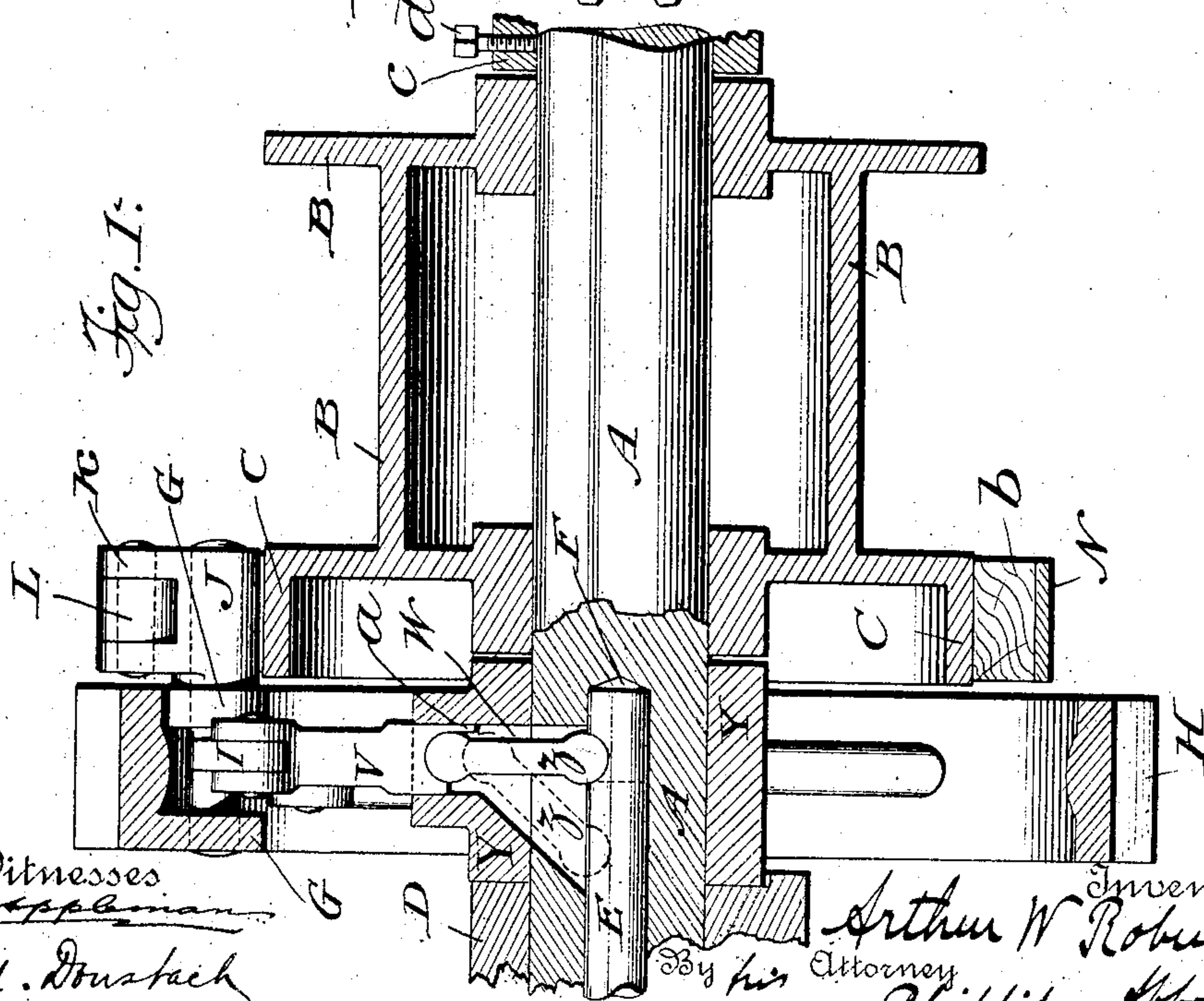
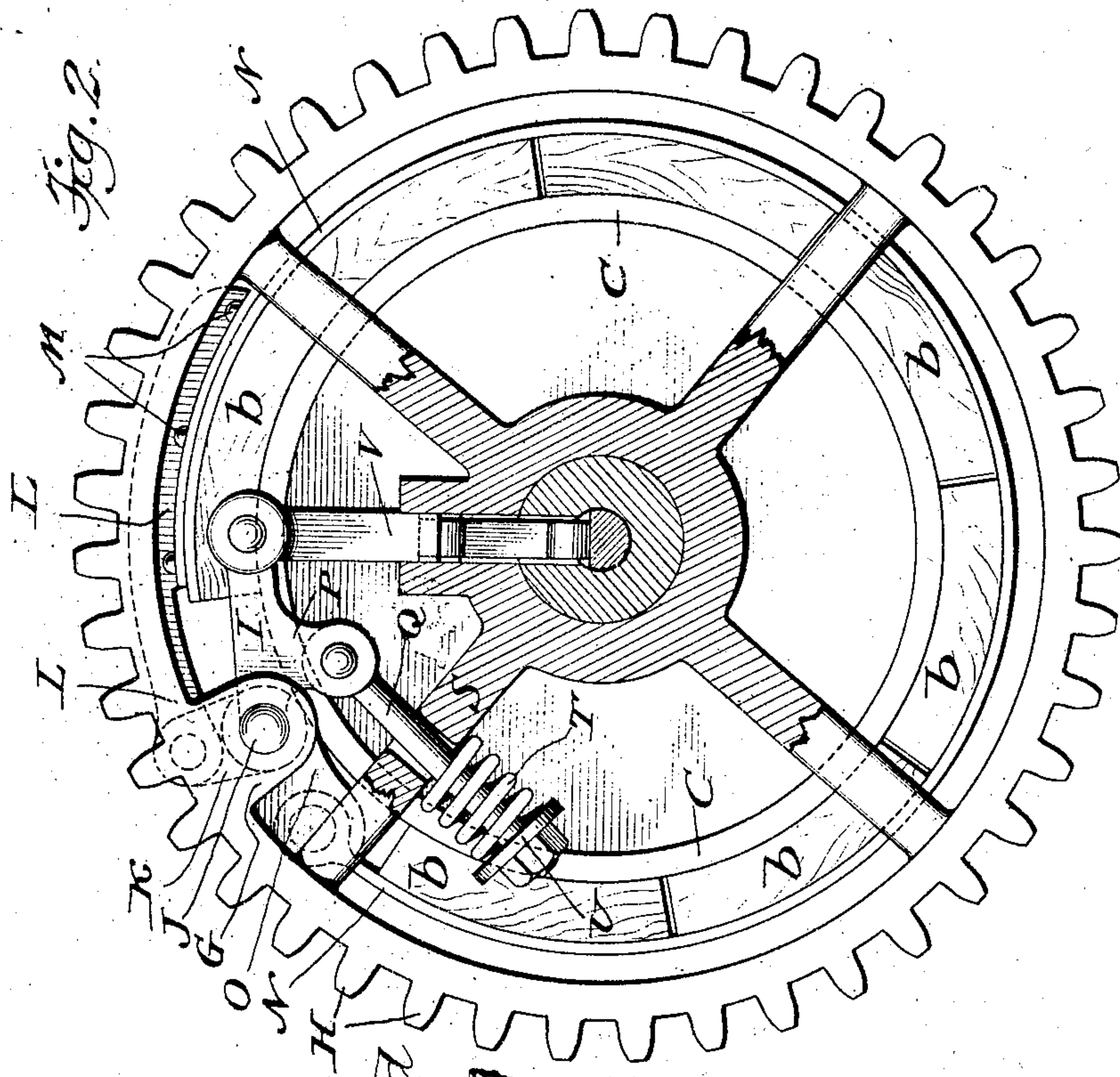


No. 834,936.


PATENTED NOV. 6, 1906.

A. W. ROBINSON.
FRICTION CLUTCH.

APPLICATION FILED APR. 20, 1906.



Witnesses
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UNITED STATES PATENT OFFICE

ARTHUR W. ROBINSON, OF MONTREAL, QUEBEC, CANADA.

FRICTION-CLUTCH.

No. 834,936.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed April 20, 1906. Serial No. 312,794.

To all whom it may concern:

Be it known that I, ARTHUR W. ROBINSON, a citizen of the Dominion of Canada, and a resident of the city of Montreal, county of Hochelaga, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a longitudinal vertical section of one form of the invention as mounted upon a shaft. Part of the shaft is shown in elevation. Fig. 2 illustrates an end view of that which is shown in Fig. 1.

My invention, broadly stated, relates to the means employed to convert motion along the axis of a shaft into rectilinear motion at right angles thereto—in other words, radially to a wheel mounted thereon—for the purpose of operating a friction-belt in such manner that the parts required to produce the end motion along the axis of the shaft shall not occupy any extra space thereon, as is ordinarily the case, and also in such manner that the parts are extremely simple, inexpensive, and durable and embody a toggle connection whereby I obtain a great increment of power at the latter part of the clutch action or frictional hold, the advantage of which is well known.

The general purpose of the present invention is similar to that embodied in my Patent No. 465,536, dated December 22, 1891; but the construction, arrangement, and method of operation of the parts is essentially different, and from these differences flow a series of quite important advantages, which in certain classes of mechanism are very valuable.

Referring to the drawings, the construction and method of operation of this present invention, as illustrated in the form shown, are as follows:

A represents the shaft upon which the entire apparatus is mounted.

B is a drum running loosely on the shaft.

C is the surface of the drum upon which the friction of the clutch is applied.

D represents one of the bearings for the shaft.

E is a sliding bar which actuates the toggle of the clutch. It is arranged to slide longitudinally through a hole made in the

axis of the shaft. F represents the extreme forward end of this hole.

G G are two lugs projecting inwardly from the rim of a spur-gear H.

I is an arm or lever rigidly connected with a cross-shaft J, which has its bearings in the lugs G G, and on the projecting end of this shaft there is a bell-crank lever K, the edge of which is pivotally connected to a metallic strap or casting L, which is riveted or bolted, as by bolts M M, to the metallic strap N of the friction-clutch. This strap extends entirely around the spur-gear and is attached at its other end to a centrally-located lug O, cast on the rim of the spur-gear, as shown. On the lever I there is a downwardly-extending lug P, to which a spring-bar Q is pivoted, which passes through an opening made in one of the spokes S of the spur-gear and is provided with a spring T, which abuts at one end against a washer U, confined by a nut, as shown, and at its other end abuts against the spoke S, as shown.

V is a radius-bar, the outer edge of which is pivoted to the lever I, as shown, and the inner end slides in a slideway W, cut in the hub Y of the spur-gear.

Z is the toggle-arm, the ends of which are rounded, constituting semicircular heads or bearing-surfaces, which work, respectively, in a correspondingly-shaped recess made in the sliding bar E and in the radius-bar V. It will be noted that the latter is supplied with a downwardly-extending projection or lip *a*, so located as to more effectively support the radius-bar and take the end thrust of the toggle-arm Z during the first part of its operation.

The friction-belt N may be made in any preferred form and supplied with any preferred friction-surfaces. I show wooden blocks *b* as the immediate wearing-surfaces between the belt and the friction-surface C of the drum.

c represents a collar provided with a set-screw *d*, whereby it may be fastened on the shaft A, so as to prevent end movement on the part of the drum. This may, if preferred, be one of the bearings for the shaft A.

The operation is obvious. Assume that the shaft and spur-gear, which is keyed to it, are in motion, the drum being at rest. When it is desired to communicate the rotary move-

ment of the shaft A to the drum B, the bar E is by any suitable manual or mechanical apparatus or device given endwise or longitudinal movement through the hole in the shaft A, in which it slides, and as it gradually moves inwardly the toggle-arm Z will, as is well understood, assume more and more a vertical position, in so doing presenting upwardly the radius-bar V, which in turn forces radially the free end of the lever I, rocking the shaft J upon its bearings in the lugs G G. Thus through the instrumentality of the bell-crank lever K closing strain is applied upon the part L and through it to the friction-belt N, whereupon the friction-surfaces *b b* of the belt are drawn forcibly down upon the friction-surface C of the drum, thus by frictional contact compelling it to rotate coincidently with the shaft A, and it will be noted that the toggle-arm Z assumes more and more a vertical position, thus exerting greater and greater force as the resistance of the clutch increases, thus effecting a smooth, powerful, and sure clutching operation. When it is desired to release the drum, the bar E is withdrawn, sliding backwardly through the slideway made for it in the axis of the shaft A, whereupon the spring T through the spring-bar Q retracts the parts above described, returning them to primary position and maintaining always close contact between the heads or bearing-surfaces of the toggle-arms Z and the seats in which they, respectively, work, one in the sliding bar E, the other in the radius-bar V.

It will be noted that the inner end of the radius-bar and the toggle-arm and sliding bar are all inclosed within the shaft and within the recesses formed in the hub of the spur-gear and in the shaft, so that they cannot become misplaced and are free from injury and distortion and also that the thrust of the toggle-arm upon the sliding bar is received upon its extended under surface, which bears circumferentially against the interior bore of the shaft, and that this pressure may be distributed throughout as extended a bearing-surface as desired and that it is not interrupted or reduced by any openings through the sliding bar E or in the shaft A. Consequently not only is the bearing-surface continuous, but it is an easy matter to lubricate the same, and the lubrication remains for a long time.

The simplicity and effectiveness of the invention is obvious. Its embodiment as illustrated in the drawings is given as one example only and as a desirable form in which it may be employed and is a form employed by me in the construction of hoisting apparatus. It is well adapted to dipper-dredges and, in fact, to a large number of machines where a clutch of this class is available.

The details of construction are of course immaterial. Obviously a second friction

apparatus may be applied on the opposite side of the spur-gear, if desired, and it is not essential that the apparatus be supported upon a spur-gear. Any suitable equivalent—as, for instance, a mere plate fast on the shaft A—will serve the same purpose, the power which effects the rotation of the shaft being of course suitably applied. Also in place of the drum illustrated in the drawings as the part which is to be actuated or controlled by the clutch any other part or element in a mechanical combination may obviously be substituted. Also I have shown the shaft A as supported upon journals and adapted to rotation. Obviously the construction may be such that the shaft will be stationary and act merely as a support for the parts that coact with it, the power being otherwise applied.

I claim—

1. The combination of a shaft for the support of the device to be actuated or controlled, said device itself, a bar adapted to longitudinal movement in the axis of the shaft, a suitably-supported lever, a clutch device connected with said lever, a toggle-arm for actuating the lever the inner end whereof is supported upon the movable bar and means to move the bar.

2. The combination of a shaft for the support of the device to be actuated or controlled, said device itself, a bar inclosed within the shaft and adapted to longitudinal movement relative thereto, a suitably-supported lever, a clutch device connected with said lever, a toggle-arm arranged to operate within the plane of the support for the lever, one end whereof passing through the shaft rests upon and is supported solely by the movable bar, the other end whereof actuates said lever, and means to move the bar.

3. The combination of a suitably-supported rotary shaft, upon which the device to be actuated or controlled is loosely supported, said device itself, a bar adapted to longitudinal movement relative to the shaft, a gear keyed to the shaft, or bell-crank lever pivoted thereto, a friction-clutch, one end whereof is fast to the gear, the other end being connected to the lever, a toggle-arm, one end whereof is supported upon the longitudinally-moving bar, the other end actuating said lever, and means to longitudinally move said bar.

4. The combination of a shaft for the support of the device to be actuated or controlled, said device itself a bar adapted to longitudinal movement relative to the shaft, a suitably-supported lever, a clutch device connected with said lever, a toggle-arm, one end whereof rests upon and is supported by the movable bar, means to move the bar and a spring to return the parts to primary position upon the release of the clutch.

5. The combination of a suitably-sup-

ported rotary shaft upon which the device to be actuated or controlled is loosely supported, said device itself, a bar inclosed within the shaft and adapted to longitudinal movement relative to it, a gear keyed to the shaft, a bell-crank lever pivoted thereto, a friction-clutch, one end whereof is connected with said gear, the other end being connected to said lever, a toggle-arm, one end whereof rests upon and is supported by the longitudinally-moving bar, the other end whereof through suitable devices actuates said lever, said last-named devices and means to move said bar.

6. The combination of a shaft for the support of the device to be actuated or controlled, said device itself, a bar adapted to movement relative to the shaft, means to move said bar, a suitably-supported lever, a suitably-supported radius-bar connected with one end of said lever, a clutch device also connected with the lever, and a toggle-

arm, one end whereof rests upon and is supported by the movable bar, the other end engaging with said radius-bar.

7. The combination of a shaft for the support of the device to be actuated or controlled, said device itself, a bar adapted to movement relative to the shaft, means to move said bar, a suitably-supported lever, a suitably-supported radius-bar connected with one end of said lever, a clutch device also connected with said lever, a toggle-arm, one end whereof engages with the movable bar, the other end engaging with said radius-bar, and a spring to return the parts to primary position upon the release of the clutch.

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

ARTHUR W. ROBINSON.

Witnesses:

A. W. STEVENSON,
A. N. McMILLAN.