No. 822,496. PATENTED JUNE 5, 1906.

E. H. WAUGH.

FRICTION CLUTCH.

APPLICATION FILED JULY 6, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

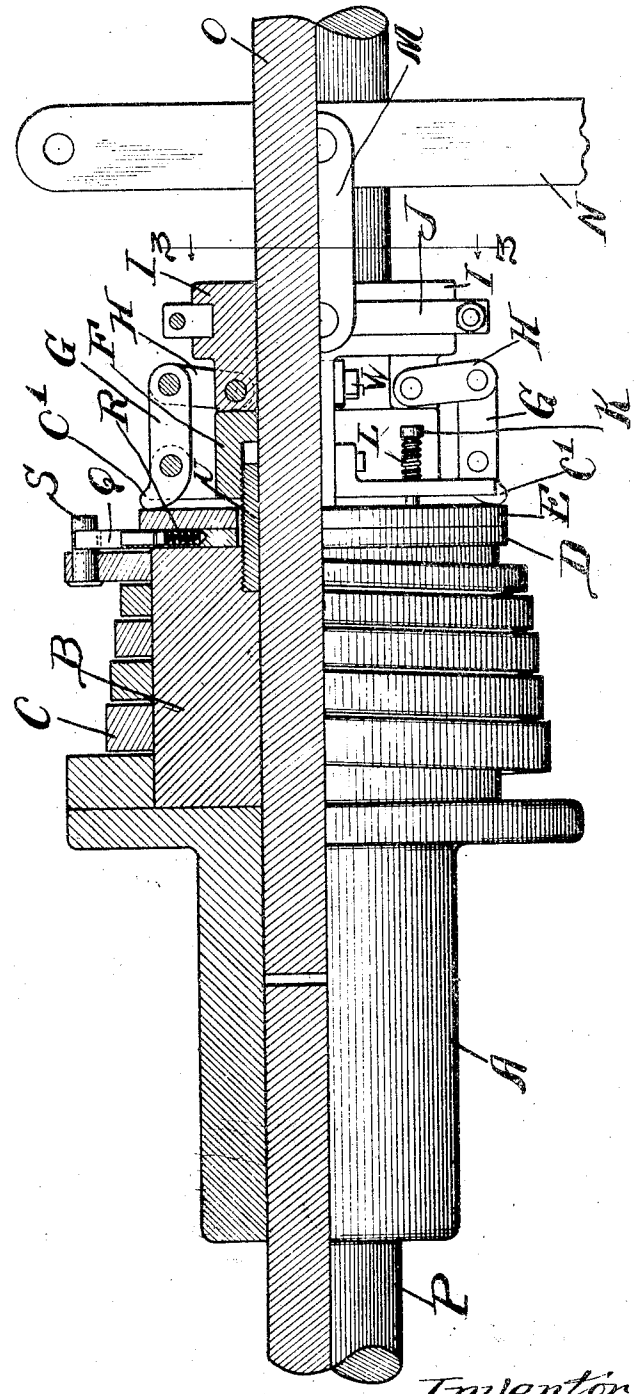
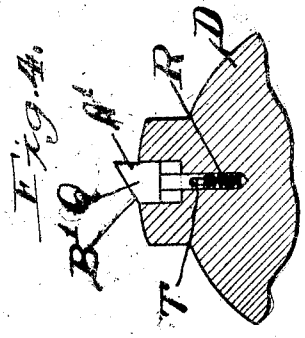


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 2.

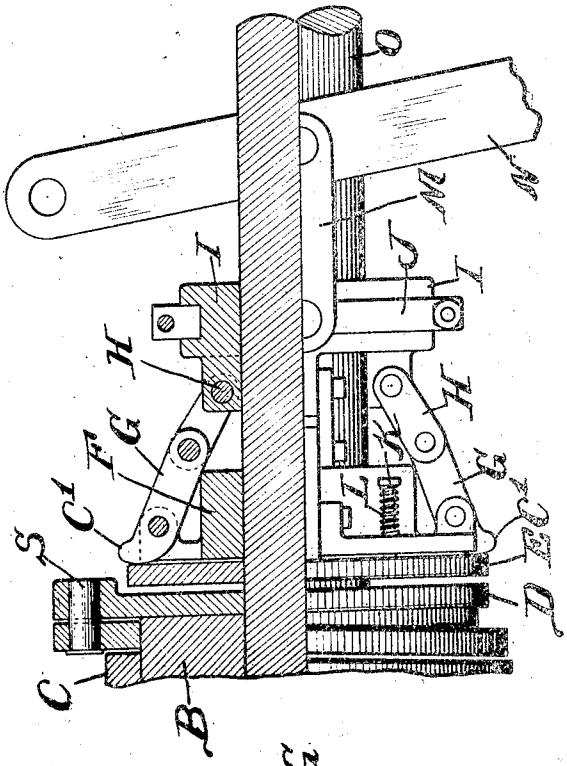
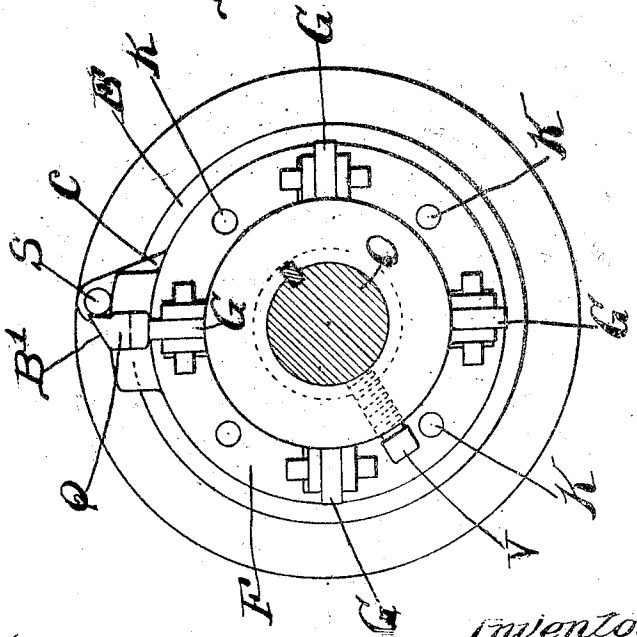


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD H. WAUGH, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE DOUBLE-FRICTION COIL CLUTCH COMPANY, A CORPORATION OF ILLINOIS.

FRICTION-CLUTCH.

No. 822,496. Specification of Letters Patent. Patented June 5, 1906.

Application filed July 5, 1904. Serial No. 215,245.

To all whom it may concern:

Be it known that I, EDWARD H. WAUGH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Friction-Clutch, of which the following is a specification.

This invention relates to friction-clutches.

The object of the invention is to provide a construction of friction-clutch, and particularly a friction-clutch of the coil-spring type, which is simple and efficient.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference-signs appearing thereon, Figure 1 is a view, partly in side elevation and partly in longitudinal section, parts broken off, of a friction-clutch mechanism embodying the principles of my invention and showing the parts locked in clutched relation. Fig. 2 is a view similar to Fig. 1, showing a slightly-modified arrangement and the parts in released or unclutched relation. Fig. 3 is a view in transverse section on the line 3 3 of Fig. 1 looking in the direction of the arrows. Fig. 4 is a detached detail view in section, showing the clutch-latch and the manner of mounting the same.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

Referring to the accompanying drawings, reference-signs O and P designate the shafts to be coupled, one of said shafts being the driving-shaft and the other the shaft to be driven. Of course it will be understood that it is immaterial which is the driving and which the driven shaft, as it is obvious that the clutch mechanism embodying my invention may with equal facility be applied to either of said shafts. In the particular form shown, however, shaft P is designed to be the driving-shaft and shaft O the driven shaft. Mounted upon and in the form shown in Fig. 1 keyed or splined to shaft P is a hub A, while suitably mounted on to rotate with shaft O is a drum B. Mounted upon drum B is a coil-spring C, having one end connected or secured to a flange on hub A. The other or free end of the coil carries a pin S. A friction disk or plate D is mounted to revolve loosely about the axis of shaft O. A latch-dog Q is carried adjacent the periphery of disk or plate D, a spring R serving to yieldingly press such latch-dog outwardly beyond the peripheral edge of disk or plate D and into the path of coil-pin S. The latch-dog Q is permitted sliding movement radially with respect to disk or plate D, being held and guided during such movement by a pin T, operating in a radial slot formed in the stem of latch-dog Q. On one edge of the latch-dog is formed an engaging wall or surface A′. The other edge or surface of the latch-dog is beveled, as indicated at B′. (See Figs. 3 and 4.)

From the foregoing description it will be seen that in the case where shaft P is the driving-shaft the hub A and coil C revolve with shaft P, whereas drum B is keyed or otherwise mounted or secured to rotate with shaft O. During the rotations of shaft P the coil-pin S engages the engaging wall or surface A′ of latch-dog Q, thereby rotating said disk or plate D, the latter, as above explained, being mounted to freely rotate about the axis of shaft O. If, however, the rotating movement of disk or plate D is retarded, the coil C will wind up on drum B, thereby producing the required friction to impart rotation to such drum, provided the retardation of the free rotation of disk or plate D is sufficient, and consequently producing rotation of shaft O. I will therefore now describe a construction and arrangement which I have proposed for retarding the free rotative movement of plate or disk D.

In one form of my invention, selected for purposes of illustration and as shown in the accompanying drawings, I propose to retard the free rotation of disk or plate D frictionally, and I propose to provide means whereby such retardation when effected frictionally is maintained in such relation by locking the parts employed in effecting the desired frictional engagement. To this end I employ a friction disk or plate E, arranged in cooperative relation with respect to friction-plate D to be brought into laterally-bearing

surface contact therewith, but normally yieldingly held out of frictional contact in any convenient manner, the said friction disk or plate E being mounted or connected to rotate with shaft O, while, as above explained, disk or plate D is free to revolve or rotate upon the axis of shaft O. Sleeved upon to rotate with shaft O is a yoke F, which I will call a "toggle-yoke." Pivotally mounted upon the toggle-yoke F are a series of toggle-levers G, the points of pivotal connection of said levers upon yoke F being intermediate the ends of said levers, as clearly shown in the drawings. The free ends C' of said levers are rounded or beveled and arranged to be brought into bearing contact with disk or plate E when said levers are rocked in order to force said disk or plate into bearing frictional contact with plate or disk D. To the other ends of toggle-levers G are pivotally connected links H, the other ends of said links being connected to a sliding collar I, mounted upon to rotate with shaft O, but capable of sliding longitudinally thereon. A strap or ring J is seated in a peripheral groove in collar I and affords through links M means for operating connection between the collar I and the operating-lever N for operating or sliding collar I longitudinally of shaft O.

The operation of this part of my invention is as follows: When the clutch is disengaged, the parts are in the relative positions thereof shown in Fig. 2. When it is desired to effect a coupling of the clutch, operating-lever N is manipulated in a direction to slide collar I toward the left from the position occupied thereby as shown in Fig. 2 and toward the position thereof shown in Fig. 1, such movement being effected from the operating-lever N through the links M, which are connected to strap or ring J, the latter, as above explained, being seated in a peripheral groove in collar I. This movement of collar I effects a rocking movement of toggle-levers G through the link connections H, the free ends of said toggle-levers G being thereby rocked or swung in a direction to bear against one face of disk or plate E and force the other face of said disk or plate into frictional contact with plate or disk D, thereby retarding the rotative movement of said disk or plate D in order, as above explained, to wind up the spring C upon drum B to produce the required friction-drive connection between shafts P and O. The collar I is permitted a sufficient extent of sliding movement in a direction to effect the frictional coupling above explained, so as to carry the links H or the points of pivotal connection thereof with collar I and the ends of toggle-levers G, respectively, into such relation (as shown in Fig. 1) as to lock the toggle-levers G in their engaging positions or relations as shown in Fig. 1, so that when the clutch is once thrown into operation the parts are held or locked in such relation until the operating-lever N is again operated or manipulated to release the clutch engagement.

I have above stated that disk or plate E is normally maintained out of frictional engagement with disk or plate D. This result may be effected in any convenient manner—as, for instance, by means of studs K, carried by said disk or plate E and projecting through the peripheral flange of toggle-yoke F and springs L being interposed between said flange and the heads of said studs K, the tension of said springs being normally exerted upon said studs in a direction to move friction disk or plate E away from its coöperating plate or disk D.

If desired, and in order to secure a desirable relative adjustment of the drum B and toggle-yoke F, I may employ an adjusting-sleeve U. This adjusting-sleeve is screwed into the bore of hub B and into the bore of toggle-yoke F, while the plates D and E are sleeved onto said adjusting-sleeve U freely. When, therefore, wear takes place between the friction disks or plates D and E or between the toggle-levers G and friction-plate E, the toggle-yoke F and yoke I are turned up onto the threaded end of adjusting-sleeve U or backed off, as may be desired or required, until the proper adjustment is obtained, a set-screw V serving to hold the toggle-yoke F and sleeve I in their adjusted positions on shaft O.

The object and purpose of the beveled surface B' on latch-dog Q are to enable pin S to pass by or over the clutch-dog Q when these parts are relatively revolved in the reverse direction from that of a driving connection—as, for instance, should shaft P be stopped and momentum continue the rotation of shaft O. In that case the pin S being carried in the opposite direction from that required for a driving connection and riding over the inclined surface B' of the clutch-dog will force said dog Q radially toward the center of disk D and against the action of spring R, and hence enabling said pin S to pass by said dog without danger of unwinding or uncoiling the coil C.

It will be observed by reference to Fig. 2 that the pin S is rigidly connected not only to the free end of coil C, but also to disk or plate D. This construction I propose to employ in cases where the clutch is intended to be operated only occasionally.

It is obvious that the yoke F and sleeve I and adjusting-sleeve U, as well as hub B, may be mounted and connected to rotate with shaft O in any convenient manner and either independently of each other or by the same connecting means.

It is obvious that a friction-clutch construction such as above described is equally well adapted for coupling shafts or to drive pulleys or the like. I therefore do not desire

to be limited or restricted in respect to the use of the mechanism nor with respect to the particular construction and arrangement of the parts shown and described, and many variations and changes in the details of construction and arrangement would readily occur to persons skilled in the art and still fall within the spirit and scope of my invention; but,

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a friction-clutch the combination of driving and driven parts, a coil-spring connected at one end to one of said parts and having a free end, a loosely-mounted friction member, means whereby the free end of said coil-spring and said friction member engage with each other, a coöperating friction member connected to rotate with one of said driving and driven parts, but capable of movement longitudinally thereof, and means for effecting frictional engagement between said members.

2. In a friction-clutch, a driving and a driven part, a coil-spring connected at one end to one of said parts and carrying a pin at its free end, a loosely-mounted friction-disk, means carried thereby, against which said pin detachably bears, a coöperating friction-plate connected to rotate with one of said parts but capable of movement longitudinally thereof, and a toggle mechanism for effecting frictional engagement between said disks.

3. In a friction-clutch, a driving member and a driven member, a coil-spring connected at one end to one of said members and carrying a pin at the free end thereof, a freely-mounted friction-disk, a latch-dog carried thereby and against which said pin detachably bears, whereby said disk is rotated with said coil, and means for retarding the rotative movement of said disk, comprising a cooperating friction-disk connected to rotate with but capable of movement along the other of said members, and a toggle mechanism for effecting frictional engagement between said disks.

4. In a friction-clutch, a driving and a driven member, a coil-spring connected at one end to one of said members and carrying a pin at its free end, a friction-disk connected to rotate with the other of said members, a toggle-yoke, toggle-levers connected thereto and having the free ends thereof arranged to engage said disk, means for rocking said levers, and a coöperating friction-disk freely rotatable and carrying a yielding latch-dog for detachable engagement with said pin.

5. In a friction-clutch, a driving member and a driven member, a coil connected at one end to one of said members and carrying a pin at its free end, a loosely-mounted friction disk or plate, a yieldingly-mounted latch-dog carried by said friction-plate and arranged for detachable engagement with said pin, whereby said coil and plate normally revolve in unison, means for retarding the rotation of said plate, including a cooperating friction plate or disk, means for normally maintaining said disks or plates yieldingly out of contacting relation, a toggle mechanism for effecting frictional engagement between said plates or disks, and means for actuating said toggle mechanism.

6. In a friction-clutch, a drive-shaft and a driven shaft, a drum mounted upon one of said shafts to rotate therewith, a spring coiled upon said drum and connected at one end to the other of said shafts, the free end of said spring carrying a pin, a loosely-sleeved friction disk or plate having means against which said pin freely bears, a cooperating friction disk or plate mounted to rotate with said drum, a toggle mechanism for effecting frictional engagement between said disks or plates, and means for operating said toggle mechanism.

7. In a friction-clutch, a driving member and a driven member, a drum mounted to rotate with one of said members, a spring coiled upon said drum and connected at one end with the other of said members, a toggle-yoke, friction devices interposed between said yoke and drum, toggle-levers carried by said yoke for effecting frictional engagement between said friction devices, detachable pin-and-bolt connections between said friction devices and the free end of said spring, and means for actuating said toggle-levers.

8. In a friction-clutch, a driving member and a driven member, a drum mounted to rotate with one of said members, a spring coiled upon said drum and connected at one end to the other of said members, a toggle-yoke, frictional engaging devices interposed between said yoke and drum, detachable pin-and-bolt connections between said friction devices and the free end of said spring, toggle-levers carried by said yoke, means for operating said levers to effect frictional engagement between said devices, and means for relatively adjusting said yoke and drum.

9. In a friction-clutch, a driving-shaft, a hub mounted thereon to rotate therewith, a driven shaft, a drum mounted thereon to rotate therewith, a spring coiled upon said drum and connected at one end to said hub, a pin in the free end of said spring, a friction disk or plate mounted to freely rotate, a detachable latch-dog yieldingly carried thereby against which said pin bears, a coöperating friction disk or plate mounted upon said driven shaft to rotate therewith but capable of movement longitudinally thereof, a yoke sleeved upon said driven shaft to rotate therewith, toggle-levers carried by said yoke,

a collar also mounted upon to rotate with said driven shaft, links pivotally connecting said collar and levers, and means for sliding said collar upon said shaft to operate said levers.

10. In a friction-clutch, a driving part and a part to be driven, a coil-spring connected at one end to one of said parts and having its other end free, a loosely-mounted friction member, means for detachably engaging said friction member and the free end of said coil-spring, a coöperating friction member mounted to rotate with one or the other of said driving or driven parts, and means for effecting the frictional engagement of said friction members.

11. In a friction-clutch, a driving part and a part to be driven, one of said parts provided with a drum, a spring coiled upon said drum and having one end connected to one of said parts and the other end free, a friction member mounted to rotate with the other of said parts, a loosely-mounted coöperating friction member, means for detachably engaging said last-mentioned friction member and the free end of said coil, and means for effecting the frictional engagement of said friction members.

12. In a friction-clutch, a driving and a driven member, a coil-spring connected at one end to one of said members and having its other end free, a drum mounted to rotate with the other of said members and upon which said spring is coiled, a friction member mounted to rotate with said drum, a coöperating friction member loosely mounted, means for detachably engaging said loosely-mounted friction member and the free end of said coil, a toggle-yoke, toggle-levers pivotally mounted thereon and having their free ends arranged when said levers are rocked to engage the rotating friction member to move the same into frictional engagement with the coöperating loosely-mounted friction member, and means for shifting said toggle-yoke.

13. In a friction-clutch, a driving and a driven member, a coil-spring connected at one end to rotate with one of said members and having its other end free, a friction-disk mounted to rotate with the other of said members, but capable of longitudinal movement thereon, a coöperating loosely-mounted friction-disk, means for detachably engaging said loosely-mounted friction-disk with the free end of said spring, and a toggle mechanism for shifting said first-mentioned friction-disk into frictional surface contact with the loosely-mounted friction-disk.

14. In a friction-clutch, a driving member and a driven member, one of said members having a drum mounted to rotate therewith, a spring coiled upon said drum and connected at one end to the other of said members, and having its other end free, means for detachably engaging the free end of said coiled spring whereby said spring is coiled upon said drum to exert a gripping action thereon, and a friction mechanism for controlling said detachable engaging means.

In witness whereof I have hereunto set my hand, this 1st day of July, 1904, in the presence of the subscribing witnesses.

EDWARD H. WAUGH.

Witnesses:

RAYMOND W. FAIRFOULL,

S. E. DARBY.