No. 702,834. Patented June 17, 1902.

H. VÖTSCH.

BRAKE FOR HOISTING APPARATUS.

(Application filed Jan. 26, 1901.)

(No Model.)

Fig. 2.

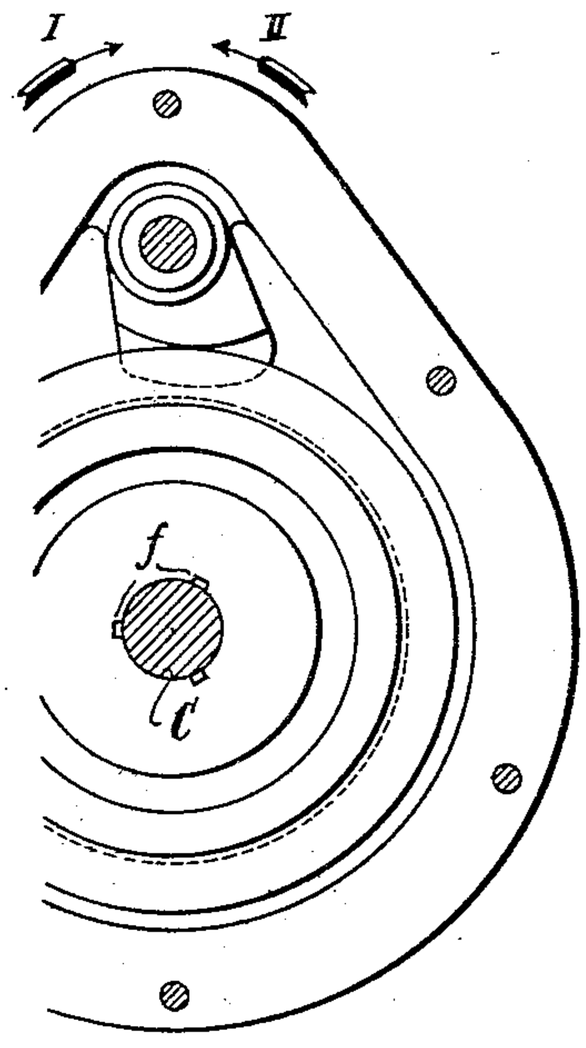

Fig. 1.

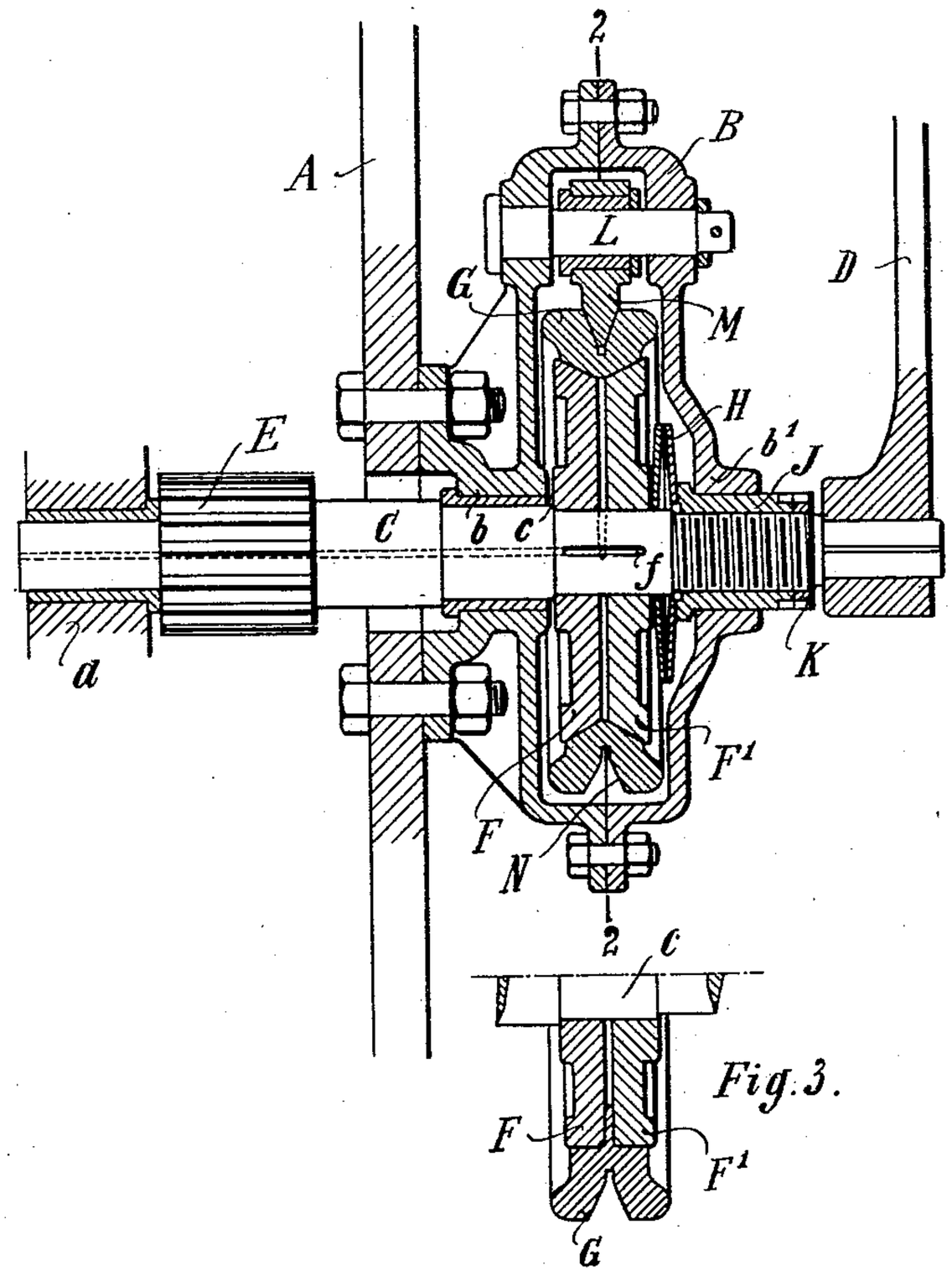

Fig. 3.

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BRAKE FOR HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 702,834, dated June 17, 1902.

Application filed January 26, 1901. Serial No. 44,793. (No model.)

To all whom it may concern:

Be it known that I, HERMANN VÖTSCH, engineer, a citizen of the German Empire, residing at 21 Kettwiger Chaussee, Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Brakes for Hoisting Apparatus, of which the following is a specification.

The present invention has reference to improvements in hoisting apparatus, and particularly to an automatic friction-brake which enables the load to be raised without resistance from the brake, to be held at any elevation automatically by a brake resistance corresponding to the desired safety, and to be lowered by simply overcoming the brake resistance by means of force applied to the crank.

The brake constructed according to the present invention is distinguished from the brakes heretofore known by extraordinary simplicity and compactness of construction, and has furthermore the great advantage that the operating parts are contained in an entirely-closed housing, and are consequently excluded from the wear caused by smut and grit.

The new friction-brake consists, essentially, of two friction-disks mounted upon the driving-shaft so as to rotate with the same, but adapted to be moved relatively toward and from each other, and a friction-ring provided with suitable friction-surfaces, which said friction-ring is carried upon the peripheries of the friction-disks and is prevented from turning when the load is lowered by a detent operating from one side, while the friction-disks are pressed constantly against the friction-ring by a suitable spring. In consequence of this construction the friction-disks carry the friction-ring along when the load is lifted; but when the load is lowered the friction-ring is held fast by the detent and the load is braked.

The nature of the invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section of a friction-brake constructed according to this invention. Fig. 2 is a vertical section on the line 2 2, Fig. 1, part being broken away. Fig. 3 shows a sectional view of a modified construction of the friction-disks and the friction-ring, part being broken away.

Similar letters of reference designate corresponding parts throughout the several views of the drawings.

Referring to the drawings, the letter A designates a frame, to which the housing B of the brake is attached by bolts or other suitable means. This housing is made of two longitudinal dished parts, having suitable flanges, through which are passed bolts or screws for uniting the same. The said housing is provided with two hubs *b b'*, in which one end of the driving-shaft C is supported, while the other end of said shaft is supported in a suitable bearing *a*, formed in a part of the frame A. The driving-shaft is provided at one end with a square post, to which is attached a suitable crank D for turning said shaft, and the motion of the shaft so induced is communicated to the winding-drum (not shown) from a gear-wheel E, rigidly mounted on said shaft in the usual manner. Within the housing B are placed two friction-disks F and F', which are keyed to the shaft C by means of feathers *f*, so that these friction-disks turn with the shaft, but can be moved toward and from each other. The circumferences of these friction-disks are made conical or tapered and are so arranged that the apexes of the cones face each other, while the frictional conical surfaces slope in different directions. Surrounding and mounted upon the peripheries of said friction-disks is a friction-ring G, provided with friction-surfaces conforming to the friction-surfaces of the friction-disks. The friction-disk F abuts against a shoulder *c*, formed on the driving-shaft C, and the other friction-disk F' abuts laterally against dished or cupped springs H, which are placed loosely upon the priving-shaft C and are acted upon by an adjusting-nut J, screwed upon the driving-shaft C. The springs H serve to press the friction-disk F' constantly against the friction-ring G, and this latter ring against the friction-

disk F, so that ordinarily the three parts are coupled by frictional contact and all turn together. The pressure of the springs H and the pressure caused thereby between the friction-ring and the friction-disks, which friction is to afford the necessary brake resistance, can be adjusted according to circumstances by means of the adjusting-nut J, which is then held in its adjusted position by means of a lock or jam nut K. To reduce the length of the apparatus as far as possible, the adjusting-nut J is turned cylindrically externally, and therefore serves also as a journal for the driving-shaft C in the hub *b'*.

M is an automatic detent acting from one side upon the friction-ring G and which is adapted to prevent the turning of the said friction-ring in the sense of lowering and which said detent I have shown in Figs. 1 and 2 in the form of a wedging-dog. The friction-ring G has its periphery provided with a wedge-shaped groove N, and the wedging-dog is mounted upon a stud L, mounted in the casing and extending parallel with the driving-shaft C. The wedging-dog is provided with an eccentric edge, which is made wedge-shaped or tapered and enters the groove N of the friction-ring in such a manner that if the friction-ring is turned in the direction of lowering the load the increased radii of the wedging-dog cause the latter to engage with the friction-ring and to hold the same against rotation, while if the ring is turned in the opposite direction—that is, the direction of lifting the load—the dog is carried out of and remains out of engagement with the friction-ring and the ring is free to turn.

The operation of the brake mechanism is as follows: In raising the load the shaft is turned by means of the crank D in the direction of arrow I, Fig. 2, and during this movement the friction-ring G turns freely with the friction-disks F F', as the wedging-dog M has no retarding action on the friction-ring. The load is therefore lifted as usual without any braking action. If the moment of the load exceeds the moment of force at the crank or if the force is slackened or released at the crank, the load tends to run down and causes a reverse movement of the mechanism—that is, a movement in the direction of arrow II, Fig. 2. The first slight reverse movement, however, of the friction-ring G causes the friction or wedging dog to be automatically thrown into engagement with the friction-ring and checks its motion. Since the friction-disks are coupled to the friction-ring by frictional contact induced by the pressure of the springs H, said friction-disks are also prevented from further retrograde turning so long as the moment of friction between the friction-ring and the friction-disks balances the moment of load. To hold the load after the release of the crank, the moment of friction must exceed the moment of load, and the amount of this excess will depend on the special purpose for which the apparatus is designed or intended. When the load is to be lowered, the crank is turned backward, and consequently the friction-disks F F' turn in the stationary friction-ring G and the moment of friction acts as a brake. For the purpose of lowering the load there is required, therefore, only a moment of force which is somewhat greater than the difference between the moment of friction and the moment of load.

Of course it is to be understood that it is not absolutely necessary to have the frictional contact-surfaces between the friction-ring and the friction-disks made tapering or conical, as it is evident, as shown in Fig. 3, that flat surfaces could be used; also, the wedging-dog may be replaced by another form of detent—for instance, by a ratchet-pawl.

What I claim as new is—

1. The combination of two friction-disks having relative lateral movement, means tending to hold the disks together continuously, a friction-ring surrounding the disks, and means adapted to hold the ring against movement.

2. The combination of two friction-disks having relative lateral movement, a spring tending to hold the disks together, a friction-ring surrounding the disks, and means adapted to hold the ring against movement.

3. The combination of two friction-disks having relative lateral movement, means tending to hold the disks together continuously, a friction-ring surrounding the disks, and an eccentric wedging-dog adapted to hold the ring against movement.

4. The combination of the shaft, two friction-disks to turn in unison upon the shaft, one of which is movable from and toward the other, two cup-shaped springs mounted upon the shaft, tending to hold the disks together, a friction-ring surrounding the disks, and an eccentric wedging-dog adapted to hold the ring against movement upon rotation of the shaft in one direction, and to release the ring upon rotation of the shaft in the reverse direction.

5. The combination with the shaft, of disks mounted thereon, a friction-ring surrounding the disks, and an eccentric wedging-dog forcing the ring into engagement with the disks.

6. The combination with the shaft, of friction-disks mounted thereon, a spring tending to force the disks together, and means adapted to be forced into engagement with the disks to act as a brake.

7. The combination of the friction-disks, a spring tending to force the disks together, a friction-ring surrounding the disks, and an eccentric wedging-dog adapted to force the ring into engagement with the disks.

8. The combination with a shaft of two friction-disks having cone-shaped peripheries mounted upon the shaft and movable longi-

tudinally thereon, cup-shaped springs mounted upon the shaft and tending to force the disks together, a friction-ring surrounding the disks, and an eccentric wedging-dog adapted to force the ring into engagement with the disks.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HERMANN VÖTSCH. [L. S.]

Witnesses:
WILLIAM ESSENWEIN,
P. LIEBER.