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H. W. HILL & L. J. HIRT.

FRICTION CLUTCH.

No. 468,615. Patented Feb. 9, 1892.

Fig 1.

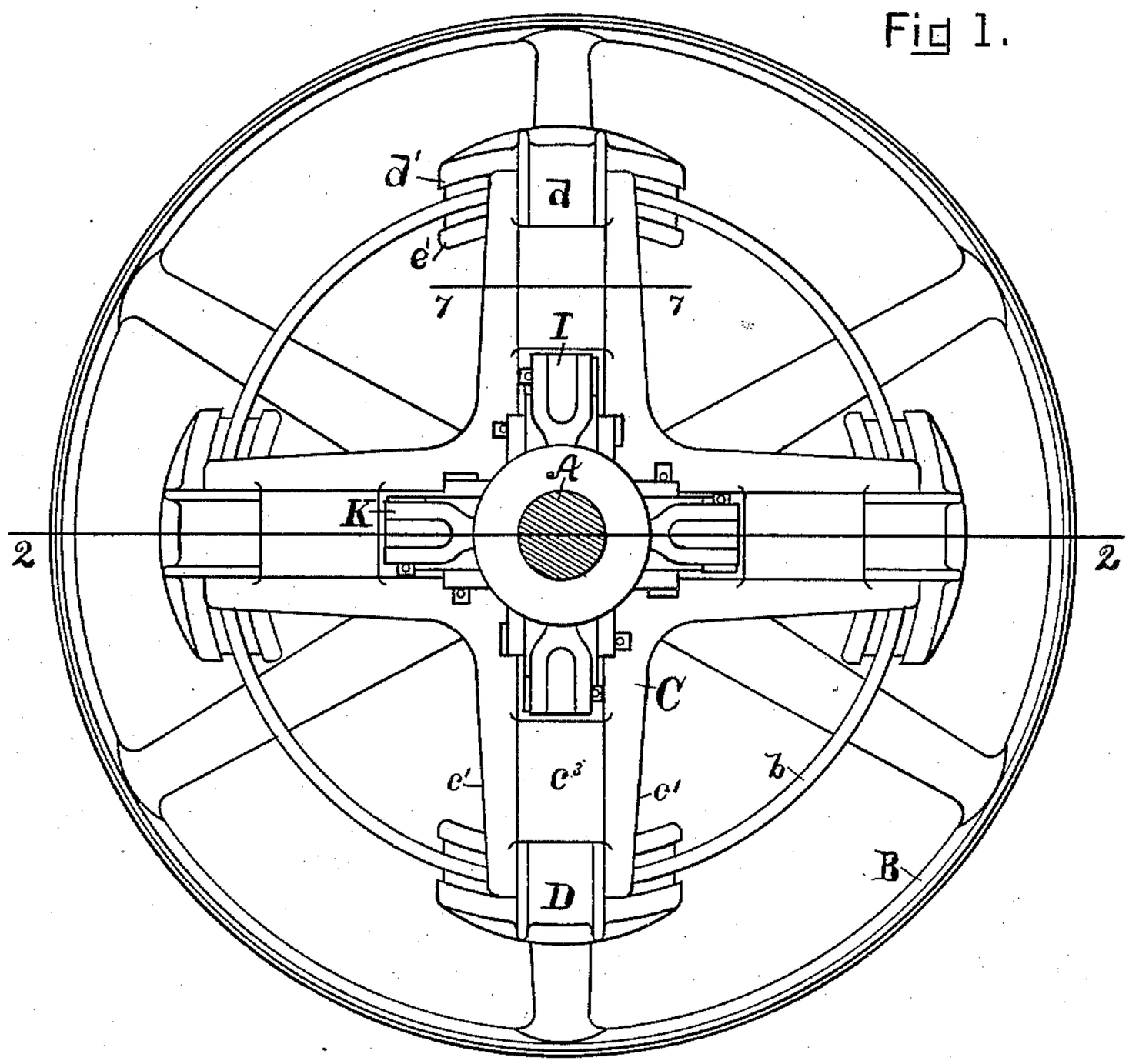

Fig 2.

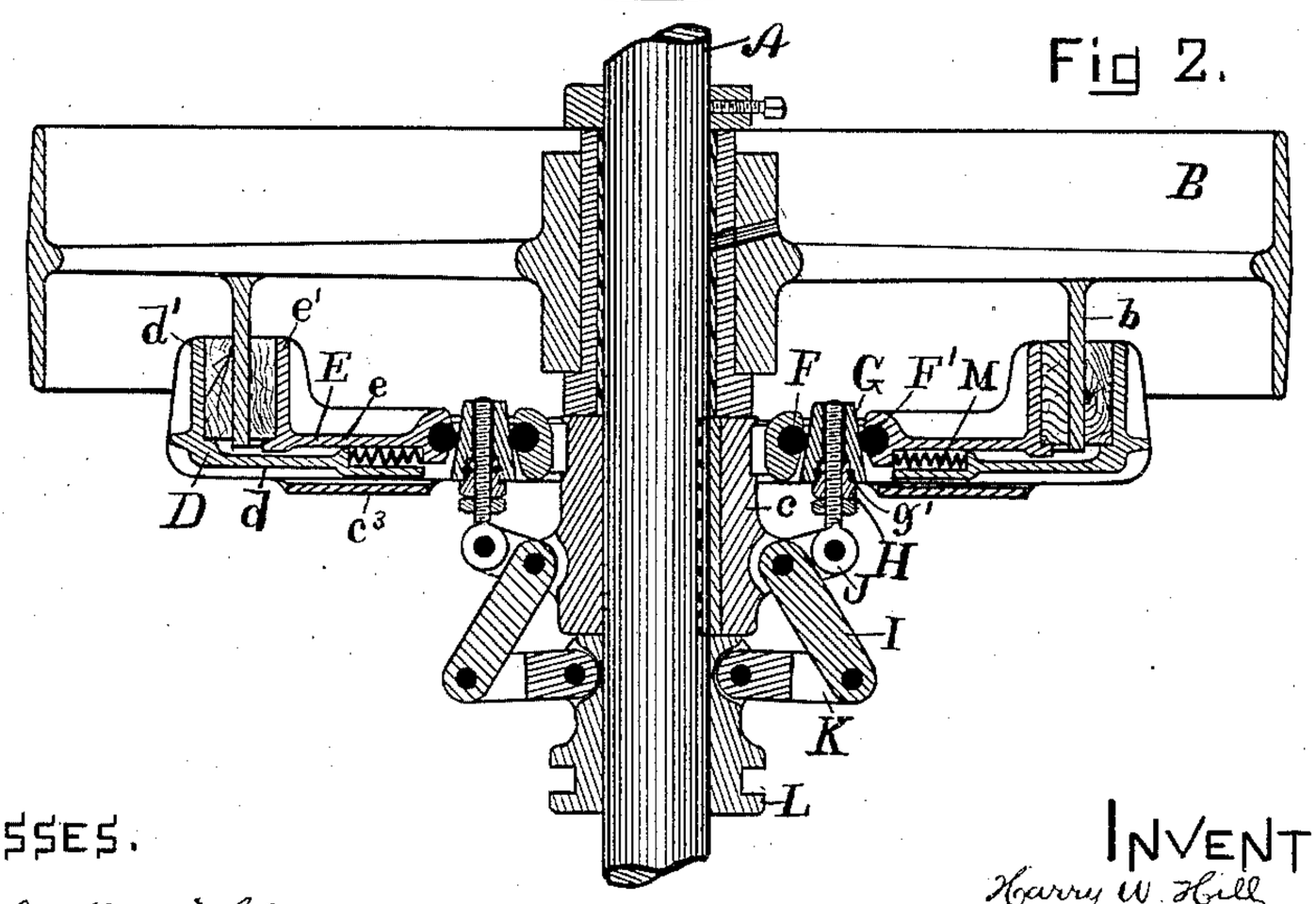

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Fig 4.

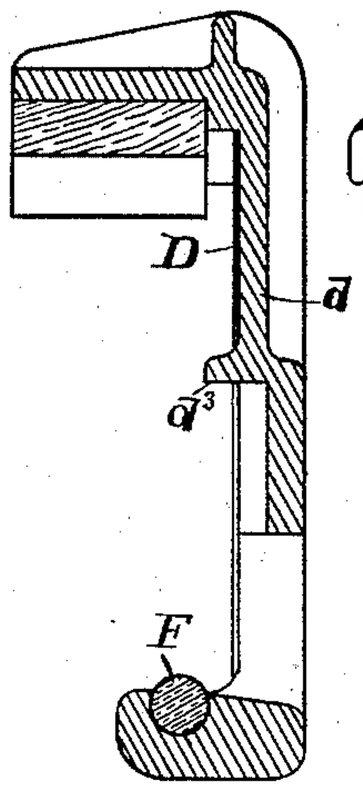

Fig 5.

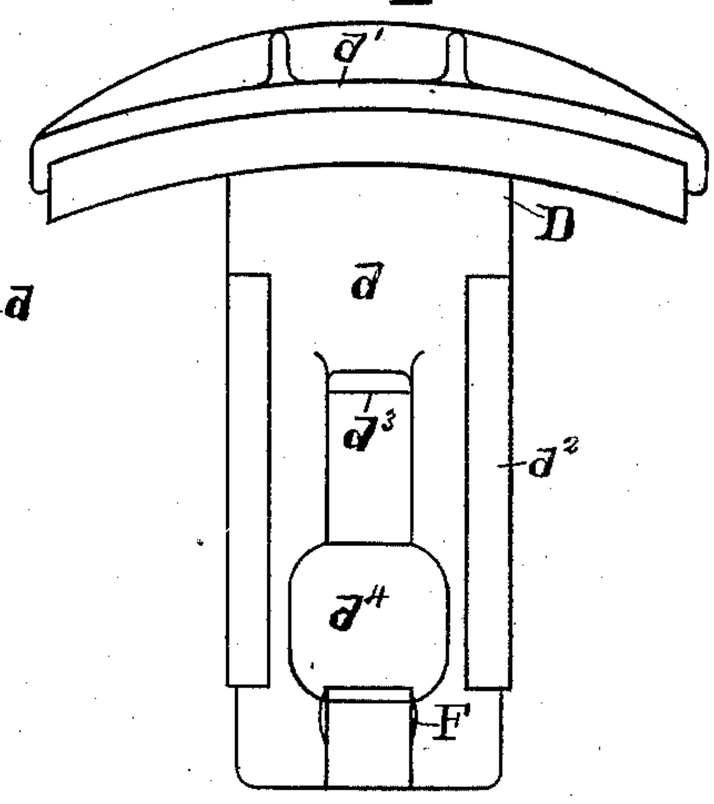

Fig 3.

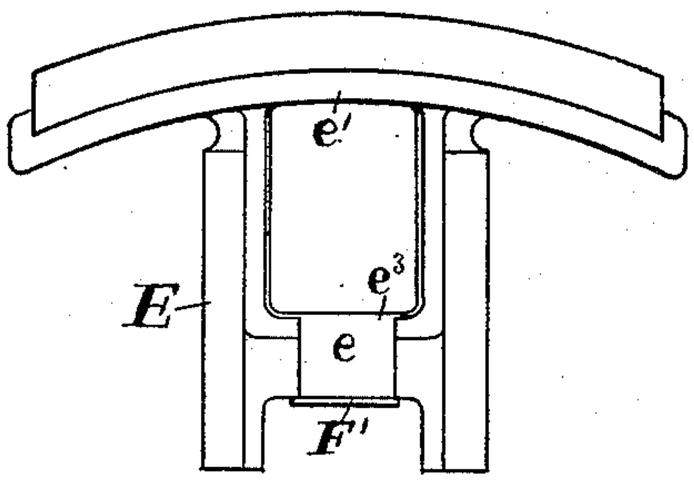

Fig 8.

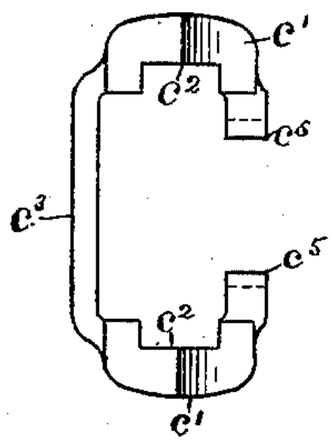

Fig 6.

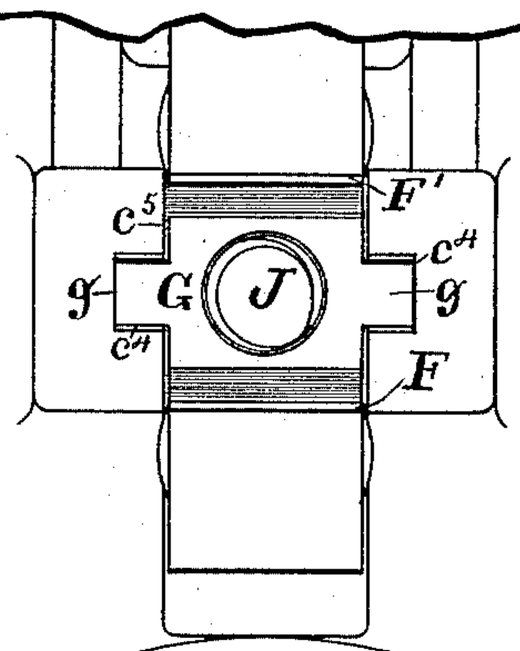

Fig 9.

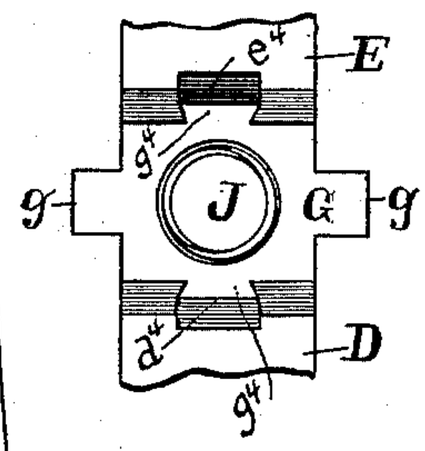

Fig 7.

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Fig 10.

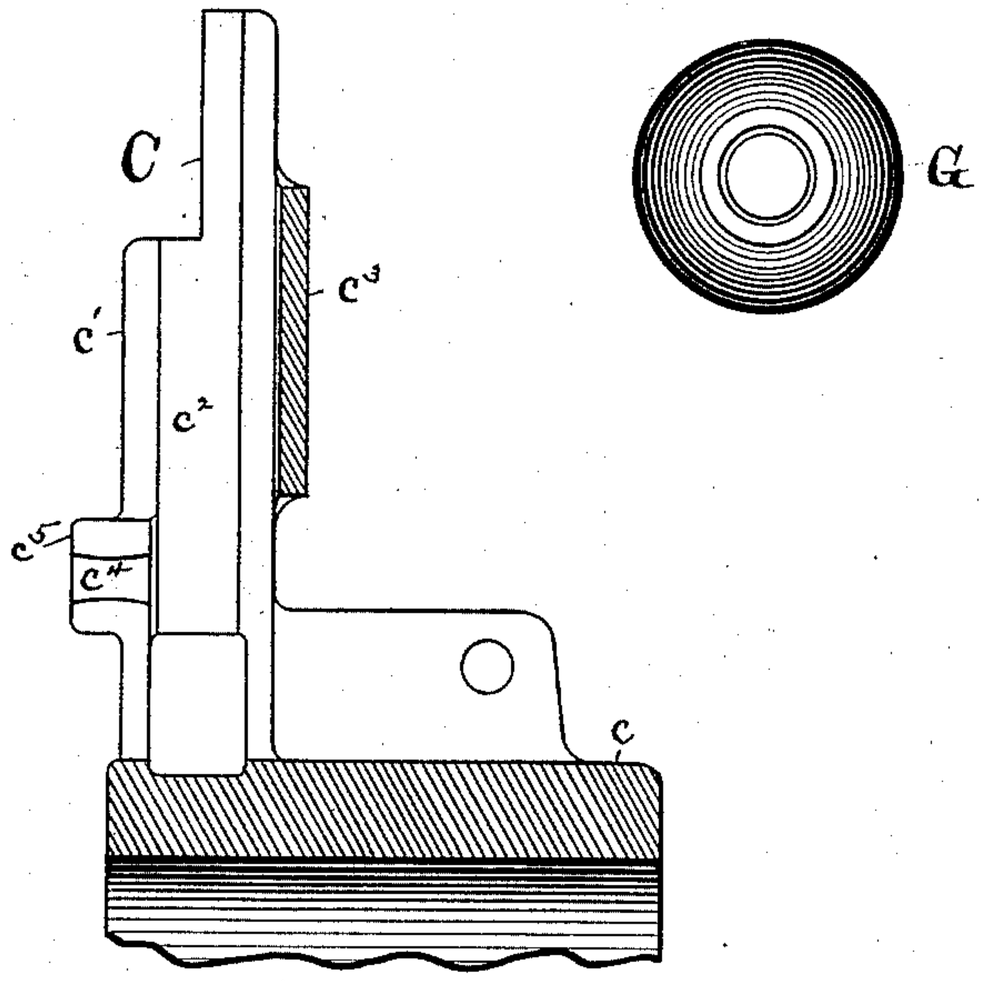
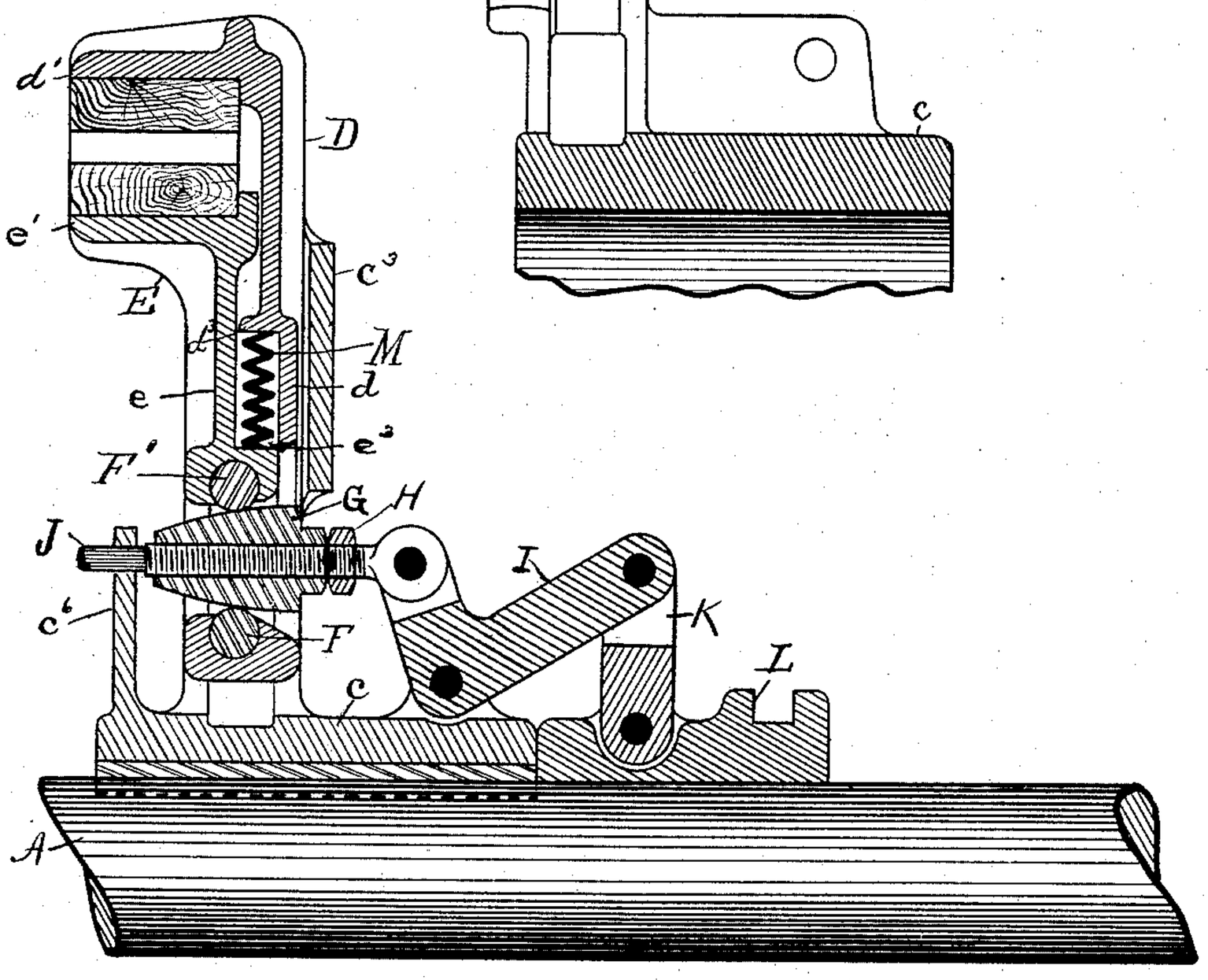


Fig 12.

Fig 11.



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UNITED STATES PATENT OFFICE.

HARRY W. HILL AND LOUIS J. HIRT, OF CLEVELAND, OHIO; SAID HIRT ASSIGNOR TO SAID HILL.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 468,615, dated February 9, 1892.

Application filed January 21, 1889. Serial No. 296,985. (No model.)

To all whom it may concern:

Be it known that we, HARRY W. HILL and LOUIS J. HIRT, both of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

Our invention relates to that class of friction-clutches in which a cylindric pulley-flange is grasped between two inversely and radially moving jaws.

The objects of our invention are, first, to provide means for imparting to said jaws the inverse movement, whereby the flange is grasped and released, and, second, to provide improved means for sustaining said jaws and guiding their movements in radial paths; and it consists in the construction and combination of parts herein shown and described, as definitely pointed out in the claims.

In the drawings, Figure 1 is a side elevation of our improved clutch. Fig. 2 is a central sectional view on the line 2 2 in Fig. 1. Fig. 3 is a detached side view of the inner clutch member. Fig. 4 is a central vertical section, and Fig. 5 a side view, of the outer clutch member. Fig. 6 is a view from the opposite side to that shown in Fig. 1 of a part of one of the radial clutch-arms and some of the operating parts. Fig. 7 is a sectional view taken on line 7 7, Fig. 1. Fig. 8 is an end view of one of the radial clutch-arms. Fig. 9 is an end view of the wedge and inner ends of the jaw-shanks in a modified construction, in which the motion of the wedge moves the jaws away from as well as toward the flange. Fig. 10 is a longitudinal sectional view of one of the radial clutch-arms. Fig. 11 is a sectional view of a clutch having a wedge differently formed, guided, and adjusted; and Fig. 12 is an end view of the last-mentioned wedge.

Referring to the drawings, A represents the shaft, upon which are mounted the pulley B and the clutching mechanism hereinafter described, either of which may be fixed to the shaft, while the other is loose upon it. The pulley is provided with a cylindric flange *b*, which may be made integral with the pulley, or bolted or otherwise secured thereto.

c represents a hub, which is mounted on the shaft A, and to this hub are secured the radial clutch-arms C, which clutch-arms are arranged in pairs at points directly opposite to each other for the purpose of balancing the clutch mechanism. The clutch-arms C consist of two parallel bars *c'*, having grooves c^2 on their approximate faces. For the purpose of strengthening these bars and preventing them from spreading they are connected by a yoke c^3.

The clutch-members D and E are of the type shown in the Patent No. 312,122, granted February 10, 1885, to H. W. Hill—that is to say, they have inwardly-projecting jaw-shanks *d* and *e*, from the outer ends of which the concave and convex friction surfaces or jaws *d'* and *e'* project substantially at right angles to said shanks, said jaws being arranged to engage with the outer and inner surfaces, respectively, of the cylindric flange *b*. Near the edges of the meeting faces of the jaw-shanks *d* and *e* the ribs d^2 and e^2 are finished smoothly, so that they will slide freely on each other with as little friction as possible. When the jaw-shanks *d* and *e* are laid together in the manner shown in the drawings, they are inserted in the grooves c^2 c^2 in the side bars *c'* of the radial clutch-arm, as most clearly shown in Fig. 7.

By the above-described construction of the clutch-arm C and the shanks of the friction members the following important advantages, among others, are secured: First, the clutch-arms may be made of the necessary strength with less metal than they could be if they were made of a solid piece, on opposite sides of which the jaw-shanks were seated; second, less finishing is necessary to make the parts operative when the jaw-shanks slide upon each other, than would be necessary if the jaw-shanks slid on opposite sides of a solid clutch-arm.

Bearing-surfaces for the operating-wedge are provided on the two jaw-shanks and arranged in substantially the same radial plane with the bearing-surface on the outer jaw-shank nearest the shaft. The result is accomplished

in the form of the invention shown in the drawings by bending the inner end of the outer jaw-shank *d* beneath the end of the jaw-shank *e*, and the transverse central portion of said outer jaw-shank is cut away sufficiently to permit a wedge to pass freely through the opening d^4, substantially as shown in the drawings. The ends of the two shanks *d* and *e* are finished, so that by the insertion of the wedge G between them the ends of said shanks may be forced apart with as little friction between them and the wedge as possible. The means provided for securing this result consist of two polished and hardened metal cylinders F F′, which are partially embedded in the ends of said shanks, as shown in Fig. 2.

G represents a wedge, which is inserted between the bearing-surfaces F F′ on the jaw-shanks, and by its movement it forces said bearing-surfaces apart and draws the jaws *d′* and *e′* toward each other. In order that said jaws may at the same time move toward the flange *b*, the wedge is guided in a path more or less parallel to the axis of the shaft, as shown in the drawings. With both forms of the wedge and its guides, as shown, the path in which the wedge moves will be somewhat curved by reason of its attachment at one end to the lever I. The guides prevent it from moving so far out of its path as will permit only one jaw to engage with the flange *b*, but, on the contrary, compels the engagement of both jaws therewith.

In Figs. 2, 6, and 9 is shown a wedge having on its sides the ribs *g g*, which slide in grooves c^4 in the side bars of the clutch-arms, or perhaps more exactly, which slide between shoulders in the offsets c^5 on said bars, whereby said wedge G is guided, as above described. In the outer or larger end of this wedge G a revoluble nut H is secured by means of an annular groove around the nut, and pins *g* driven into the wedge. A bolt J screws into this nut and is pivoted at its outer end to the bell-crank lever I, said bell-crank lever being pivoted to the hub *c*. The other end of the bell-crank lever I is connected by means of the link K or its equivalent to the shifting sleeve L. When the shifting sleeve L is moved toward the hub *c*, the lever I is rocked and the wedge is driven in between the opposing ends of the jaw-shanks *d* and *e* and the jaws *d′* and *e′* are drawn toward each other, and, by reason of the guided motion of the wedge, toward the cylindric pulley-flange *b*, which is grasped between them. The jaws may be adjusted to compensate for wear and to grasp pulley-flanges of different thicknesses by the revolution of the nut *g′*, whereby the position of the wedge G when the parts are locked, as shown in Fig. 2, is varied.

The wedge shown in Figs. 11 and 12 is in the form of the frustum of a cone, and may be screwed back and forth on the bolt which passes centrally through it, for the purpose of adjusting the jaws, as hereinbefore explained. With this construction, the wedge is guided in its movement by extending the bolt and passing it through a hole in an arm c^6, attached to the hub *c*, as shown. Between the jaw-shanks *d* and *e* a coiled spring M is placed and arranged to thrust against the shoulders d^3 and e^3 on the shanks *d* and *e*, respectively, whereby when the shifting sleeve is moved backward and the parts unlocked the friction-surfaces of the jaws are thrust away from each other and from the interposed cylindric flange. In other words, the clutch is released.

If it is desired that the releasing movement of the friction members shall be positive and not wholly dependent upon the action of the spring, the wedge G and the ends of the jaw-shanks may be provided with dovetailed tongues and grooves, as shown in Fig. 9. As this construction is shown in Fig. 9, g^4 represents dovetailing tongues provided on the upper and lower faces of wedge G, and e^4 is a groove in the lower end of the inner jaw-shank, and d^4 is a groove in the lower end of the outer jaw-shank, into which grooves the upper and lower tongues on the wedge are adapted to fit and slide. By this construction the ends of the jaw-shanks are drawn toward each other when the wedge is moved by the backward movement of the shifting sleeve and the jaws compelled to move positively away from the pulley-flange, as well as from each other. The spring alone, however, has been found to be sufficient to effect a complete release of the clutch members, when the clutch is of any ordinary size and is not running at an unusually-rapid speed.

We hereby disclaim the combination of a pulley having a cylindric flange, two inversely and radially movable clutch members, and a clutch-arm upon which the jaw-shanks are mounted, said outer member provided with a shoulder and said inner member provided with a shoulder in substantially the same plane but nearer to the shaft, and a spring arranged to thrust against said shoulders, as the same is not our joint invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a friction-clutch, the combination of a pulley having a cylindric flange, a radial clutch-arm, and two inversely and radially movable clutch members of the type specified, with a movable wedge adapted to engage with the shanks of said clutch members, and mechanism for moving said wedge in a path parallel to the axis of the shaft, substantially as and for the purpose specified.

2. In a friction-clutch, the combination of a pulley having a cylindric flange, a radial clutch-arm, and two inversely and radially movable clutch members of the type specified with a movable wedge adapted to engage with the shanks of said members, a shifting sleeve, suitable connections between said sleeve and wedge, and means for guiding the movement

of said wedge in a path parallel to the axis of the shaft, substantially as and for the purpose specified.

3. In a friction-clutch, the combination of a pulley having a cylindric flange, a radial clutch-arm, and two inversely and radially movable clutch members of the type specified, the inner ends of the shanks of the two members being in substantially the same radial plane, grooves in the clutch-arm substantially parallel to the axis of the shaft, with a wedge having tongues on its sides adapted to engage in said grooves, a shifting sleeve, and an adjustable connection between said wedge and shifting sleeve, substantially as and for the purpose specified.

4. The combination of a pulley having a cylindric flange and two inversely and radially movable clutch members of the type specified with a radial clutch-arm consisting of two parallel bars having grooves upon their proximate faces, a wedge interposed between the inner ends of said clutch members for the purpose of moving the same, and a spring placed between the shanks of said clutch members, said clutch members having the shoulders against which said spring thrusts, substantially as and for the purpose specified.

5. The combination of a pulley having a cylindric flange and two inversely and radially movable clutch members of the type specified with a clutch-arm consisting of two parallel bars having grooves upon their proximate faces in which the shanks of the clutch members slide and mechanism for moving said clutch members, substantially as and for the purpose specified.

6. In a friction-clutch, a frame for supporting the clutch members, having radial arms arranged in pairs on opposite sides of the shaft, each clutch-arm consisting of two parallel bars having grooves on their proximate faces, and a yoke connecting the same, substantially as and for the purpose specified.

7. The combination of a pulley having a cylindric flange and two inversely and radially movable clutch members of the type specified with a wedge interposed between the inner ends of the shanks of the clutch members and provided with guides and dovetailed tongue-and-groove connections between the wedge and the inner ends of said clutch members, and mechanism for moving said wedge, substantially as and for the purpose set forth.

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LOUIS J. HIRT.

Witnesses:
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LEONARD WATSON.