No. 704,911. Patented July 15, 1902.

R. E. OLDS.

FRICTION CLUTCH.

(Application filed Feb. 25, 1902.)

(No Model.)

Fig. 1.

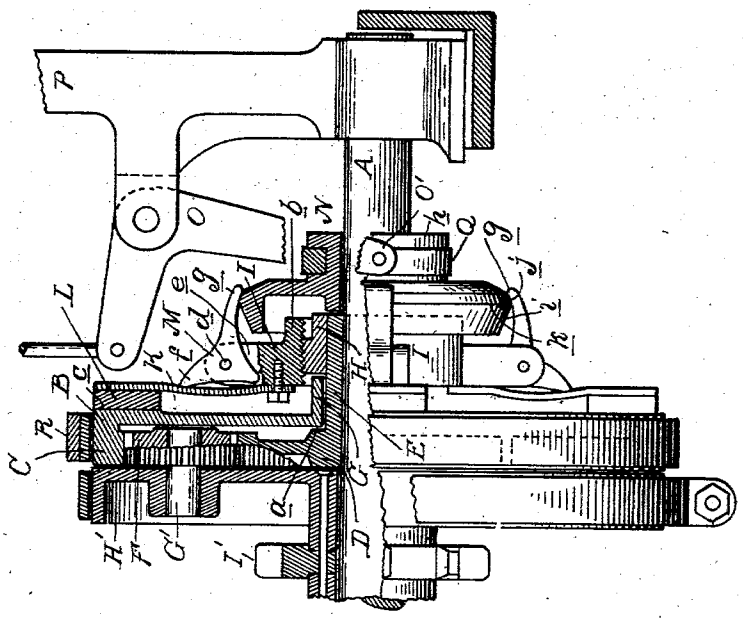
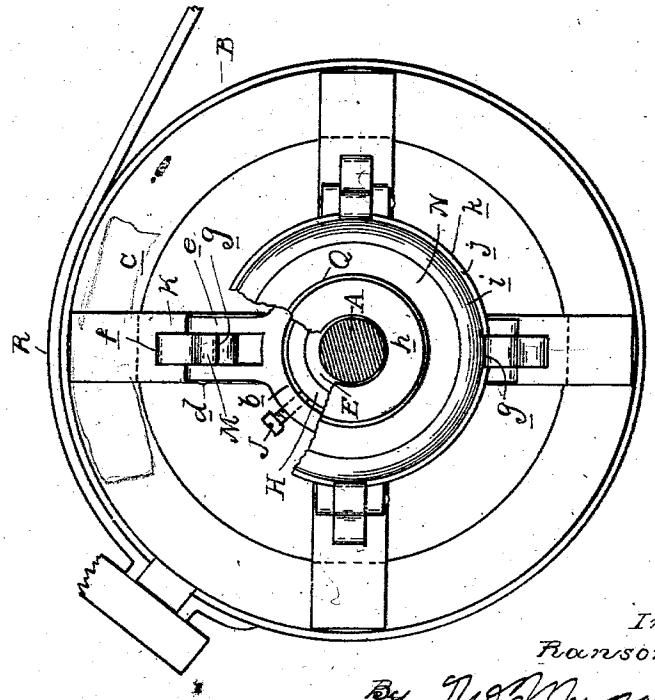


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

RANSOM E. OLDS, OF DETROIT, MICHIGAN.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 704,911, dated July 15, 1902.

Application filed February 25, 1902. Serial No. 95,612. (No model.)

To all whom it may concern:

Be it known that I, RANSOM E. OLDS, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to friction-clutches, and is more especially designed for use in connection with transmission-gearing for motor-vehicles, &c.

The invention consists in the peculiar construction, arrangement, and combination of parts, as hereinafter described.

In the drawings, Figure 1 is a sectional elevation of the clutch as applied to a transmission-gearing, and Fig. 2 is an end elevation.

A is a drive-shaft, and B is a head loose thereon. This head constitutes a portion of the driven mechanism, and in connection with the parts hereinafter to be described comprises a friction-clutch. As shown, the head B is provided with a flange C, with an internal gear-wheel formed thereon, and within this flange is secured to the shaft A a gear-wheel D upon the hub E, on which the head B is sleeved. Between the gear-wheel D and the internal gear-wheel C and in mesh with each is a pinion F, said pinion being journaled upon a stub-shaft G', which is carried by a head H', also sleeved upon the shaft A and connected to the sprocket-wheel I'.

The arrangement of parts as above described is not absolutely essential to the present invention, which relates chiefly to the construction of friction-clutch. The latter is, however, primarily designed for use in connection with said mechanism and coöperates therewith, as will be hereinafter set forth.

The hub E is preferably formed with a shoulder *a*, against which one end of the head B bears. The head B is also preferably provided with a hub G, which extends outwardly and forms a longer bearing upon the hub E. Adjacent to the end of this hub G is a collar H, which is fixedly secured to the hub E in any suitable manner. The collar H is screw-threaded externally and is adapted to engage with a head I, having a correspondingly internal screw-threaded hub *b*. This construction permits of adjusting the head I longitudinally upon the collar H, and it may then be locked from rotation by any suitable means, such as a set-screw J.

The head I is provided with a series of radially-extending arms K, which are formed of flat spring metal arranged in substantially the plane of rotation of the head. The width of these arms is sufficient to make them comparatively rigid in resisting strains in the direction of rotation, while at the same time they are thin enough to permit of freely flexing transversely to the plane of rotation. At the outer ends of the arms K are secured friction-blocks L. These are adapted to bear against an annular friction-face *c*, formed upon the side of the head B, adjacent to the periphery thereof.

M represents dogs pivotally secured to the head I and adapted to bear, respectively, against the arms K. As shown, these dogs are in the form of bell-crank levers, which are pivoted by pins *d* to ears *e*, projecting radially from the head I. One arm *f* of each bell-crank extends into proximity to the respective arm K between the block L and the point of attachment to the head I. The other arm *g* of the bell-crank lever extends outwardly substantially parallel to the shaft A, its under face preferably being curved, as shown in Fig. 1.

N is a head sleeved upon the shaft A beside the head of the hub E. This head is adapted to be moved longitudinally upon the shaft by any suitable connection (not shown) consisting of a bell-crank lever O, fulcrumed upon a stationary frame P, in which the shaft A is journaled. This bell-crank lever is provided with a fork O', which embraces the hub *h* of the head N and is pivotally connected to the collar Q, engaging with the groove in said hub *h*.

The head N is provided on its periphery with a tapering portion *i* adjacent to the head I and an oppositely-tapering portion *j* at its outer end. The portion *i* is adapted to engage with the arms *g* of the dogs M, so that when the head N is moved inward—*i. e.*, toward the head I—the tapering portion *i* will act as a cam which will move the arm *g* out-

ward and cause the arm *f* to press against the spring-arms K. This will cause said arms K to yieldingly press the blocks L against the annular face *c* of the head B. If the inward movement of the head N is sufficient, the arm *g* will pass beyond the ridge *k* on said head and into engagement with the oppositely-inclined portions *j* or into the position shown in Fig. 1.

With the arrangement of parts as described the operation will be as follows: Rotary motion being imparted to the shaft A, it will be communicated to the gear-wheel D and hub E, which are fixedly secured to said shaft. From the hub E the collar H, which is fixed thereon, will be driven, and the latter will drive the head I, the radial arms K, and friction-blocks L. In the normal position of parts these blocks L are out of frictional contact with the annular friction-face *c* of the head B, so that the latter is free to remain stationary or to revolve independently of the shaft and the parts secured thereto. In the construction shown the head B is intended to operate as a portion of a differential gearing, and to this end is provided with a peripheral brake-strap R, which at certain times will hold said head from rotation. This will cause the gear-wheel D to impart a cycloidal movement to the pinions F, which travel around in mesh with the internal gear on the flange C and through the stub-shafts G′ will impart rotary motion to the head H′ and sprocket I′. The sprocket I′ will thus be driven in the same direction but at a slower speed than the shaft A. When it is desired to impart to the sprocket I′ the full angular speed of the shaft A, the peripheral brake R is released and the bell-crank lever O operated to cause the head N to be moved inward. This, as before described, will cause the dogs M to press upon the spring-arms K and press the friction-blocks L against the annular face *c* of the head B. The result will be that said head will be gradually started to rotate and will eventually be driven at the same speed as the shaft A. As soon as this occurs the pinions F will be locked from their cycloidal movement, which will cause the stub-shafts G′ to drive the head H′ and sprocket I′ at the same speed as the shaft A.

It is to be noticed that the spring-arms K gradually apply the pressure against the friction-blocks L, and at no time can this pressure exceed the tension of the spring. This will prevent danger of stripping the gearing or the breakage of parts, which might occur if the friction were suddenly applied, so as to give a quick jerk from a slow to a faster speed. It is also to be noticed that when the head N is moved inward sufficiently to change the engagement of the arm *g* from the incline *i* to the incline *j* the spring-arms K will no longer tend to force the head N outward. Thus the friction-clutch will be locked in its engagement until the lever O is moved in the reverse direction and the head N is positively driven outward.

It will be noticed that the curved face on the inner side of the arm *g* of the bell-crank levers acts as a holding means or lock for the cam-head N. Where this clutch is used on moving vehicles, such as automobiles, this forms a convenient lock for the cam-head to prevent its accidental longitudinal movement, whereby the clutch might become disengaged in the movement of the vehicle. I do not herein claim the construction of the cycloidal gear connection or its combination with such a friction-clutch as is herein claimed, as I have made such gear the subject-matter of another pending application, Serial No. 79,085.

What I claim as my invention is—

1. In a transmission-gearing, the combination with a drive-shaft, of a head loose upon said shaft, a head secured to rotate with said shaft upon one side of said loose head, a spring-arm secured to the latter head having a friction-block at its outer end in close proximity to the face of said loose head and means for pressing against said spring-arm to yieldingly press said block in frictional contact with said loose head.

2. In a transmission-gearing, the combination with a drive-shaft, of a head loose upon said shaft, a head fixed upon said shaft beside said loose head, a plurality of radial arms secured to said fixed head flexible laterally but rigid in the plane of rotation, friction-blocks at the outer ends of said arms in close proximity to said loose head, dogs secured to said fixed head for bearing against said spring-arms and having operating-arms projecting laterally, and a cam-head longitudinally movable upon said shaft adapted to spread said operating-arms and cause said dogs to press against said flexible radial arms thereby pressing said blocks into frictional contact with said head.

3. In a transmission-gearing, the combination of the drive-shaft, a head loose on the shaft, a head fixed on the shaft beside the loose head, spring-arms secured to the latter head and adapted to bear against the loose head, dogs on the fixed head for flexing the springs and means for actuating said dogs.

4. In a transmission-gearing, the combination of the drive-shaft, a head loose on the shaft, a head fixed on the shaft beside the loose head, spring-arms secured to the latter, adapted to be pressed against the loose head by flexing the spring-arms, means for flexing the spring-arms, and for automatically locking said flexing means against accidental movement.

5. In a transmission-gearing, the combination of the drive-shaft, a head loose on the shaft, a head fixed on the shaft beside the loose head, spring-arms secured to the latter adapted to be pressed against the loose head

by flexing the spring-arms, bell-crank levers for flexing the spring-arms, one arm thereof adapted to bear against the springs, a cam-head movable on the shaft for engagement with the other arm thereof, and a curved bearing on said arm with which the actuating-cam engages.

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

RANSOM E. OLDS.

Witnesses:
HARRY E. HOOKER,
WM. H. HUMPHREY.