R. M. ROOF.

FRICTION CLUTCH.

APPLICATION FILED JUNE 8, 1910.

1,015,250.

Patented Jan. 16, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

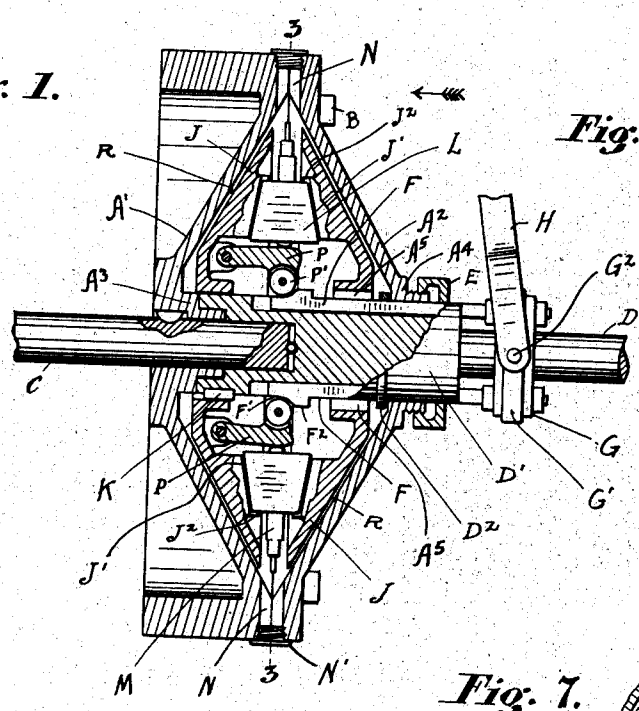


Fig. 5.

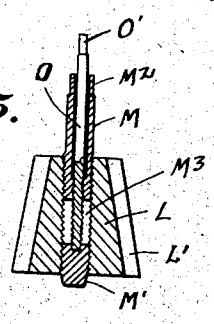


Fig. 7.

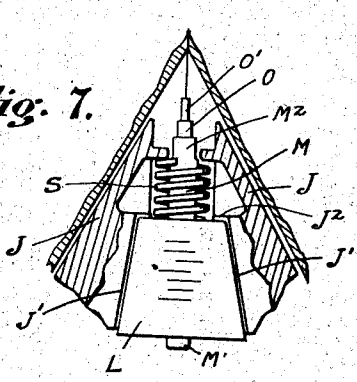
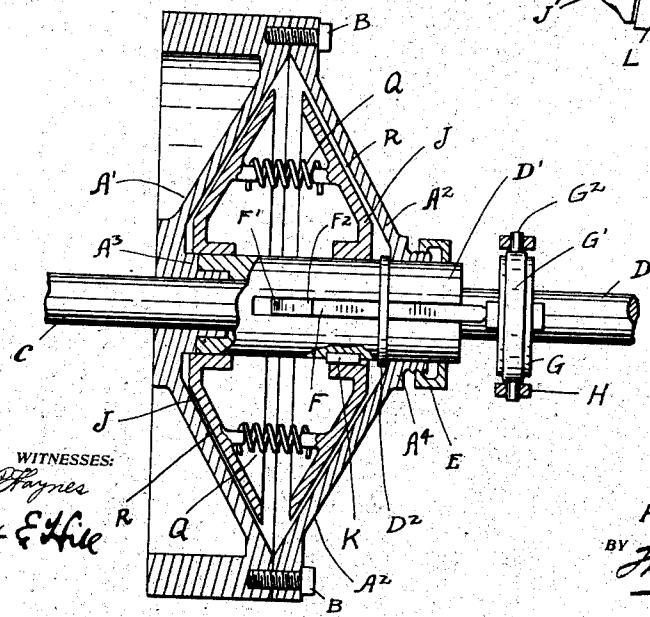


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

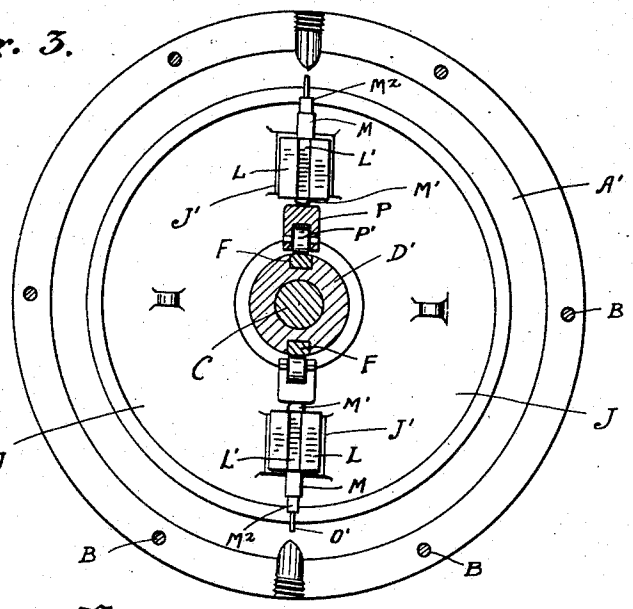


Fig. 6.

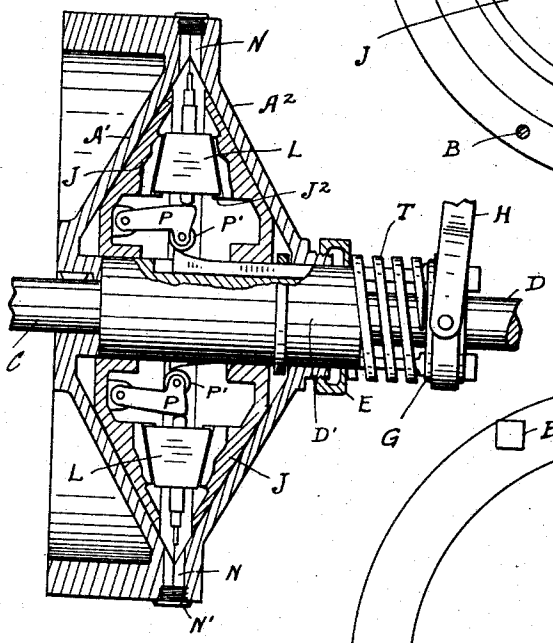
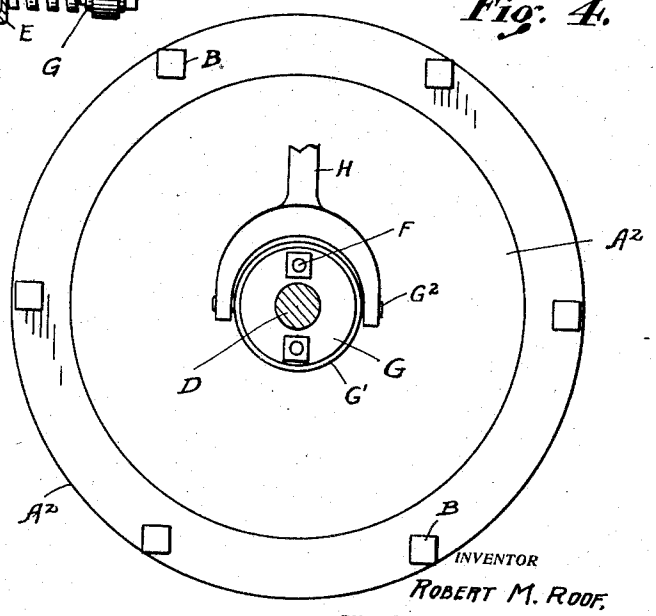


Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT M. ROOF, OF MUNCIE, INDIANA.

FRICTION-CLUTCH.

1,015,250. Specification of Letters Patent. Patented Jan. 16, 1912.

Application filed June 8, 1910. Serial No. 565,676.

To all whom it may concern:

Be it known that I, ROBERT M. ROOF, citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

This invention relates to friction clutches and has especial reference to clutches of this type wherein opposed grip members are arranged within a driving member, and which grip members are adapted to be separated to cause the motion of the driving member to be transmitted to the driven member.

Objects of my invention are to provide a clutch device of this character which will be dependable and effective in operation, durable and not liable to get out of repair or adjustment.

Further objects of my invention are to effect such improvements in construction, that while retaining the above desirable features the device will be compact, easy to install, and economical of manufacture.

To accomplish the foregoing purposes, this invention consists essentially of a pair of opposed circular members secured together at their peripheral portions, the hub of one of the said members being adapted to be secured to the driving shaft, opposed shoes between said circular members and arranged to be carried rotatively but free to move longitudinally on the driven shaft, connections between the said shoes, and means operable from outside the device to maintain the shoes in or out of engagement with the circular members.

My invention further consists in the new and improved construction, combination, and arrangement of parts described in this specification, illustrated in the accompanying drawings, and defined in the appended claims.

Similar characters of reference are applied to the several parts of my improved clutch as they appear in the different views in the drawings.

Figure 1 and Fig. 2 are longitudinal central sectional views of my improved clutch, some of the parts being shown in elevation and partly broken away. Fig. 3 is a transverse sectional view taken on the line 3—3 and viewed in the direction indicated by the arrow in Fig. 1. Fig. 4 is an end view taken in the direction indicated by the arrow in Fig. 1. Fig. 5 is an enlarged detail view of one of the separator wedges removed. Fig. 6 is a modification. Fig. 7 is a detached detail view of the grip members having a spring arranged in combination with the separator wedges.

In the form of embodiment given my invention in this specification thereof the member which has connection with the driving shaft is shown as a fly wheel. It will be obvious that the invention is especially applicable to such adaptation, thus making it of especial utility where used as a clutch for automobile mechanisms, or mechanisms for other purposes where a short coupled direct connected and self contained clutch is desired. The driving member, which I will designate herein as a housing, is composed of two half sections, designated as housing sides A^1 and A^2. These half-sections are cone shaped and their flanges are secured together by suitable bolts B. In the bore of the inturned hub A^3 of the half section A^1 is secured the driving shaft C. The said hub is shouldered as shown in Fig. 1. The driven shaft D has the head portion D^1 of enlarged diameter, and in the bore and counter bore of same are journaled the end of the driving shaft and the shoulder portion of the hub A^3 respectively. The hub A^4 of the half section A^2 has its bore of diameter suitable to snugly fit but to permit free movement of the driven shaft D. The function of the stuffing box E that is carried on this hub is to provide a closed connection between the housing and the shaft thereby preventing the entry of dirt and foreign particles from the outside and also preventing the leaking away of the lubricant that is retained upon the inside of the housing. Push bars F and F are seated slidingly in the said head portion D^1 and each has the tapered end F^1 terminating at its rear end in the flat face F^2, the outer ends of said push bars being secured to a collar G. This collar which may be mounted slidingly on the driven shaft D as shown, has suitable studs G^1 to afford proper connection for the fork ends of a suitable shifting lever H. The function of the annular shoulder D^2 formed integral with the head portion D^1 of the driven shaft is to afford a check against which the housing side A^2 will bear when pushed into position when assembling the device. It also acts as a brace to hold the

driven shaft against longitudinal displacement when the clutch is operated as will be hereinafter described.

The friction members composed of opposed cones J having hubs of the substantial size as shown are mounted on the head portion D^1 of the driven shaft so as to be movable slidingly but are held against rotative movement thereon, by the feathers K. The faces of these cones are machined so as to register throughout their extent with the machined internal faces of the half sections A^1 and A^2. On the inner faces of the cones are raised seats J^1 which have the tongues J^2. These seats extend in a direction radial to the axial center of the device, and at such angle that there are formed wedge shaped spaces between the opposed seats. The said wedge shaped spaces are filled by keystone shaped separator blocks or wedges L having grooves L^1 which will be engaged by the said tongues J^2. Carried by each of the separator wedges is an adjustment stud M. This stud is threaded and has a rounded head M^1, and may be screwed through the threaded hole of the separator wedge to the desired adjusted position. It is intended that the position of this adjustment stud may be adjusted without taking the housing apart. To accomplish this result semicircular recesses in the flanges of the sides of the housing, and which will register with each other, constitute the openings N. The angular head M^2 of the adjustment stud may be engaged by a socket wrench passed through the opening N. To render the adjustment stud capable of being locked at the adjusted position, the said stud has a central bore tapered to smaller diameter at its bottom. Near the end of the said central bore is a longitudinal slit M^3 in the adjustment stud. In said central bore is the set screw O having the angular head O^1. When the adjustment stud has been placed at desired position the set screw is screwed down which bulges the body of the stud sufficiently to make it hold rigidly in position. The openings N are closed by suitable caps N^1.

A non-friction bearing between the tapered ends F^1 of the push bars, and the heads M^1 of the adjustment studs is effected by providing dogs P and P having the rollers P^1 therein, to bear against the faces of the push bars. These dogs are carried by one of the cones J, as shown in Fig. 1. The cones when in proper adjusted positions will be slightly apart from the housing sides and the heads of the adjustment studs will be in engagement with the dogs P. By the strong coil springs Q having their ends connected to the lugs on the inner sides of the cones the latter are urged toward each other, same being kept the proper distance apart by the separator wedges.

My improved clutch may be in the form of a combination clutch and shaft coupling as shown wherein the head end of the driven shaft D has a bore of depth sufficient to afford a substantial bearing for the end of the driving shaft, or it may be furnished without the bore for the driving shaft. In the latter case the driving shaft would have its connection solely in the hub of the housing side A^1.

In assembling the device, the housing side A^1 is first secured to the driving shaft, the push bars F are slipped into position in the channels therefor, their outer ends being passed underneath the annular shoulder D^2. The cones J are then slipped onto the head portion D^1 of the driven shaft, the grooves A^5 permitting one of the cones to pass beyond the head ends of the push bars F. The separator wedges being between the seats J^1, the springs Q are then hooked in into position. With the placement then of the end of the driving shaft in the bore of the head end D^1, the flanges of the housing sides will meet and will be secured together by the bolts B. By adjustment of the position of the separator wedges the width of the clearance R may be varied to accord to the throw desired by the shifting lever H. The outer ends of the push bars are then secured to the collar G and the mechanism is complete. A proper amount of lubricant is introduced, and by the caps N^1 the openings N are closed. The operative parts will be protected, and by the stuffing box E and the shouldered construction shown at the junction of the driving shaft and the head end D^1 leakage of the lubricant will be prevented.

Advantages gained by my invention are that besides being rugged and compact and having the parts inclosed, there is a minimum amount of machine work involved in the manufacture of the device. Large frictional areas are possible while the general bulk and size of the mechanism is comparatively small. It will be capable of easy adjustment and will be positive in action.

When the shifting lever H is moved the dogs moving on the tapered faces F^1 of the push bars will move the wedges and expand the cones into braking or clutching engagement with the housing sides. The rollers P^1 being now on the faces F^2 all of the operative parts will remain immovable until by a reverse movement of the shifting lever the dogs are lowered to the position as shown in Fig. 1. By the force of the springs Q in drawing the cones toward each other the natural tendency of the wedges by centrifugal force to move outwardly will be overcome and the wedges will move inwardly, and the cones will be immediately disengaged from the housing. It is contemplated that in the larger sizes of clutches

auxiliary springs S as shown in Fig. 7 may be used to overcome the tendency of centrifugal force to move the wedges. It will be understood that a sufficient amount of lubricating oil will be carried within the housing so that there will be always sufficient lubricant between the parts that they will work positively and freely.

Where it is desired that the clutch shall operate normally in the locked position rather than in the position as shown, then the modified form as shown in Fig. 6 is used. In this modification the direction of the taper of the push bars is reversed. A strong spring T is placed to operate between the housing and the collar G which will hold the cones normally in closed or locked engagement with the housing sides. The operation of this modified form of clutch will be such that with a slight movement of the shifting lever the clutch will be operated.

It will be understood that the mechanism may be arranged with any suitable number of wedges, and the springs Q and that minor changes in the general formation and detailing of the several parts may be made without departing from the nature or spirit of my invention or sacrificing any of its advantages.

What I claim as my invention and desire to secure by Letters Patent, is—

1. A clutch, comprising a circular housing composed of recessed half sections secured together at their peripheral portions, a hub for one of said half sections adapted to be secured to the driving shaft, a driven shaft, friction-shoes between the said half-sections and mounted slidingly and non-rotatively on the driven shaft, wedges between the friction shoes, means to pull the friction shoes yieldingly toward each other and to move the wedges, means carried by the driven shaft to move the said wedges to force the friction shoes apart from each other and to locked engagement with the housing.

2. A clutch, comprising a circular housing composed of cone shaped half sections secured together at their peripheral portions, a hub for one of said half sections adapted to be secured to the driving shaft, a driven shaft, friction shoes between the said half sections and mounted slidingly and non-rotatively on the driven shaft, springs to pull the friction shoes toward each other, means to overcome the tension of the springs and force the friction shoes apart and into frictional contact with the half sections.

3. A clutch comprising a housing composed of cone shaped half sections secured together at their peripheral portions, a hub for one of said half sections adapted to be secured to the driving shaft, a driven shaft, friction shoes between the said half sections and mounted slidingly and non-rotatively on the driven shaft, wedges between the friction shoes, means to pull the friction shoes yieldingly toward each other and to move the wedges, means carried by the driven shaft to move said wedges to force the friction shoes apart from each other and into locked engagement with the housing, and means to adjust the distance between the wedges and the wedge moving means.

4. A clutch comprising a housing composed of cone-shaped half sections secured together at their peripheral portions, a hub for one of the said half sections adapted to be secured to the driving shaft, a driven shaft having a bore in which the end of the driving shaft will have bearing, friction shoes between the said half sections and mounted slidingly and non-rotatively on the driven shaft, means to urge the friction shoes yieldingly toward each other, wedges between the shoes, push bars carried by the driven shaft and movable slidingly thereon and having their ends tapered, connections between the wedges and the tapered ends of the push bars, means to vary the distance between the said connections and the tapered ends of the said push bars.

5. A friction clutch, comprising a circular housing composed of cone-shaped half sections secured together, a hub for one of said half sections, a driving shaft secured in the said hub, a driven shaft to extend through the opposite half-section and having a bore in which the end of the driving shaft will have bearing, opposed cone-shaped shoes mounted on the driven shaft slidingly and non-rotatively, wedges between the said shoes, springs to connect the said shoes, tapered push bars carried by the driven shaft and which extend outside of said housing, rollers between the ends of the wedges and the tapered push bars, a collar mounted loosely on the driven shaft and to which collar the outer ends of the push bars are secured and which collar is adapted to receive connections for a shifting lever.

6. A friction clutch, comprising a circular housing composed of cone-shaped half sections recessed at their edges to provide radial openings in the peripheral portion of said housing, means to secure the half sections together, a driven shaft to extend into the housing, opposed cone shaped shoes mounted slidingly and non-rotatively on the driven shaft, wedges between the said shoes, adjustment studs carried by said wedges, tapered push rods movable longitudinally of the driven shaft, dogs caried by one of the shoes and adapted to operate between the tapered push bars and the adjustment studs.

7. A friction clutch, comprising a circular housing composed of cone shaped half sections secured together, a hub for one of the

said half sections, a driving shaft secured to the said hub, a driven shaft to extend through the opposite half section and having a bore in which the end of the driving shaft will have bearing, a packing box to form a closure between the driven shaft and the last named half section, opposed cone shaped shoes mounted on the driven shaft slidingly and non-rotatively, wedges between the said shoes, springs to connect said shoes, tapered push bars carried by the driven shaft and disposed slidingly in channels therein and which extend outside of said housing, rollers between the ends of the wedges and the tapered push bars, a collar mounted loosely on the driven shaft and to which the outer ends of the push bars are secured and which collar is adapted to receive connections for a shifting lever.

8. A friction clutch, comprising a circular housing composed of cone-shaped half sections recessed at their edges to provide radial openings in the peripheral portion of said housing, means to secure the half sections together, removable plugs to close said radial openings, a driven shaft to extend into the housing, a packing box to form a closure between the driven shaft and the housing, opposed cone-shaped shoes mounted slidingly and non-rotatively on the driven shaft, wedges between the said shoes, a stud having a threaded bore and being slit longitudinally and threaded externally and screwed through each of said wedges, a threaded stem screwed into the bore of said studs, tapered push rods movable longitudinally of the driven shaft, dogs carried by one of said cone shaped shoes and having their free ends to engage the inner ends of said studs, rollers in the ends of said dogs to bear against said tapered push rods.

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

ROBERT M. ROOF.

Witnesses:
FRANK E. HILL,
THOMAS L. RYAN.