portion of this last-named collar and the sleeve is a wedge-shaped recess 15, adapted to receive the end of the hub opposite that which enters the recess 8. Located in the recess 15 and engaging the adjacent end of the hub is a coil-spring 16, one extremity of which engages the collar 14 at the bottom of the recess 15. In the end of the collar 14 opposite that which engages the hub 9 is a groove 17, forming a ball-race engaged by ball-bearings 18, which also engage a groove of corresponding shape formed in the hub 19 of a hand-wheel 20, provided with two segmental lugs 21 and an annular rib 22, projecting in the opposite direction from the collar 14. Mounted on the sleeve 6 is a loose collar 23, whose body portion is exteriorly threaded. This collar 23 is provided with recesses 24, adapted to receive the segmental lugs 21 of the hand-wheel 20, whereby the said wheel and the loose collar are interlocked, the interlocking parts being in sliding engagement, permitting the necessary longitudinal movement of one member in order to engage and actuate the clutch member. A hand-wheel 25 is provided with a hub 26, interiorly threaded and engaging the exterior threads on the collar 23. The hub 26 of this hand-wheel is provided with an annular groove 27^a, adapted to receive the rib 22 of the hand-wheel 20. Between this rib and the bottom of the groove are located ball-bearings 27. The surface of the collar 23 opposite its interlocking face is grooved to form half of a ball-raceway, the other half of the said raceway being formed in a collar 28, secured to the

sleeve 6 by set-screws 29. In the raceway between these loose and fast collars are located ball-bearings 30.

From the foregoing description the operation of my improved friction-clutch mechanism will be readily understood. Assuming that it is desired to lock the wheel 10 on the shaft, whereby the two parts are made to rotate in unison, the hand-wheel 20 is held by one hand of the user, whereby the collar 23 is locked against rotation by the interlocking members of the hand-wheel 20 and the said collar, as heretofore described. The hand-wheel 25 is then turned on the collar 23 in a direction to force the hand-wheel 20 and the collar 14 toward the left, referring to Fig. 1, whereby the hub of the wheel 10 is wedged tightly between the collars 7 and 14, both of which rotate with the shaft, as heretofore explained. Hence the wheel 10 when thus actuated must also turn with the shaft. To release the wheel 10, it is only necessary to turn the hand-wheel 25 in the opposite direction, when the recoil of the springs 12 and 16 will produce the desired result. The ball-bearings 18, 27, and 30 make it practicable to manipulate the hand-wheels 20 and 25, as heretofore explained, since the friction between the parts engaged by these bearings is reduced to a minimum.

In case the circumference of the wheel 10 is considerable and it is desired to apply the friction farther from the center in order that it may act more efficiently two parts 31 may be secured to the wheel beyond the collar 14 and provided with friction-faces arranged to engage the exterior adjacent faces of these collars, as shown in Fig. 1. In case it is desired to apply the friction still farther from the center modified forms of collars (shown in Fig. 5 and designated 7^a and 14^a) may be employed, making it practicable to secure the friction parts 31 to the wheel 10 farther from the center of motion. In this last-named case the friction-collars do not engage the hub of the wheel.

Having thus described my invention, what I claim is—

1. In friction-clutch mechanism, the combination with a shaft and a wheel normally loose thereon, and friction-collars arranged to turn with the shaft one of which is longitudinally slidable thereon, the collars being arranged one on each side of the wheel and adapted when the one is made to move toward the other, to lock the wheel on the shaft, of a collar loose on the shaft and exteriorly threaded, a hand-wheel also loose on the shaft, engaging the sliding collar or clutch member on one side of the hub of the wheel and the loose collar on the other side, the latter and the hand-wheel having interlocking members in sliding engagement, and another hand-wheel whose hub is threaded to engage exterior threads of the loose collar and arranged to bear against the first-named hand-wheel, whereby the sliding collar is forced toward the wheel to be locked on the shaft, substantially as described.

2. The combination with a shaft and a normally loose wheel, of friction-clutch members arranged on opposite sides of the wheel and rotating with the shaft, one of said members being longitudinally movable on the shaft, two loose interlocking members mounted on the shaft and slidably connected, means for holding the said interlocking members against rotation, and a hand-wheel threaded on one of the interlocking members and bearing against the other member, substantially as described.

3. The combination with a shaft and a normally loose wheel thereon, of friction-clutch members arranged on opposite sides of the wheel, one of said members being slidable on the shaft, springs interposed between the hub of the wheel and said members, two interlocking members loose on the shaft one of which bears against the slidable clutch member, and an actuating member threaded on one of the interlocking members and bearing against the other interlocking member, substantially as described.

4. In friction-clutch mechanism, the combination with a shaft and a wheel loose thereon, of two clutch members arranged on opposite sides of the wheel and adapted to engage the hub thereof, both of said members being arranged to turn with the shaft and one of them being slidable longitudinally thereon, a releasing-spring engaging the hub of the wheel at one extremity and one of the clutch members at the opposite extremity, two interlocking members loose on the shaft, one of them bearing against the slidable clutch member, and the other against a stop on the shaft, ball-bearings interposed between the clutch member and the one interlocking member, and between the other interlocking member and a stop, an actuating member threaded on one interlocking member and engaging the other interlocking member, and ball-bearings interposed between the actuating member and its engaging interlocking member, substantially as described.

5. In friction-clutch mechanism, the combination with a shaft and a wheel normally loose thereon, of two clutch members arranged on opposite sides of the wheel, the latter being provided with friction-faces adapted to engage the clutch members, one of the latter being slidable longitudinally on the shaft, two interlocking members loose on the shaft and slidably connected, one of them bearing against the longitudinally-slidable clutch member, a collar fast on the shaft and engaged by the other interlocking member, and an actuating member threaded on the last-named interlocking member and bearing against the other interlocking member, substantially as described.

6. In friction-clutch mechanism, the combination with a shaft and a wheel normally

loose thereon, of a friction-face applied to the wheel outside of its hub, clutch members on opposite sides of the wheel and adapted to engage said friction-face, two interlocking members loose on the shaft and slidably connected, one of them engaging one of the clutch members, the latter being movable longitudinally on the shaft, and an actuating member threaded on one of the interlocking members and adapted to engage the other interlocking member, substantially as described.

7. In friction-clutch mechanism, the combination with a shaft and a wheel normally loose thereon, of friction-faces applied to the wheel outside of its hub, clutch members located on opposite sides of the wheel and adapted to wedge into the space between the hub and the applied friction-faces, two interlocking members loose on the shaft and slidably connected, one of them engaging one of the clutch members, and the other being movable longitudinally on the shaft, and an actuating member threaded on one of the interlocking members and adapted to engage the other interlocking member, substantially as described.

8. The combination with a shaft and a normally loose wheel, of a friction-clutch member arranged adjacent the said wheel and adapted to engage the latter, said member rotating with the shaft and being longitudinally movable thereon, two loose interlocking members mounted on the shaft and slidably connected, one of said interlocking members bearing against the clutch member, means for holding the interlocking members against rotation, and an actuating member threaded on one of the interlocking members and bearing against the interlocking member, which engages the clutch member.

9. In clutch mechanism, the combination with a shaft and a clutch member slidable thereon and turning therewith, of two interlocking members loose on the shaft and slidably connected, one of the interlocking members being adapted to actuate the clutch member, and an actuating device threaded on one of the interlocking members and arranged to actuate the interlocking member which drives the clutch member.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD C. HILLS.

Witnesses:

DENA NELSON,

A. J. O'BRIEN.