No. 850,462. PATENTED APR. 16, 1907.

H. H. BENN.

FRICTION COUPLING.

APPLICATION FILED APR. 17, 1902.

4 SHEETS—SHEET 1.

Fig. 2

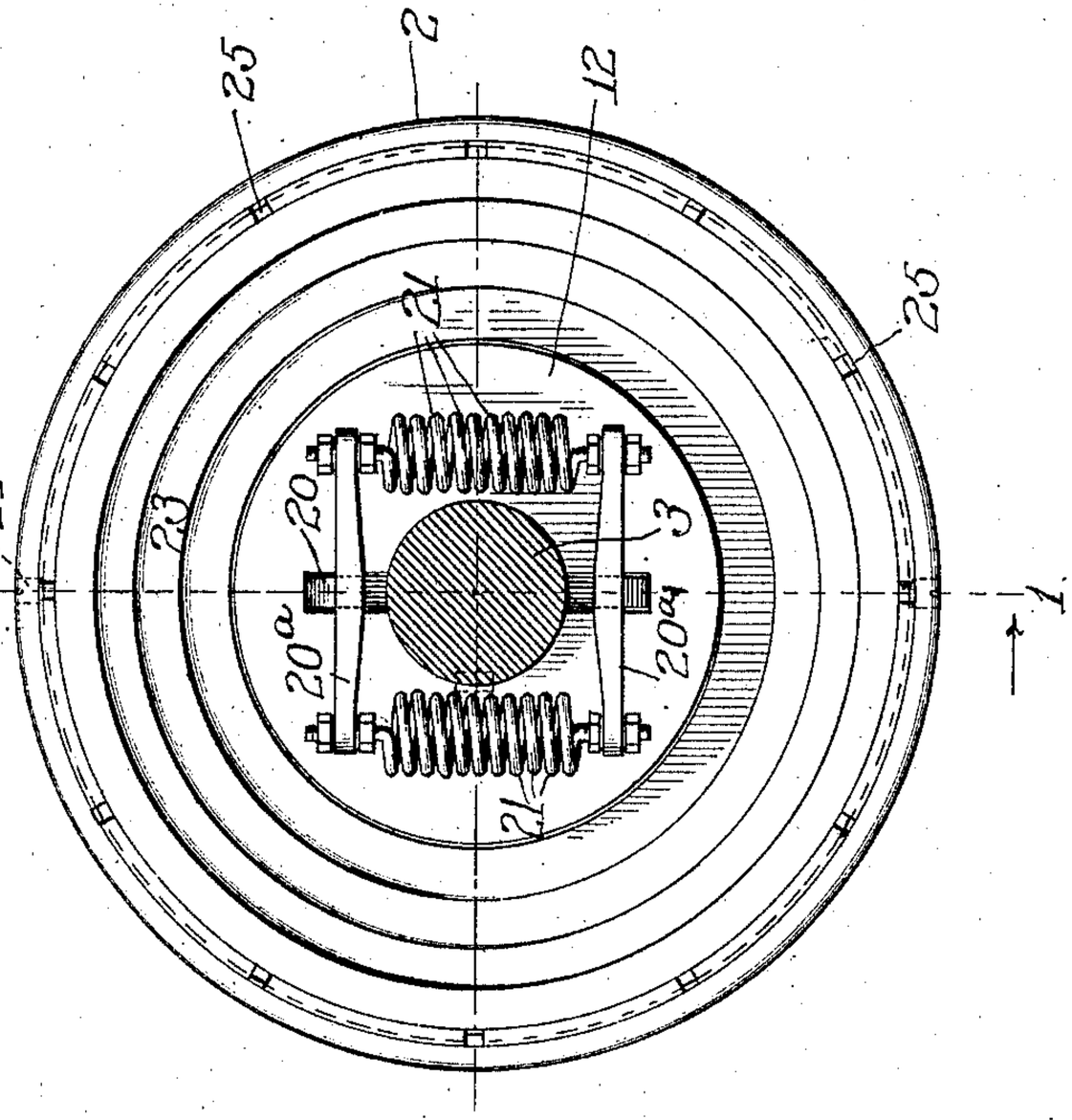
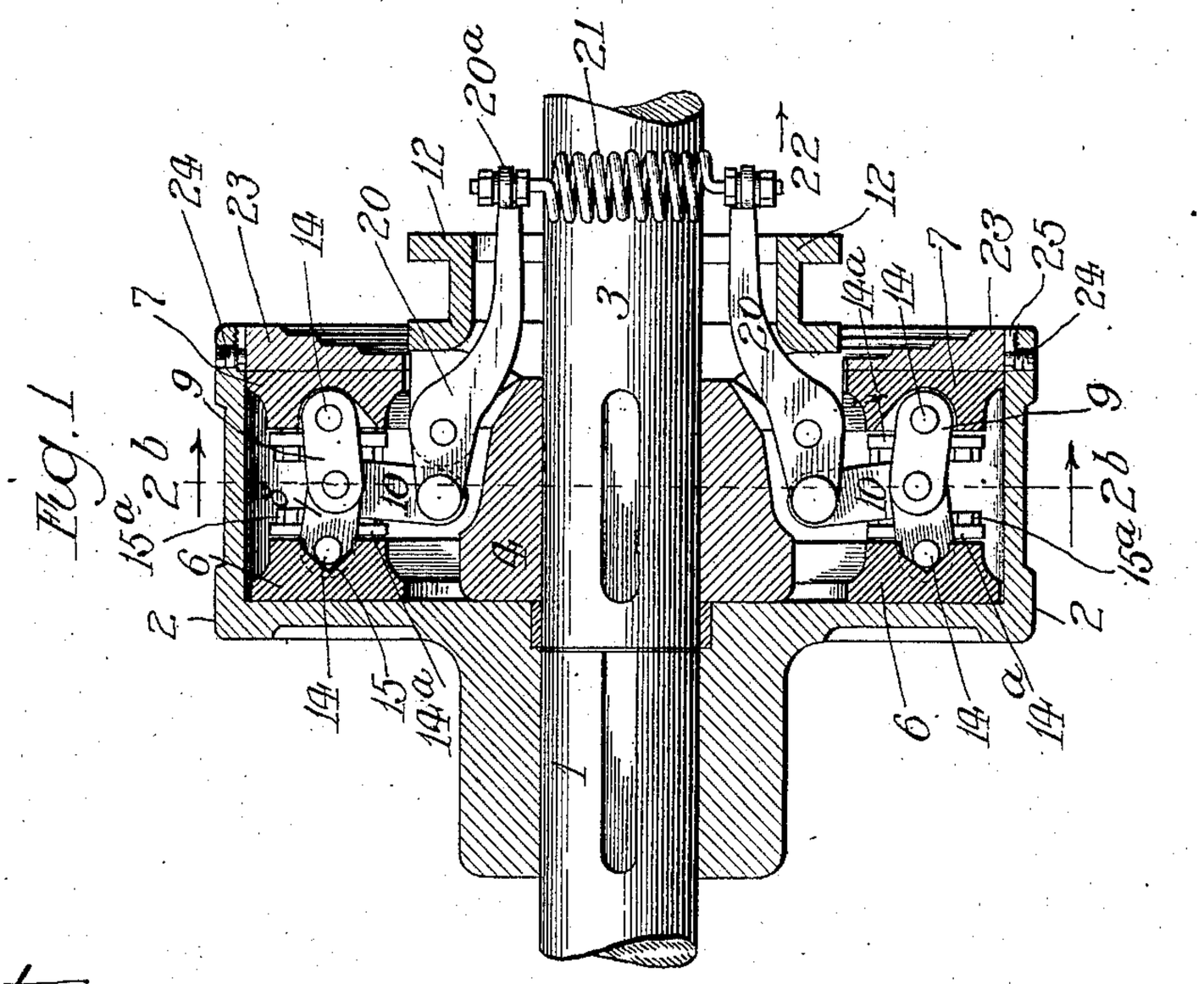


Fig. 1



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His Attys

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4 SHEETS—SHEET 2.

Fig. 2b

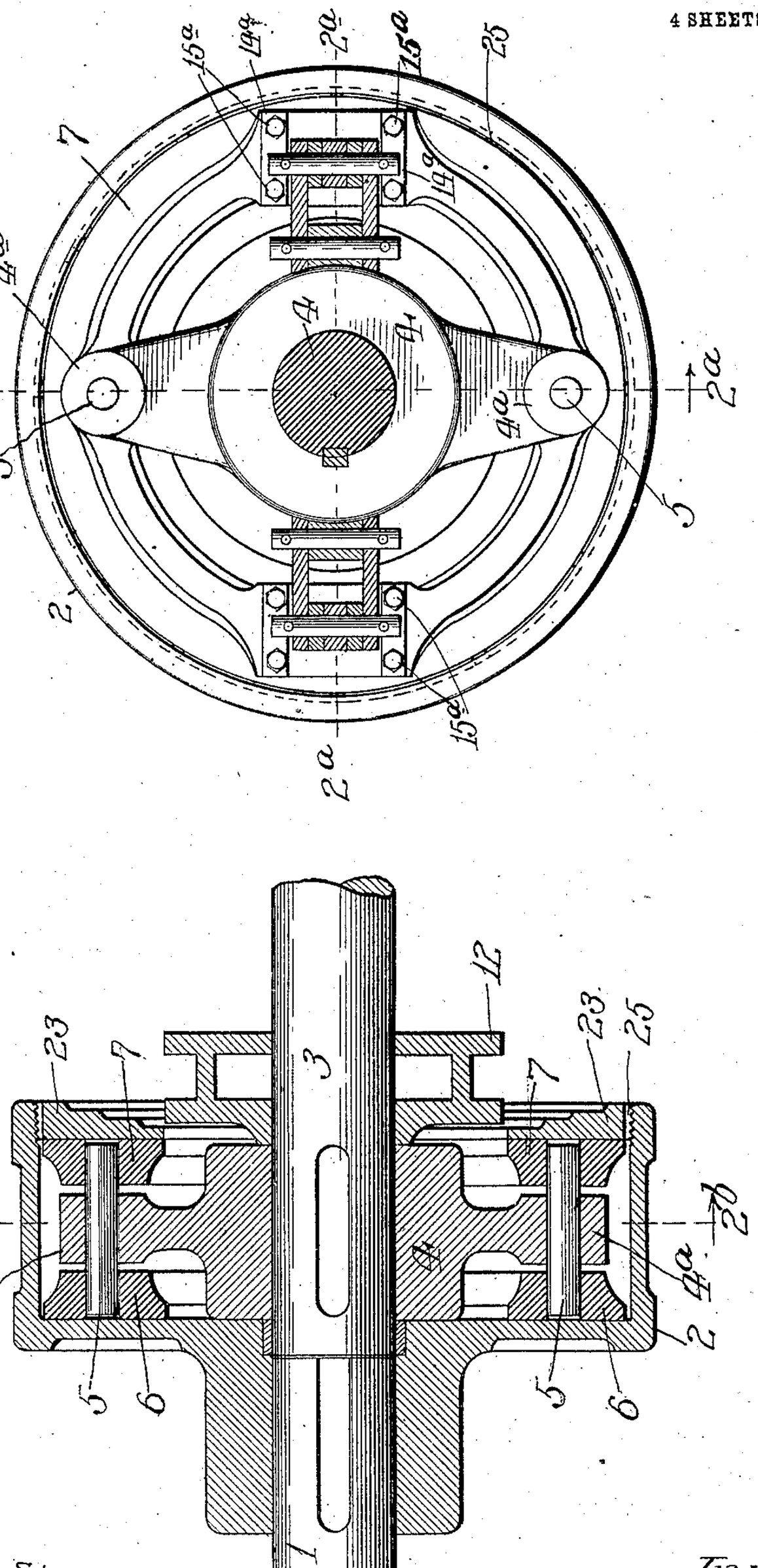

Fig. 2a

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4 SHEETS—SHEET 3.

Fig. 3.

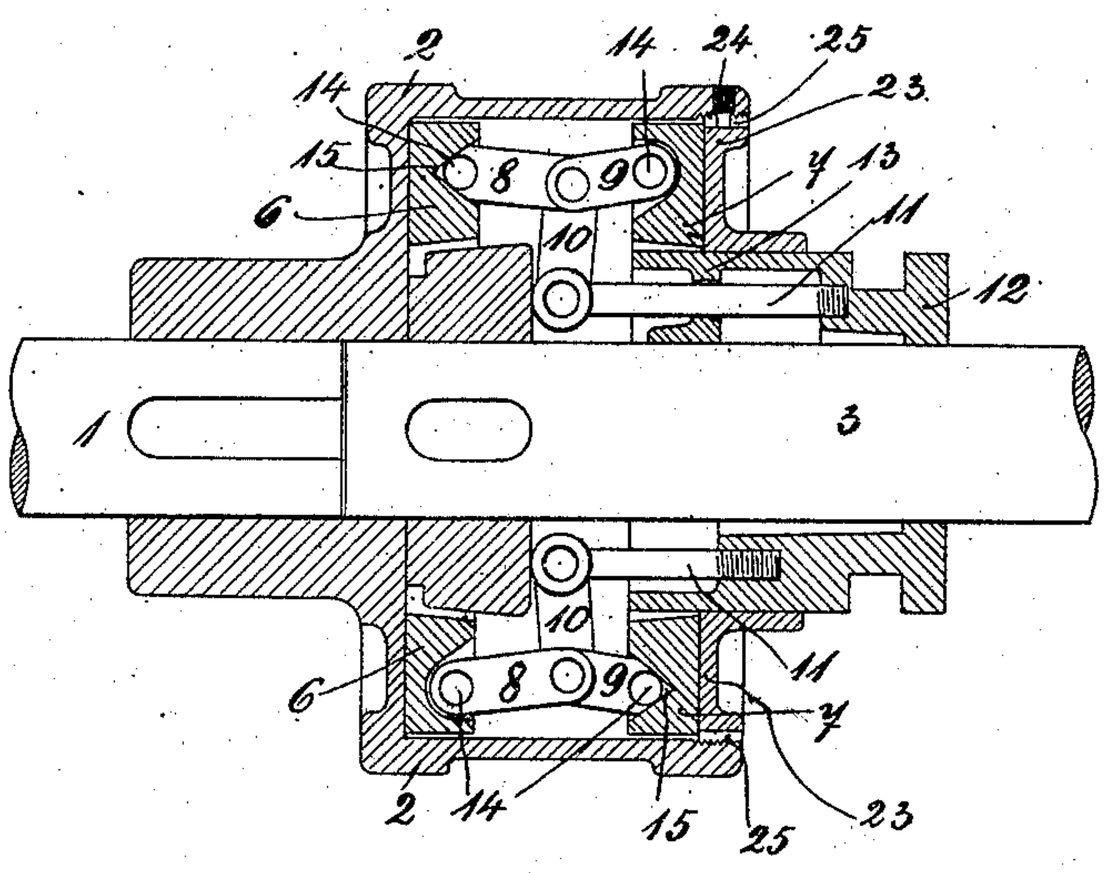
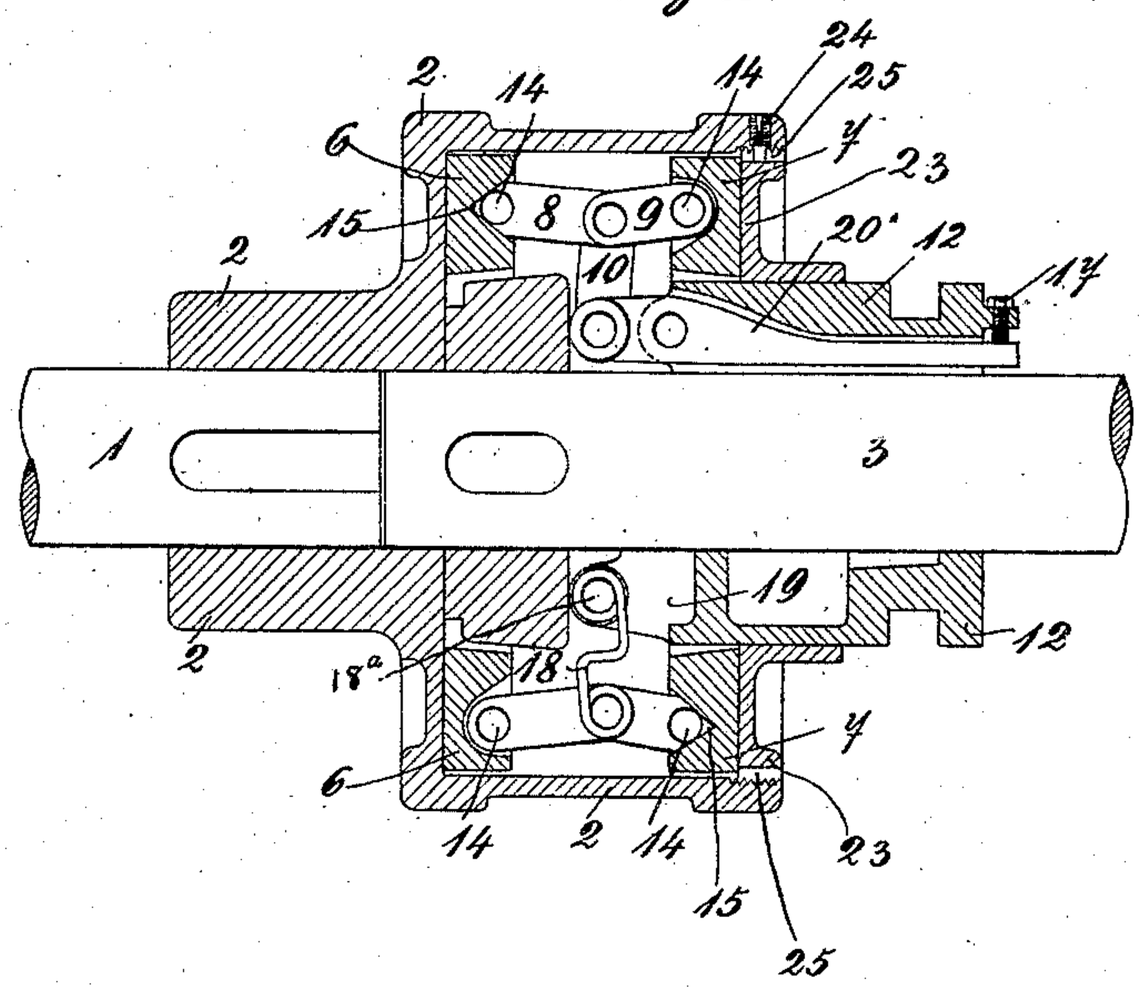


Fig. 4.



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No. 850,462. PATENTED APR. 16, 1907.

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FRICTION COUPLING.

APPLICATION FILED APR. 17, 1902.

4 SHEETS—SHEET 4.

Fig. 5.

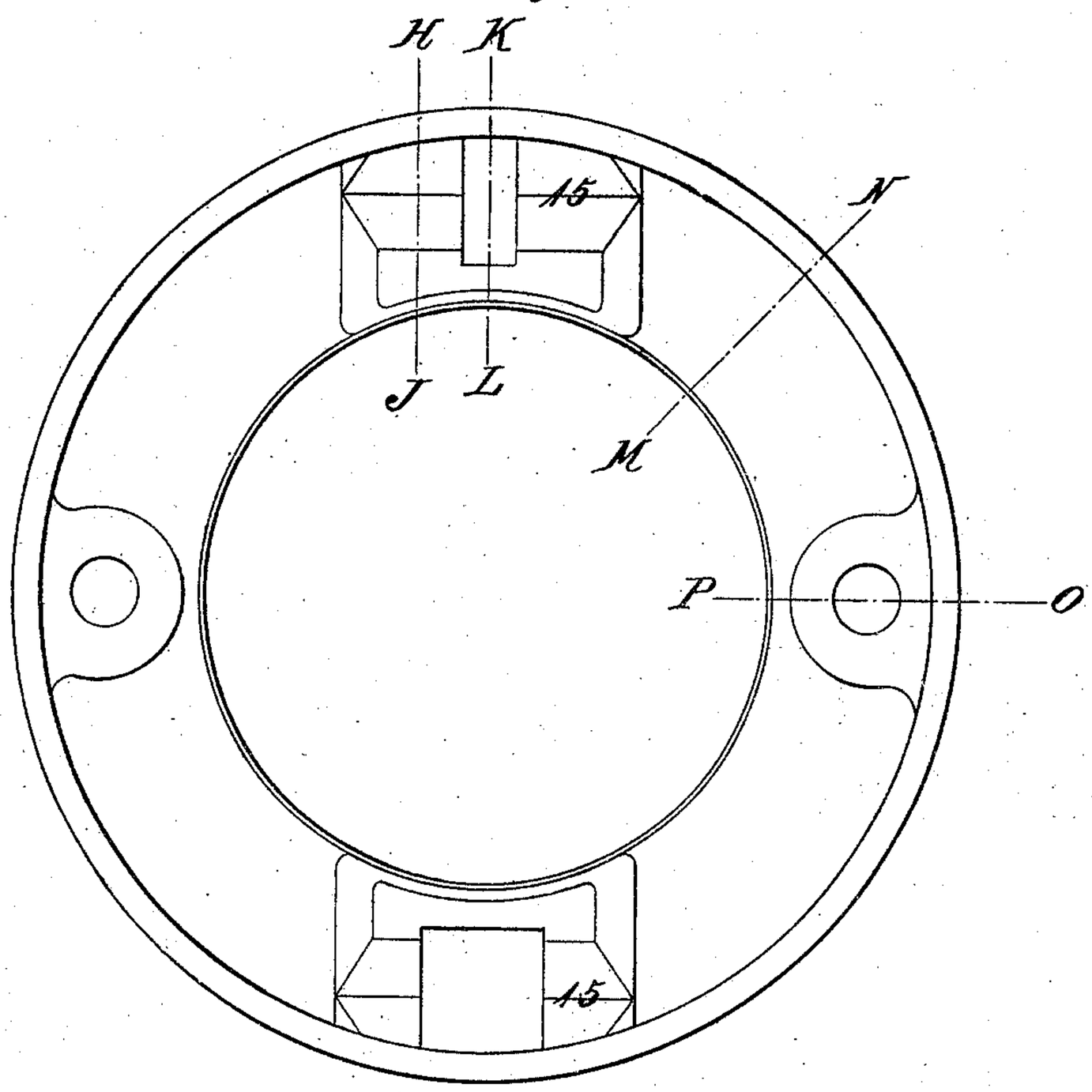


Fig. 6.

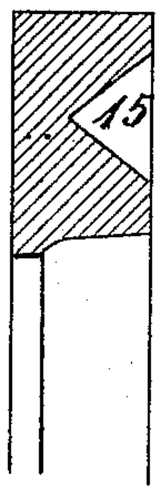


Fig. 7.

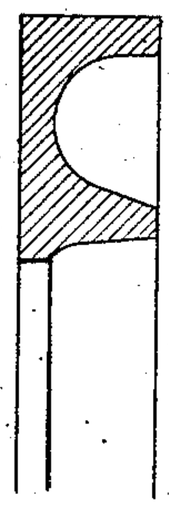


Fig. 8.

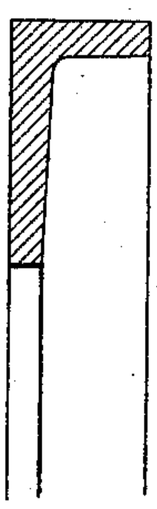
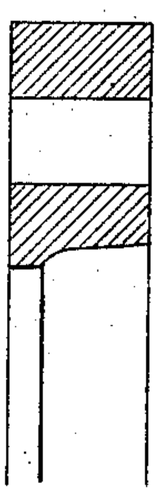


Fig. 9.



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UNITED STATES PATENT OFFICE.

HANS HAMILTON BENN, OF PRERAU, AUSTRIA-HUNGARY.

FRICTION-COUPLING.

No. 850,462. Specification of Letters Patent. Patented April 16, 1907.

Application filed April 17, 1902. Serial No. 103,466.

To all whom it may concern:

Be it known that I, HANS HAMILTON BENN, a citizen of the British Empire, and a resident of Prerau, in the Province of Mähren, Empire of Austria, engineer, have invented certain new and useful Improvements in Friction-Couplings, of which the following is an exact specification.

My invention relates more particularly to improvements upon the friction-coupling heretofore patented to me in various foreign patents, of which Letters Patent of Great Britain, No. 8,854, dated, April 27, 1899, is an instance; and it has for its object a lessening of the cost of manufacture and an increase in the durability and efficiency of such couplings, as will be hereafter more fully pointed out.

Figure 1 is a section of my improved coupling in the plane of its axis; Fig. 2, an elevation of the right-hand end of the coupling shown in Fig. 1; Fig. 2ª, another section of the coupling, also in the plane of its axis, but at right angles to the section shown in Fig. 1; Fig. 2ᵇ, a middle cross-section of the coupling (in the position shown in Fig. 2ª) in a plane at right angles to its axis, but with the supporting-hub for the friction-rings shown in elevation; Figs. 3 and 4, sectional views corresponding to Fig. 1, but illustrating modifications in construction; Fig. 5, a detail view of the back or inner side of one of the friction-rings; and Figs. 6, 7, 8, and 9, detail cross-sections of the same on the dotted lines H J, K L, M N, and O P.

The same letters of reference are used to indicate corresponding parts in the several views.

In the construction shown in Figs. 1, 2, 2ª, and 2ᵇ, 1 is the driving-shaft, upon which is keyed or otherwise secured in fixed position the hub of a cylindrical box or casing 2. Fast upon the driven shaft 3 within the cylindrical casing 2 is a hub 4, having in the present instance formed integral with it two oppositely-extending radial arms 4ª, Figs. 2ª and 2ᵇ, which arms have secured in their outer ends bearing-pins 5, upon which are supported the friction-rings 6 and 7, located within the casing 2 and adapted to coöperate with its opposite walls. These rings, being carried by the arms 4ª of the hub 4, fast upon the driven shaft 3, turn with the latter shaft, while being supported upon the pins 5, carried by the hub-arms 4ª, they are free to move toward and from each other, sliding upon the pins 5 as supports and guides. The outer faces of the friction-rings 6 7 and the coöperating inner faces of the walls of the casing 2 are planed or ground to closely fit against each other, and when the two rings are forced outward or apart against the walls of the casing 2 the friction between the rings and the walls of the casing frictionally couples the driving and the driven shaft together, so that the former may turn the latter with it. For the purpose of forcing the friction-rings apart and engaging them with the opposite walls of the casing for the purpose described the toggles 8 9 are provided, two pairs of such toggles being shown in the present instance interposed between the friction-rings on diametrically opposite sides of the shaft, Fig. 1. For the purpose of operating these toggles their joints or knuckles are connected by links 10 with the inner ends of levers 20, which are fulcrumed upon opposite sides of the shaft 3 in a sliding sleeve 12, mounted upon the shaft 3 and adapted to be slid thereon toward and from the coupling.

Secured to or formed integral with the outer ends of the levers 20 are cross-arms 20ª, Figs. 1 and 2, and the opposite ends of these cross-arms are connected upon opposite sides of the shaft 3 by strong spiral springs 21, whose tension tends to draw the outer ends of the levers 20 toward the shaft 3 and to force their inner ends and the links 10 outward away from the shaft. In Fig. 1 the friction-rings 6 7 are shown spread apart and in contact with the opposite walls of the cylindrical box or casing, and they are held against said walls by the tension of the springs 21 operating through the levers 20 and links 10 and tending to straighten the toggles 8 9. The two parts of the coupling are therefore frictionally locked together and the driving-shaft 1 coupled to the driven shaft 3. To disengage the two parts of the coupling and uncouple the shafts, the sleeve 12 is shifted outward along the shaft 3 away from the coupling, thereby swinging the inner ends of the links 10 in that direction and permitting the toggles 8 9 to bend inward toward the shaft 3 and the friction-rings 6 7 to relax their grip upon the opposite walls of the casing. To recouple the parts, the sleeve 12 is slid to the left again to the position shown in Fig. 1, which movement will cause the links 10 to straighten the toggles 8 9 again and force the friction-rings 6 7 outward against the opposite walls of the cas-

ing, as before, and the parts become yieldingly locked in this position by the inner ends of the links 10 passing beyond the plane intersecting the joints or knuckles of the toggles at right angles to the shaft, as in Fig. 1. As the inner ends of the links 10 are forced past this plane in coupling the parts together the springs 21 yield slightly and then contract again to lock the parts in coupled position, the normal tension of the springs maintaining the frictional engagement of the friction-rings with the walls of the casing. The tension of the springs 21, and consequently the frictional engagement of the parts, may be regulated by means of nuts applied to the threaded ends of the springs 21 upon the opposite sides of the cross-arms 20^a, through the ends of which said springs pass. Provision is also made for adjustment of the friction-surfaces relatively to each other, consisting in making the right-hand wall 23 of the casing 2 adjustable toward and from the opposite wall of the casing. To this end this annular wall 23 of the casing is screwed into the internally-threaded open end of the body of the casing and is provided at intervals around its periphery with notches or grooves 25, with which a screw 24, passed through the body of the casing, may be engaged to positively lock the wall 23 in its different adjusted positions.

The outer ends of the toggles 8 9 may be connected with the friction-rings 6 7 in any suitable manner. In the present instance they are shown provided with holes through which pass pins 14, seated in V-shaped recesses or grooves 15, formed in the friction-rings 6 7 to receive them, Figs. 1 and 5, while the extreme ends of the toggle members are received by a deeper recess intermediate the grooves 15. The pins 14 are confined in the grooves in the friction-rings by means of plates 14^a, secured to the friction-rings 6 7 across the opposite ends of the grooves 15 by screw-bolts 15^a, Figs. 1 and 2^b.

In my coupling as constructed prior to my present invention and as shown in the British patent above referred to the friction-rings 6 7 were mounted directly upon the shaft 3 and provided with grooves longitudinally of the shaft, which engage keys or feathers fixed in grooves in the shaft, whereby the friction-rings were locked to the shaft for purposes of rotation, but left free to slide upon the shaft into and out of engagement with the opposite walls of the casing. In the construction illustrated and described in my present application the friction-rings have their bearing entirely upon the pins 5, carried by the outer ends of the radial arms of the hub 4, fixed upon the shaft 3, which is a distinct improvement over my prior construction in several respects. In the first place, it is less expensive, dispenses with the sliding key-and-groove connection of the rings with the shaft, and obviates the wear which occurred between these parts. In the second place, the placing of the supporting-bearings for the rings near their peripheries, instead of having their bearings upon the shaft, obviates the possibility of their binding upon the shaft when being moved outward into frictional engagement with the walls of the casing. In the third place, the mounting of the friction-rings upon the pins 5 at the outer ends of the hub-arms provides a loose or more flexible bearing for the friction-rings, which permits them to accommodate themselves to any uneven wear or irregularity of the friction-surfaces, so that when the friction-rings are forced outward by the straightening of the toggles they will properly engage and grip the friction-surfaces upon the opposite walls of the casing. Again, in my coupling as heretofore constructed and shown in my prior patents above referred to the only means provided for applying the necessary spring-pressure to the toggles 8 9 to straighten them and force the friction-rings against the walls of the casing were the spiral springs 21, operating through the medium of the levers 20 and links 10; but I have found that the necessary spring-pressure may be applied to the toggles in other ways and the construction of the parts simplified and cheapened. Thus in Fig. 3 I have illustrated a modified construction in which spring-rods 11 are substituted for the levers 20 and spiral springs 21 of Figs. 1 and 2. These spring-rods 11 are fixed at their outer ends in the shifting sleeve 12 and have the toggle-links 10 pivoted to their inner ends. The upper rod 11 in Fig. 3 is shown as provided with a bearing or support 13 in the sleeve 12 about midway of the length of the rod, while in the case of the lower rod the wall of the sleeve is extended farther inward, and a shorter rod, having no intermediate bearing, is employed. In any given coupling either one or the other of these arrangements of the rod would preferably be employed instead of one arrangement upon one side of the shaft and the other upon the opposite side.

In Fig. 4 an arrangement is shown at the upper side of the shaft which employs a lever 20′ somewhat similar to the levers 20 of Figs. 1 and 2, but dispenses with the spiral springs connected to the levers in those views. In Fig. 4 the lever 20′ is of such size, shape, and material that its long arm is slightly resilient and its outer end is engaged by a set-screw 17, which limits its upward movement and permits its position to be adjusted. The lever is normally adjusted to such position by means of the screw 17 as will cause the link 10 to be forced outward with the necessary degree of pressure when the parts are in coupled position, as in Fig. 4, while the resiliency of the long arm of the lever permits the inner end of the link 10 to be forced past the dead

center point in coupling or uncoupling the parts.

At the under side of the shaft in Fig. 4 another modification is shown in which the levers and spiral springs and links 10 and rods 11 of the other constructions are all dispensed with and their place supplied by a single bent spring 18, connecting the joint or knuckle of the toggle with a stud 18ª upon a supporting-lug 19, provided for it upon the shifting sleeve 12. When the sleeve is forced inward, this spring 18 yieldingly forces the toggle-joint outward and straightens the toggle, and as the stud 18ª passes the dead-center point the spring yields slightly and then locks the parts in coupled position.

The drawings in the present case are intended to represent couplings of moderate size in which two pins 5, located on diametrically opposite sides of the shaft, afford a sufficient bearing and support for the friction-rings and in which two pairs of toggles similarly located afford sufficient means for properly forcing the friction-rings outward into contact with the walls of the casing; but in larger couplings the hub 4 will be provided with additional radial arms 4ª, carrying pins 5, to afford additional bearings and supports for the friction-rings, and additional pairs of toggles will be employed for operating the rings.

Having thus fully described my invention, I claim—

1. The herein-described friction-coupling, comprising the cylindrical casing, the hub located therein and having the radial arms, the bearing-pins carried by said arms, the friction-rings mounted upon said pins, the pairs of toggles interposed between the bearing-faces of the friction-rings, a shifting sleeve, and a yielding connection between said sleeve and the pair of toggles for operating the latter; substantially as described.

2. The herein-described friction-coupling, comprising the cylindrical casing, the hub located therein and having the radial arms, the bearing-pins carried by said arms, the friction-rings mounted upon said pins, the pairs of toggles interposed between the bearing-faces of the friction-rings at opposite sides of the coupling, links connected to the joints of said toggles and extending inward toward the axis of the coupling in substantially the plane of the radial arms, a shifting sleeve, and yielding connections between said sleeve and links for operating the toggles; substantially as described.

3. The herein-described friction-coupling, comprising the cylindrical casing, the hub located therein and having the radial arms, the bearing-pins carried by said arms, the friction-rings mounted upon said pins, the pairs of toggles interposed between the bearing-faces of the friction-rings at opposite sides of the coupling, links connected to the joints of said toggles and extending inward toward the axis of the coupling, a shifting sleeve, and yielding or spring connections for said links carried on said sleeve independently of each other, and operating to press the inner ends of their connected links outward; substantially as described.

4. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing and provided on their inner adjacent faces with substantially V-shaped notches, toggles interposed between the friction-rings and having the outer ends of their members arranged to bear in said notches, and means for operating the toggles; substantially as described.

5. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing and provided on their inner adjacent faces with substantially V-shaped notches, toggles interposed between the friction-rings and having the outer ends of their members provided with pins arranged to bear in said notches, means for confining said pins in the notches and a shiftable sleeve operatively connected with said toggles; substantially as described.

6. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing and provided on their inner adjacent faces with substantially V-shaped notches, toggles interposed between the friction-rings and having the outer ends of their members provided with pins arranged to bear in said notches, means for confining said pins in the notches, a shiftable sleeve, and a yielding or spring connection between said sleeve and toggles for operating the latter; substantially as described.

7. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing, and provided on their inner adjacent faces with V-shaped notches, toggles interposed between the friction-rings and provided at the outer ends of their members with pins bearing in said notches, means for confining the pins in the notches and means for operating the toggles; substantially as described.

8. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by

such arms to coöperate with the friction-faces on the casing, and provided on their inner adjacent faces with V-shaped notches and with an intermediate and deeper recess, toggles interposed between the friction-rings and provided at the outer ends of their members or links, with pins bearing in said notches, the links fitting in the intermediate recesses, and means for operating the toggles; substantially as described.

9. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing, and provided on their inner adjacent faces with V-shaped notches and with an intermediate recess, toggles interposed between the friction-rings and comprising the pivoted members or links 8, 9 having bearing-pins 14 near their outer ends, said ends of the links bearing in said intermediate recesses and the pins bearing in said V-shaped notches, and means for operating the toggles; substantially as described.

10. The herein-described friction-coupling comprising the cylindrical casing having friction-faces, the hub located therein and having radial arms, friction-rings carried by such arms to coöperate with the friction-faces on the casing, and provided on their inner adjacent faces with V-shaped notches and with an intermediate recess, toggles interposed between the friction-rings and comprising the pivoted members or links 8, 9 having bearing-pins 14 near their outer ends, said ends of the links bearing in said intermediate recesses and the pins bearing in said V-shaped notches, plates secured to the inner face of the rings adjacent the toggle-bearings and arranged to hold the bearing-pins 14 in place, and means for operating the toggles; substantially as described.

11. The herein-described friction-coupling, comprising the cylindrical casing, the hub located therein having radial arms, bearing-pins carried by said arms, pairs of toggles interposed between the bearing-faces of the friction-rings, links connected to the joint of the toggles and extending inward toward the axis of the coupling, a shifting sleeve, and resilient rods directly and independently connecting said links with said sleeve; substantially as described.

12. The herein-described friction-coupling, comprising a cylindrical casing, having two internal bearing-faces lying in the plane of rotation of said coupling, one of said bearing-faces being adjustable toward and away from the other bearing-face, a hub located within said casing and having lateral arms, bearing-pins carried by said arms, friction-rings slidably mounted upon said pins, pairs of toggles interposed between the bearing-faces of the friction-rings, links connected to the joints of the toggles and extending inwardly toward the axis of the coupling in substantially the plane of the radial arms, a shifting sleeve, and resilient parts directly and independently connecting said links with said sleeve, said resilient parts being adapted to maintain said sleeve in the position to which it is moved in actuating the toggles to bring the bearing-faces of the coupling into engagement; substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HANS HAMILTON BENN.

Witnesses:

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F. TREICHLER.