No. 709,918. Patented Sept. 30, 1902.

# A. MILL.

## FRICTION CLUTCH.

(Application filed Dec. 5, 1901.)

(No Model.)

Fig. 1

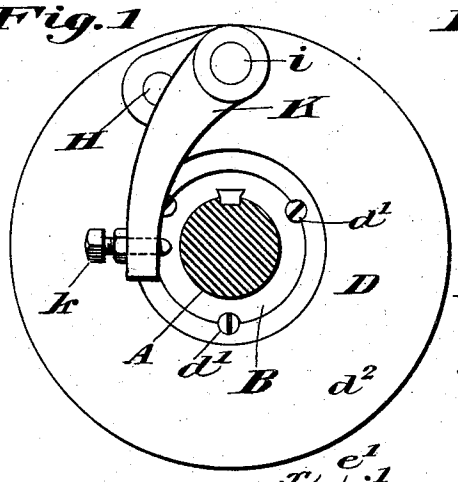



Fig. 2

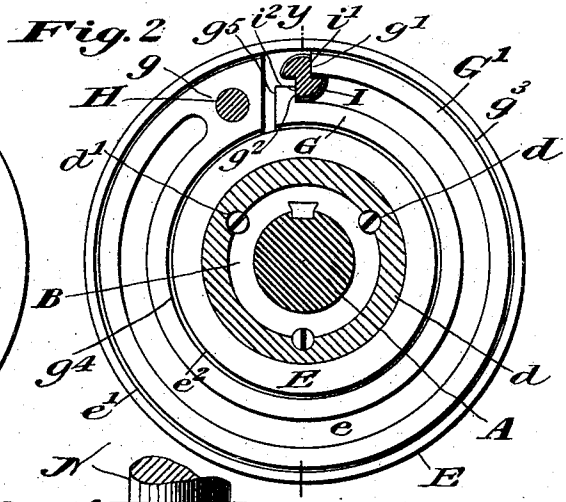



Fig. 3

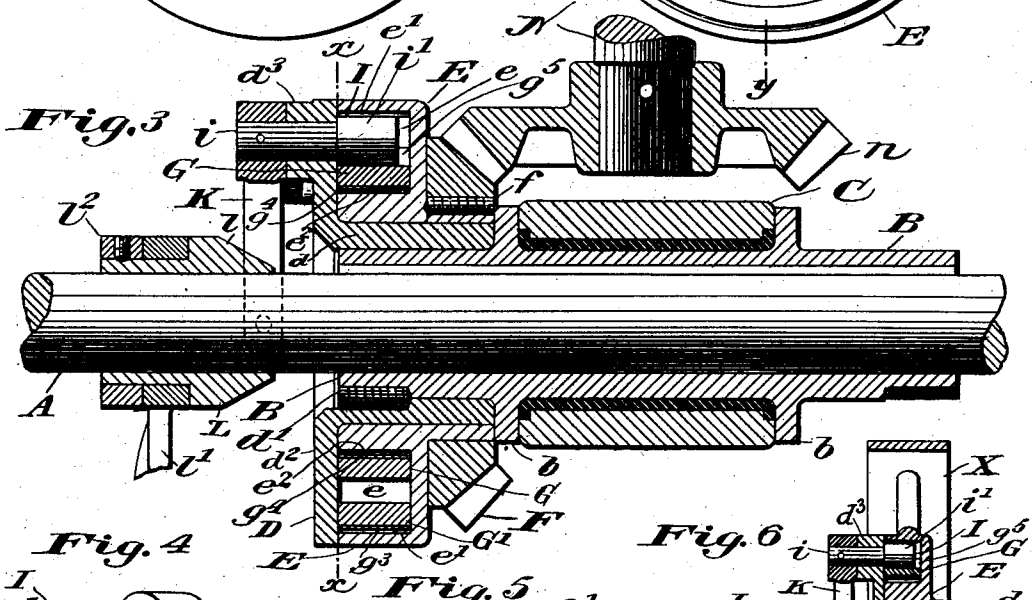



Fig. 4

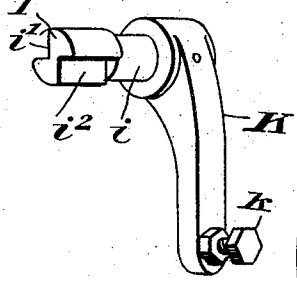



Fig. 5

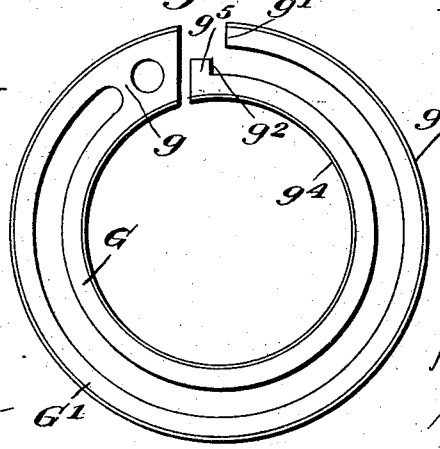
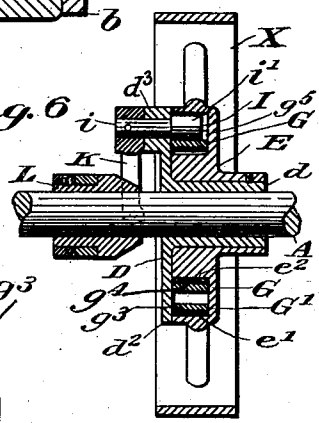



Fig. 6




Witnesses

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# UNITED STATES PATENT OFFICE.

ANTON MILL, OF CINCINNATI, OHIO, ASSIGNOR TO THE AMERICAN TOOL WORKS COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF WEST VIRGINIA.

## FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 709,918, dated September 30, 1902.

Application filed December 5, 1901. Serial No. 84,844. (No model.)

*To all whom it may concern:*

Be it known that I, ANTON MILL, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

It is the object of my invention to provide a clutch capable of instant and effective action and of great power in comparison with the size of the same and of simple construction and easy manipulation; and my invention consists in providing opposing concentric friction-faces facing each other and a double-banded clutch between them and a rock-shaft and key with wings for the key, all having a common longitudinal axis between the bands and rocking on that longitudinal axis, and thereby forcing the two bands of the clutch, one longitudinally and outwardly and the other longitudinally and inwardly, for causing uniform engagement between the rings and the said friction-faces throughout their length for together forming a clutch mechanism between the moving agency and the agency to be moved.

In the drawings, Figure 1 represents an end elevation of my improved device with the cone omitted. Fig. 2 is a cross-section of the same, taken on a line corresponding to the line $x\ x$ of Fig. 3. Fig. 3 is a vertical central longitudinal section of the same, taken on the line $y\ y$ of Fig. 2. Fig. 4 is a perspective view of the rock-key and attached rock-arm. Fig. 5 is a side elevation of the friction-rings, and Fig. 6 is a vertical central longitudinal section showing a modification in construction.

A represents the driving-shaft. B is a sleeve splined thereto journaled in a bearing C. In the form shown the bearing and sleeve are held against relative longitudinal movement by shoulders $b$. A flanged collar D has a hub $d$ surrounding the sleeve, to which it is secured, as by means of screws $d'$.

E is a hub provided with a groove $e$ for forming two oppositely-arranged friction-faces $e'$ $e^2$. A bevel-gear F or other motion receiving or imparting device may be secured to the hub, as by means of screws $f$, or, if desired, the hub may be made integral with the motion receiving or imparting device, as indicated in Fig. 6, in which the pulley X is indicated as projecting from the hub. The gear F is shown as meshing with a gear $n$ on an upright shaft N. The friction-faces $e'$ $e^2$ are engaged by a plurality of friction-rings G G', shown as secured to the flange $d^2$ of the collar D by pin H. In this manner inner and outer concentric friction-faces engaged by inner and outer bands or split rings are formed. The friction-rings are held fixedly to the flanged collar by suitable means, as by the pin H, as shown in Fig. 2, where the rings are shown as integral at their pinned end, connected by a web $g$ with the friction-ring members extending from the web and held by a single pin. The friction-ring members may be made integral with the flange of the collar, if desired, the pin being then omitted. The friction-rings are provided, respectively, with engaging faces $g'$ $g^2$, against which a suitable key I is adapted to take for contracting the one and expanding the other, preferably simultaneously. The key I rocks in a bearing $d^3$ in the flange $d^2$. The end of the band G' constitutes engaging face $g'$, and the engaging face $g^2$ is formed on a lug $g^5$ at the end of the friction-ring G. The key is shown as comprising a pin or rock-shaft $i$, which forms the journal for the key and rocks in the bearing $d^3$, and wings $i'$ and $i^2$. A rock-arm K is secured to the key, and a cone L, having coned face $l$, forces the rock-arm about its fulcrum for causing the friction-bands to engage with their faces, and thus operatively uniting the driving and the driven agencies. The friction-rings have resilient properties, and their resiliency is employed for acting in connection with the key for causing engagement with the friction-faces. The rock-arm K may be provided with an adjusting-bolt $k$ for regulating the degree of frictional contact between the rings and the friction-surfaces. The rock-arm K is caused to move by a relative movement longitudinally between the collar and rock-arm. The friction-rings may be provided with

fibrous or other friction coverings $g^3$ $g^4$, suitably secured thereto. A shifter-arm $l'$ takes about the cone L and is held thereon by a collar $l^2$.

In Fig. 6 I have shown my improved device as applied to a pulley and have also in that figure shown a modification in construction. Thus a flanged collar D may be directly secured to the shaft A and the groove provided in the pulley, the pulley being loose with relation to the shaft when the clutch is unengaged and being secured thereto when the clutch mechanism is operated for that purpose. It is obvious also that the friction-rings may be secured to the moving member or the sequence of motion reversed, or other changes made in construction without departing from the spirit of my invention.

I claim—

1. The combination of a revoluble agency, a pair of oppositely-arranged concentric friction-faces facing each other, and oppositely-arranged friction-ring members, with a rock-pin having wings thereon engaging said friction-ring members and rocking about an axis located between said friction-ring members, and means for rocking said pin thereby causing one of the friction-ring members to be pressed longitudinally and inwardly and the other to be pressed longitudinally and outwardly into frictional engagement with said faces.

2. The combination of a plurality of friction-faces concentric with the axis of a revolving agency one of which faces outwardly from and the other inwardy toward said axis and toward each other, with expanding and contracting ring members for said faces, a rock-key having wings integral therewith and rocking therewith about a common axis located between said members and means for rocking said key thereby causing engagement of said ring members with said faces by having said wings press said rings respectively longitudinally and inwardly and longitudinally and outwardly by pressure upon the ends of the same, substantially as described.

3. The combination of a revoluble agency, a pair of friction-surfaces facing respectively inwardly and outwardly with relation to the axis of the revoluble agency and toward each other's planes, a pair of friction-rings, one expansibly and the other contractibly arranged for engagement with said friction-surfaces, a shoulder for a ring, an engaging face on the other ring, a rock-key and wings thereon having a common axis located between the planes of said friction-rings for engagement with said shoulder and the engaging face of the other ring and means for rocking said key thereby simultaneously causing frictional engagement between the friction-rings and said pair of friction-surfaces.

4. The combination of a revoluble agency, a pair of friction-surfaces concentric therewith and facing each other, a pair of friction-ring members between the same, a shaft, a flanged collar, means for securing the ring members to the flanged collar, a shoulder for a ring member, a rock-shaft having wings integral therewith between said shoulder and the other ring member, and a rocker-arm secured to said rock-shaft and by its movement causing said wings to move concentrically about the axis of the said rock-shaft between the planes of said ring members and thereby engaging said shoulder and the other ring member and means for rocking said rocker-arm thereby simultaneously causing said members to engage said concentric friction-surfaces.

5. In a friction-clutch, the combination with a shaft, of a revoluble agency surrounding the shaft and having a pair of friction-surfaces facing respectively inwardly and outwardly with relation to the axis of the revoluble agency and toward each other's planes, a pair of split friction-rings, one expansibly and the other contractibly arranged for engagement with said friction-surfaces, a contact-face for each ring and a rock-key having a pair of wings arranged to engage said contact-faces and having their axis extending longitudinally of the shaft between the planes of said friction-rings and arranged to turn on that axis and means for rocking said key.

6. In a friction-clutch, the combination of the hub E, the friction-faces $e'$ $e^2$, the split friction-rings G G', the collar D, the key I having wings $i'$ $i^2$, the journal $i$ for the key, the bearing $d^3$ on the collar D in which the journal $i$ rocks, with the engaging faces $g'$ $g^2$ on the said friction-rings for engagement by said wings and means for rocking said key, substantially as described.

7. In a friction-clutch, the combination with a shaft, of a collar D therefor, a hub E surrounding the shaft, with an annular groove for the hub having therein the friction-faces $e'$ $e^2$ facing each other, the friction-rings G G' between said faces, the rock-key I having wings $i'$ $i^2$ and journal $i$ rocking about a common axis extending longitudinally of the shaft between said friction-rings and rocking on that axis for simultaneously expanding and contracting said friction-rings for simultaneously respectively increasing and decreasing their diameter uniformly and causing uniform engagement between said rings and said friction-faces throughout their length, with a cone on the shaft, and a rock-arm K for the key for rocking the latter, substantially as described.

8. In a friction-clutch, the combination of two concentric friction-faces facing each other, and a pair of concentric friction-rings between the same, a rock-pin having engaging faces for the pair of friction-rings, the axis of said rock-pin being between said fric-

tion-rings and with the rock-pin and said engaging faces rocking about said axis of said rock-pin concentrically and thereby force the friction-rings into engagement with said friction-faces, and means for rocking the rock-pin.

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

ANTON MILL.

Witnesses:
ERNEST G. SIMON,
HERBERT F. HARDEN.