T. COOPER.

FRICTION CLUTCH.

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1,306,302.

Patented June 10, 1919.

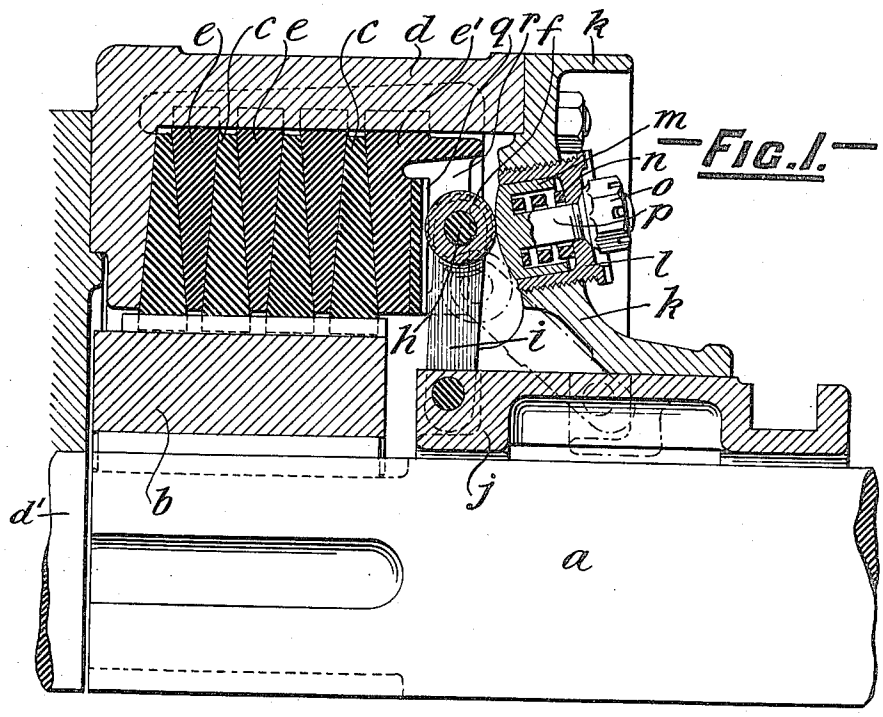
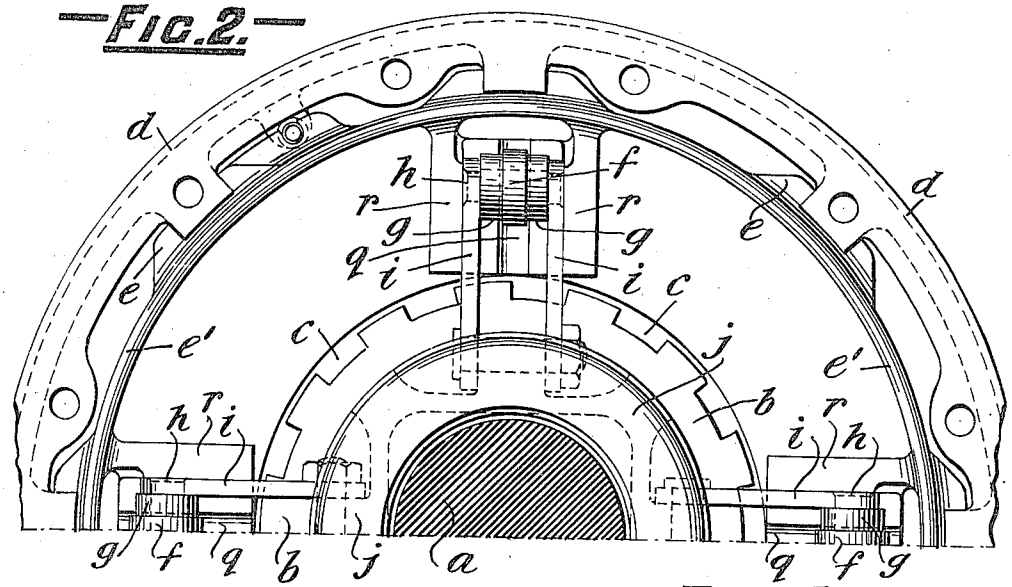


FIG. 1.

FIG. 2.



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UNITED STATES PATENT OFFICE.

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FRICTION-CLUTCH.

1,306,302. Specification of Letters Patent. Patented June 10, 1919.

Application filed October 31, 1917. Serial No. 199,475.

To all whom it may concern:

Be it known that I, THOMAS COOPER, a subject of the King of Great Britain, and resident of The South House, Kings Lynn, Norfolk, England, have invented new and useful Improvements in Friction-Clutches, of which the following is a specification.

Friction clutches to which the present improvements are applicable are of the type which comprises plates arranged side by side and attached respectively to the driving and driven members which are locked together by pressure applied to the sides of the said plates. There may be any convenient number of the said plates.

My invention resides in the device which I employ for imparting the pressure necessary for forcing the plates into frictional and binding contact.

The device comprises rollers arranged as hereafter explained coöperating with inclined surfaces carried by a fixed abutment.

The rollers may conveniently be arranged in sets of three, each set being mounted to turn freely on an axle carried by a pair of arms forming a kind of stirrup. One of these rollers, say the middle one, will be adapted to take against its inclined abutment, while the others will bear against the pressure plate of the friction clutch.

This may be arranged by having the middle roller of larger diameter than the others which are the same in diameter and by having a groove or recess in the pressure plate wide and deep enough to provide a clearance for the said larger roller. The smaller rollers when in contact with the pressure plate will not reach the abutment, so that the pressure is imparted by means of the axle.

The inclined surfaces, the number of which will correspond with the number of sets of rollers, are also curved and preferably take the form of hollow backed rams inserted in cylindrical boxes through the bottom of which extend the ends of the shanks of the rams. This permits of the employment of compression springs within the boxes held to the required degree of compression by nuts screwed on to the ends of the shanks which protrude through the bottom of the boxes.

The boxes above mentioned are inserted in the fixed abutment and being screw-threaded can be adjusted to advance or retract the inclined surfaces as may be required. The compression of the springs within the boxes being once set to the required pressure no further adjustment of the said springs is necessary or desirable. The springs supply the pressure needed for the clutch and have sufficient yield to permit the rollers to ride over the highest point or peak of the curved incline and thus a locked point is provided for the rollers.

The stirrups carrying the rollers are arranged in any suitable number about the driving or driven shaft and are furnished with means for extending them in a radial direction from positions nearly parallel to the said shaft, to positions at right angles thereto or to positions beyond, where they will remain unsupported. During this movement the rollers operate as wedges between the surfaces of the abutment and the pressure plate of the clutch.

The arrangement has considerable advantages, in that it requires a comparatively small force to put very great frictional pressure into the clutch and further a locking position is provided for holding the plates without catches; and to effect dis-engagement a positive movement of the stirrups in the reverse direction is necessary.

The clutch is capable of variation in detail without departing from the principle of the invention which involves the employment of a combined roller and wedge action, the rollers being arranged in sets, the members of which are divided into those which move into contact with the pressure plate and those which move into contact with the abutment and are so connected that the pressure can be imparted without the rollers losing their capacity for individual rotation, which would be impaired by contact at the same time with the two opposing pressure surfaces.

I have illustrated my invention in the accompanying drawing in which Figure 1 is a cross section of part of the clutch and Fig. 2 an end view with the fixed abutment removed.

a is a shaft which may be regarded as the driving member. *b* is a boss keyed thereto in any convenient manner. *c* are friction disks secured to the boss *b* but free to slide endwise thereon, the construction being such that the rotation of the shaft *a* will carry around with it the boss *b* and the disk *c*. *d* is a casing attached to the driven shaft or equivalent *d'* and inclosing the disks *c*

and also disks *e* which are placed alternately with the disks *c* and are carried by keys or their equivalent inside the said casing.

This structure constitutes a not unusual form of friction clutch means for pressing together the two sets of disks being added.

The means which I employ for imparting the pressure and which constitutes the subject of the present invention are as follows:—

Rollers of two different diameters (in the accompanying illustration, a larger roller *f* being between two smaller rollers *g g* of equal diameter) are mounted loosely on the same axle *h* in a stirrup *i*. This stirrup *i* is pivoted to a collar *j* loose on the shaft *a* and capable of sliding lengthwise thereof.

k is an abutment having a fixed position in relation to the casing *d*. In the abutment *k* is screwed a box *l* within which works a ram *m* pressed outward by spring *n* and retained by a nut *o* screwed into the threaded end of the shank *p* of the ram *m* which protrudes through the back of the box *l*. The front of the ram is rounded.

In the end plate or disk *e'* which belongs to the set of disks *e* carried by the casing *d* is a recess *q* opposite the roller *f* which recess is of sufficient depth and width to clear the said roller which is of larger diameter than the rollers *g g* on either side thereof. These rollers are able to touch the disk *e'* and lie snugly between the cheeks *r r* carried by the latter.

To lock the clutch the collar *j* is moved in one direction viz: to the left of Fig. 1 and the stirrup *i* is thereby moved from the dotted position to the position shown in the full lines.

The roller *f* is thus forced against the inclined face of the ram *m* of the abutment *k* and the rollers *g g* take a bearing against the plate *e'* on either side of the recess *q*. In this way pressure is brought to bear against the disks *c* and *e* which are forced together with the pressure derived from the compression of the adjustable spring *n* behind the ram. When pushed beyond the peak of the ram the rollers retain their position and the clutch remains locked without holding.

The movement of the collar *j* in the opposite direction takes the pressure off the plates and releases the clutch.

With this arrangement the clutch is very easy to manipulate and its operation is extremely efficient.

The drawing above described illustrates only one operating device for the clutch but in practice any suitable number will be employed all similarly arranged at intervals and operated simultaneously by the collar *j* which is manipulated by a forked lever or equivalent device.

What I claim and desire to secure by Letters Patent of the United States is:—

In a friction clutch having a set of rollers on the same axis, a bearing for imparting pressure, said bearing comprising an abutment, an abutment box adjustably secured thereto, a compression spring within the box, a ram having an inclined surface slidably mounted within the box for transmitting the pressure of the compression spring, and means for retaining the ram within the box and for regulating the pressure of the said spring.

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

THOMAS COOPER.

Witnesses:
ALFRED S. BISHOP,
MAX. C. HOFMANN.