

(No Model.)

W. D. EWART.  
FRICTION CLUTCH.

No. 427,563.

Patented May 13, 1890.

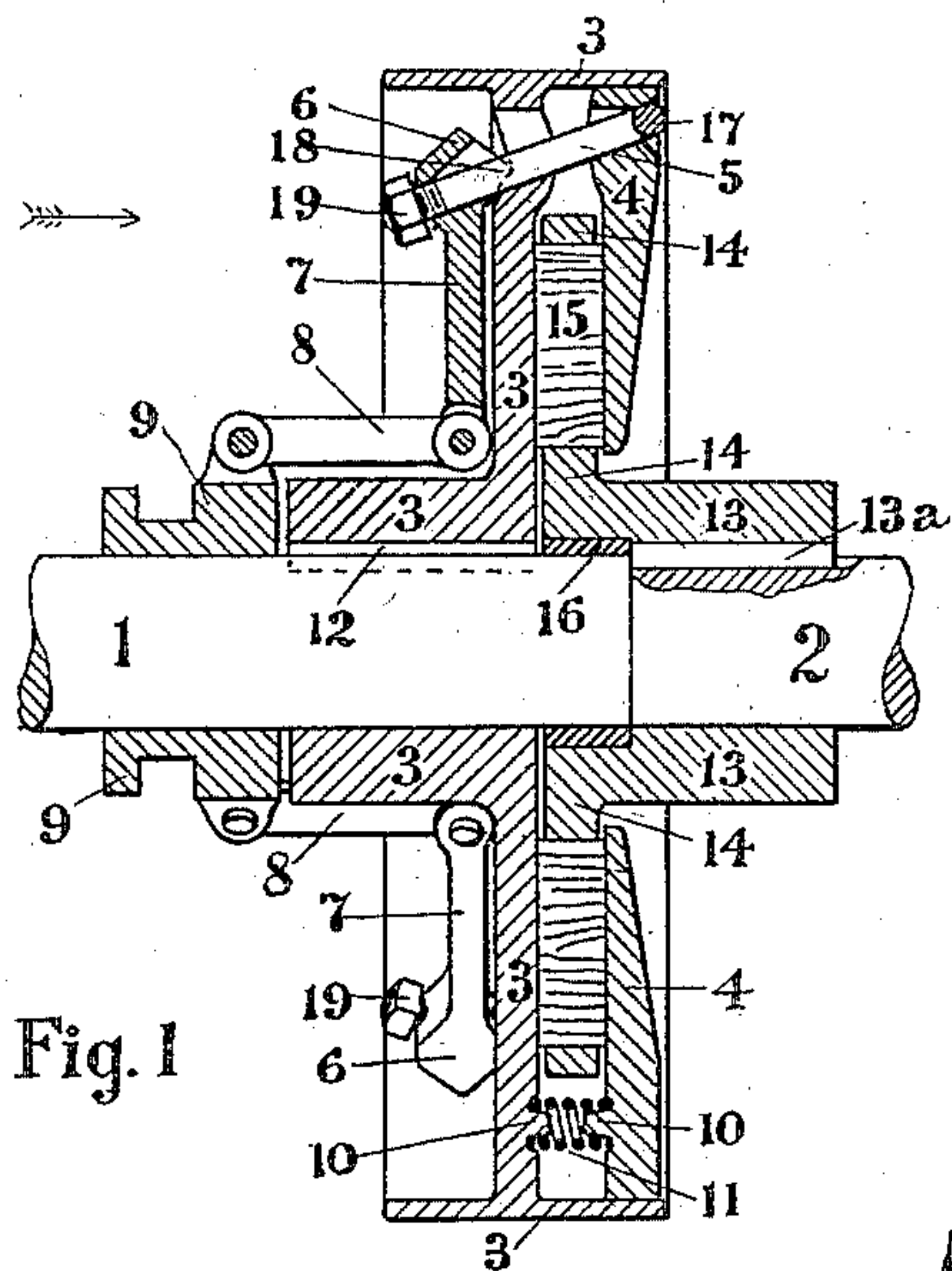


Fig. 1

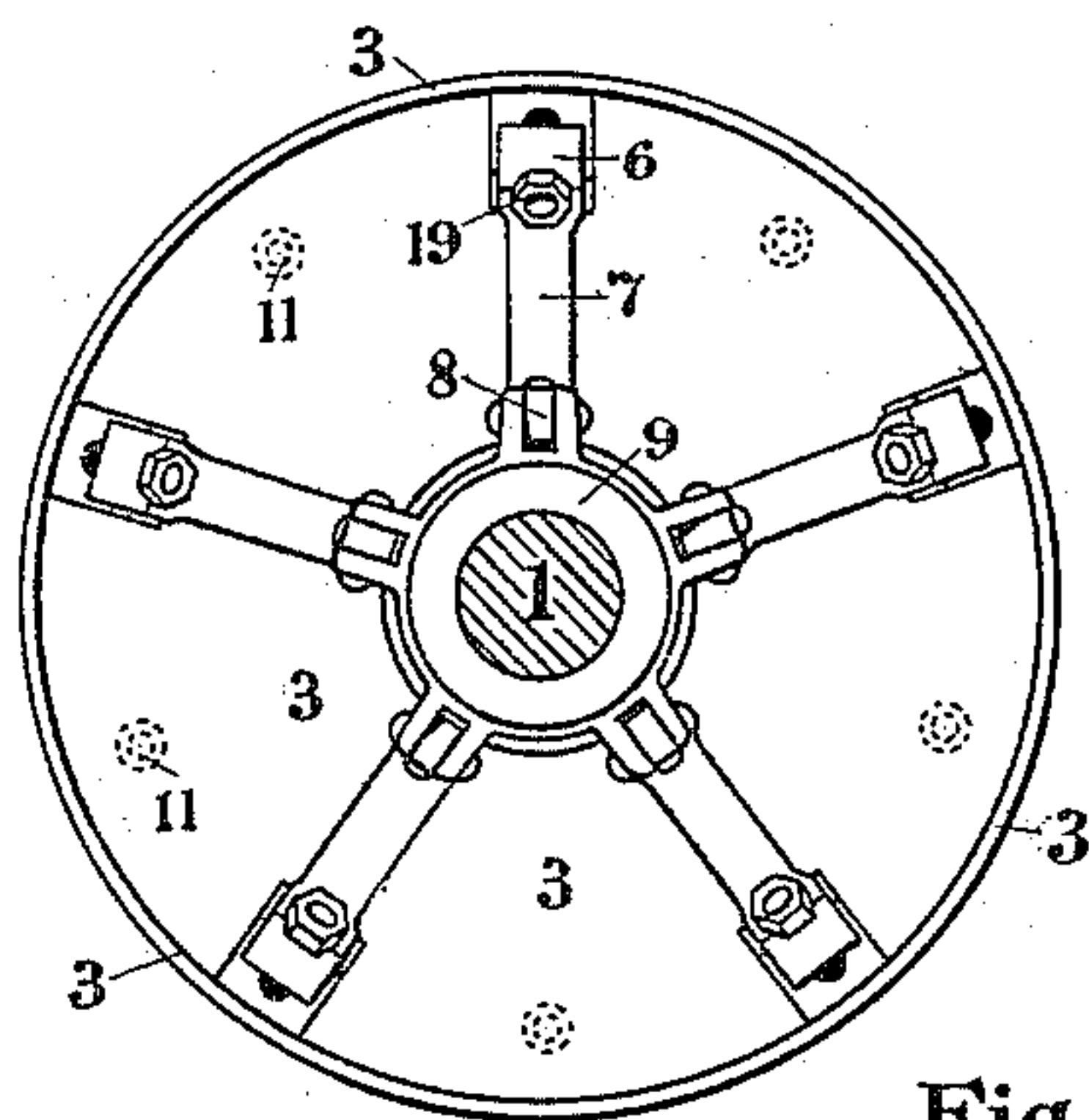


Fig. 3

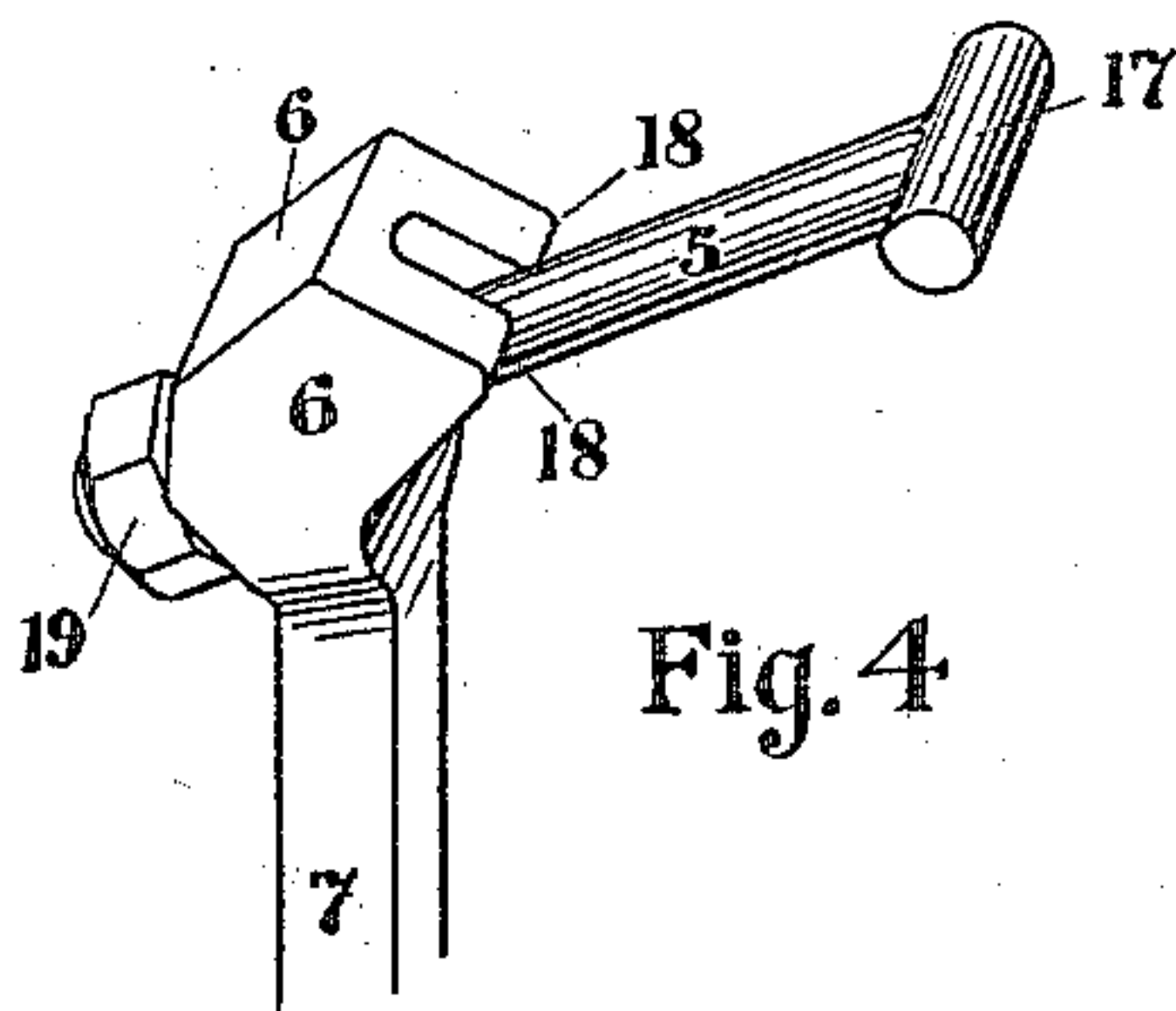


Fig. 4

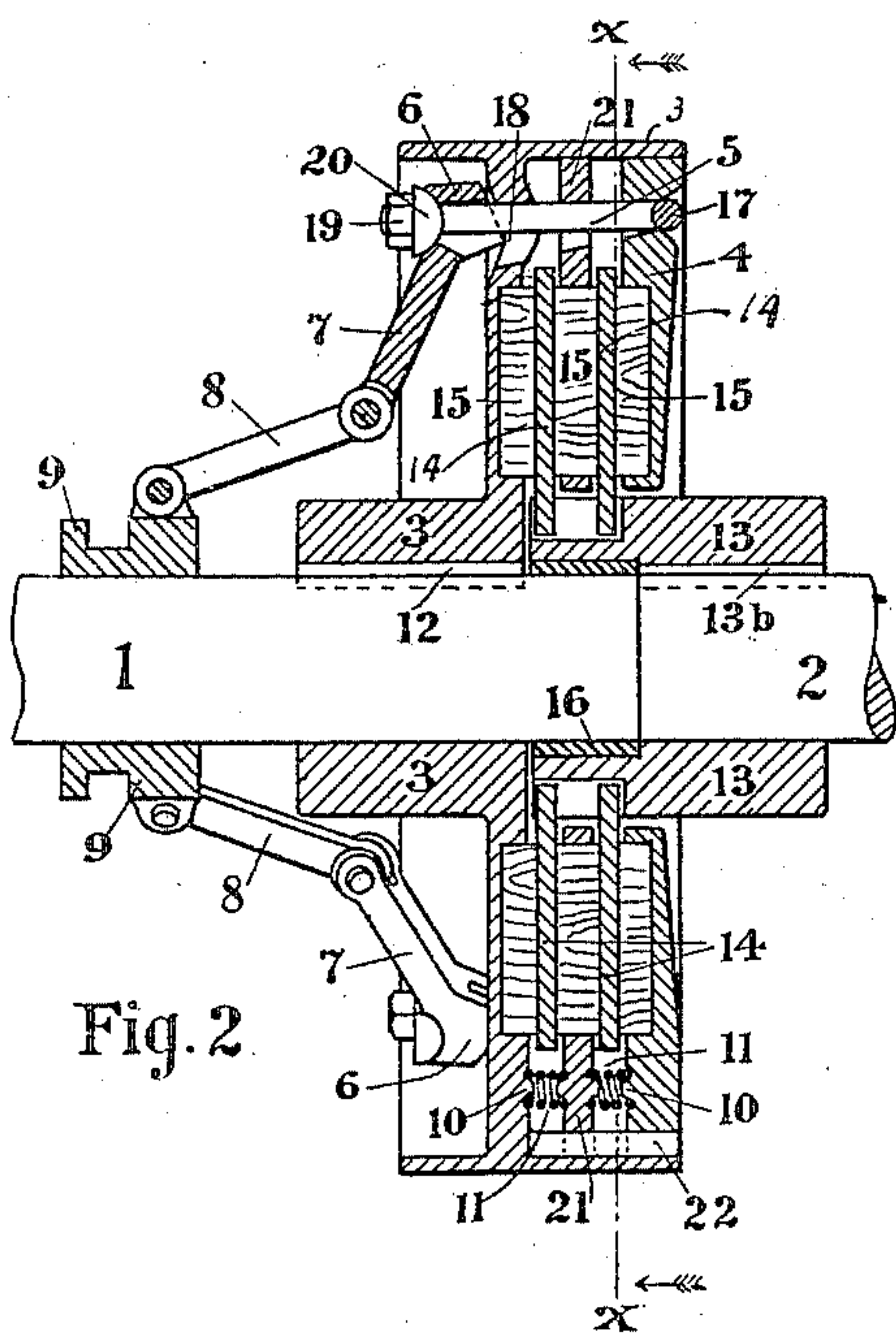


Fig. 2

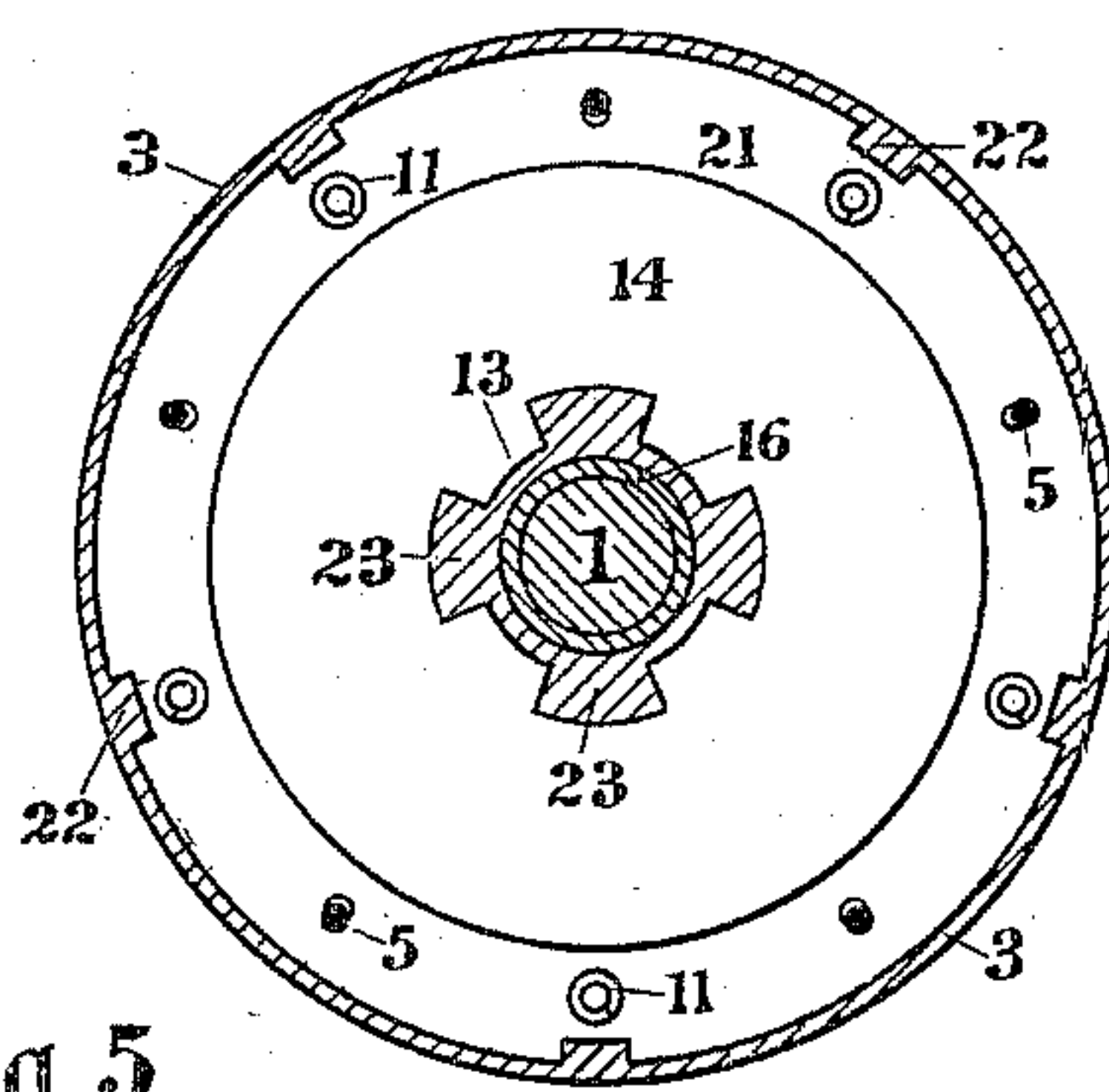


Fig. 5

Witnesses

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# UNITED STATES PATENT OFFICE.

WILLIAM D. EWART, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LINK-BELT MACHINERY COMPANY, OF SAME PLACE.

## FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 427,563, dated May 13, 1890.

Application filed December 16, 1889. Serial No. 333,917. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. EWART, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

In the construction of friction-clutches it is especially desirable that the gripping mechanism be powerful, simple, compact, free from projections, and self-locking; also that the friction-surfaces have ample clearance between them when disengaged, with facilities for renewing the non-metallic surfaces when worn without disturbing the position of the clutch on the shafting. It is further desirable to use non-metallic in contact with metallic friction-surfaces, and as disk friction-clutches furnish the largest area of any self-contained form for the non-metallic friction-fillers my invention relates to that class, and has for its object the construction of a clutch which shall embody all the above-mentioned desirable features.

To this end the invention may be said to consist, essentially, in the novel arrangements of the following instrumentalities: A plate-centered narrow-faced pulley connected with an inclosed pressure-plate by reverse toggles which are operated by arms or levers substantially parallel to the plates and in proximity thereto when in engagement, also springs for separating the plates, and central friction disk or disks connected directly with hub on shaft, all as fully explained hereinafter, and as more specifically defined in the claims.

To enable those skilled in the art to which my invention relates to construct and operate a clutch using my improvements, I will now proceed to more fully describe the same, referring to the accompanying drawings, which form part of this specification, and in which similar parts are designated by similar numbers and letters of reference throughout the several views.

Figure 1 shows a longitudinal section of a five-arm clutch-coupling employing some of my improvements, the clutch being shown in engagement and having one central friction-disk. Fig. 2 is a similar view, but showing

the clutch disengaged and with more friction-disks, arranged as hereinafter explained. Fig. 3 is an end view looking in the direction of the arrow in Fig. 1, and drawn on a smaller scale. Fig. 4 is an enlarged perspective view of the toggle device. Fig. 5 is a transverse section on the line  $xx$  of Fig. 2, looking in the direction of the arrows, and drawn on a smaller scale.

1 and 2 are ends of two shafts connected by the clutch-coupling. The frame of the clutch is substantially a plate-centered narrow-faced pulley 3, which practically incloses the working parts within its rim. Gripping or pressure plate 4 is fitted loosely inside of the rim and connected with the plate center by the reverse toggle mechanism. The long arm of the toggle is the bolt 5 and the short arm is the diamond-shaped piece 6, which in practice is conveniently made integral with the operating arm or lever 7, as shown in the views, although the two may be formed separately and united afterward, if desired. The link 8 connects the operating-arm 7 with the sliding collar or sleeve 9, which is of the usual form and grooved to receive any suitable shifting mechanism. The clamping-plates are provided with studs 10, to support in position the springs 11, which separate the plates when the clutch is disengaged.

The pulley or frame 3 is fastened rigidly to shaft 1 by a key 12 or other well-known device, and all the above-mentioned parts revolve or stop with shaft 1. Connected with shaft 2, and partaking of its motion or rest, is the hub of the other portion of the clutch, marked 13. To this I attach integrally, as in Fig. 1, or loosely, as in Fig. 2, one or more disks 14, which are plain and smooth in Fig. 2, but made with openings for friction-fillers 15 in Fig. 1.

Hub 13 is secured loosely to shaft 2 by a feather 13<sup>a</sup> in Fig. 1, and rigidly by a key 13<sup>b</sup>, in Fig. 2. Shaft 1 is mated into hub 13 to aid in keeping the two shafts in line with each other, and the anti-friction bushing 16 is employed at this point to prevent heating or cutting.

The pivotal connection between the reverse toggles and gripping-plates is formed



by the T-head 17 of the bolt 5 engaging with a recess in plate 4, and the pivotal bearing 18 of the piece 6 engaging with a recess in plate center of pulley 3. The bolt 5 passes through the piece 6, as more fully shown in Fig. 4, and has a nut 19 for adjusting the degree of pressure between the gripping-plates and to take up wear. This nut bears directly on piece 6 in Fig. 1; but for better pivotal connection it may have a half-round or other shaped washer inserted under it, as shown at 20 in Fig. 2.

Where more than one central friction-disk is employed, I use between them, as in Fig. 2, additional plate or plates, as 21, interlocked with the rim of the pulley 3 by keys or lugs 22, thus permitting slight lateral movement for engaging and disengaging. For a similar reason, and in a practically similar manner, disks 14 are fitted to slide on hub 13 in engagement with lugs, as at 23 in Fig. 5.

The mode of operation will be largely understood from the above description of the parts. In Fig. 2, which shows the clutch disengaged, it will be seen that the center lines of the arms 5 and 6 of the reverse toggles make quite a perceptible angle with each other. As the ends of the operating-arms 7 are moved by the shifting mechanism toward the plate center of pulley-frame 3 the angle between the toggle-arms will decrease, the arm 6 pivoting on its bearing 18 and shortening the distance between the gripping-plates in the well-known manner of reverse toggles.

By arranging the shapes and proportions so that toggle-arm 6 will be moved slightly beyond the dead-center by the time operating-arm 7 has reached its limit of movement I make the device self-locking, so that nothing will throw it out of engagement except a movement of the shifting mechanism.

From the well-known principles of the toggle, it is evident that the device is very powerful, and that it is at its greatest advantage at the time of its greatest need—namely, when the friction-surfaces are in engagement; also that its comparatively large range of movement affords ample clearance between surfaces when disengaged.

The friction-surfaces may be of any suitable character, but I prefer to use metallic in engagement with non-metallic surfaces, the latter being preferably the end grain of wood, projecting slightly from the plate or disk in which these wood fillers are inserted. The fillers can be placed in suitable openings either in the disks or in the clamping-plates, provided they are so arranged in each case that in the application of pressure and friction the metallic comes in contact with the non-metallic surface.

It is desirable to use springs between the pressure-plates to separate them when the clutch is thrown out of engagement, and they should be so placed as not to interfere with the free movement of the working parts. I there-

fore locate the springs 10 outside of the periphery of the disk or disks and in the intermediate spaces between the toggle devices, as shown in dotted lines in Fig. 3 and full lines in Fig. 5. These springs may be of any suitable shape and held in position in any suitable manner.

To get at the interior of the clutch to renew the friction-fillers when worn, it is only necessary to take out the bolts 5, permitting the loose plates to be removed.

The above-described arrangement, enabling me to inclose the working parts within a narrow rim and in close proximity to the central plates, is evidently compact and free from projections, (which in other clutches beat the air violently in case of high velocities or endanger life at any time,) and the simplicity of construction reduces to a minimum the number of wearing parts.

It is evident that my improved clutch is applicable to any of the well-known uses of friction-clutches, and can be connected with pulleys, wheels, gears, sheaves, drums, &c., in any suitable manner; also that the plate-centered pulley which forms the frame of my clutch can itself be used as a pulley, wheel, gear, or sheave by fitting its rim for such a purpose, there being nothing in the mechanism or construction of this self-contained clutch to interfere with such an adaptation of it. When the clutch is used for these purposes, instead of as a clutch-coupling connecting two shafts, either pulley 3 or hub 13 can be fitted to revolve loosely on the shaft, while the opposite portion will be secured thereto. It is evident that various methods of connecting hub 13 with disk or disks loosely or rigidly may be adopted without departing from my invention.

I prefer the above-described forms and relative proportions of toggle-arms 5 and 6 and operating-arms 7 and methods of connecting the latter with the former, and of arranging the pivotal connections of the toggle-arms with each other and with the clamping-plates; but it is obvious that other well-known forms, proportions, and methods can be employed without departing from my invention, and I wish it distinctly understood that I do not limit myself to them collectively or singly or to relative arrangements of them, except as specified in the claims.

I am well aware that toggles, reverse and otherwise, are old in the art, and I do not claim them, broadly; but

What I do claim as new, and desire to secure by Letters Patent, is—

1. In a disk friction-clutch, a reverse toggle mechanism for operating the gripping-plates, said mechanism being outside of the periphery of the disk or disks.

2. In a disk friction-clutch provided with a self-locking gripping mechanism outside of the periphery of the disk or disks, operating-arms for engaging and disengaging the same,



and links connecting arms with sliding collar, said arms and links arranged to be substantially parallel with the disk and hub, respectively, and in proximity thereto, all when  
5 the clutch is in engagement, substantially as and for the purpose set forth.

3. In a disk friction-clutch, springs for separating the gripping-plates located outside of

the periphery of the disk or disks and between the operating mechanisms and properly held in place by said plates, as and for the purpose specified.

WILLIAM D. EWART.

Witnesses:

ARTHUR D. DANA,  
WALTER F. ABBS.

Correction in Letters Patent No. 427,563.

It is hereby certified that in Letters Patent No. 427,563, granted May 13, 1890, upon the application of William D. Ewart, of Chicago, Illinois, for an improvement in "Friction-Clutches," an error appears in the printed specification requiring correction as follows, viz: In line 1, page 3, the syllable "fore" should be stricken out; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 12th day of August, A. D. 1890.

[SEAL.]

GEO. CHANDLER,

*First Assistant Secretary of the Interior.*

Countersigned:

ROBERT J. FISHER,

*Acting Commissioner of Patents.*