No. 762,988. PATENTED JUNE 21, 1904.

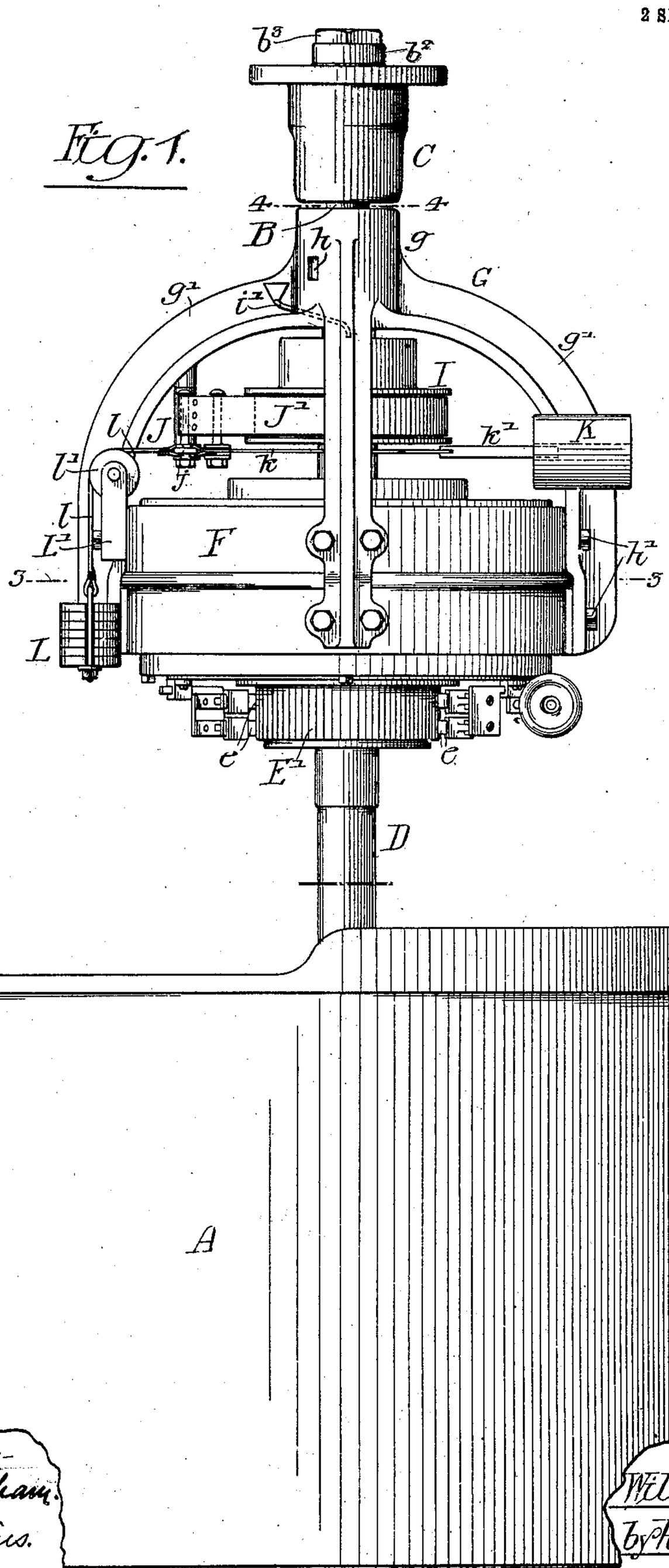
W. L. D'OLIER.

ELECTRICAL DRIVE FOR CENTRIFUGALS.

APPLICATION FILED NOV. 9, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:-
Frank L. Graham.
Herman E. Metius.

Inventor:
William L. D'Olier;
by His Attorneys;
Howson & Howson

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

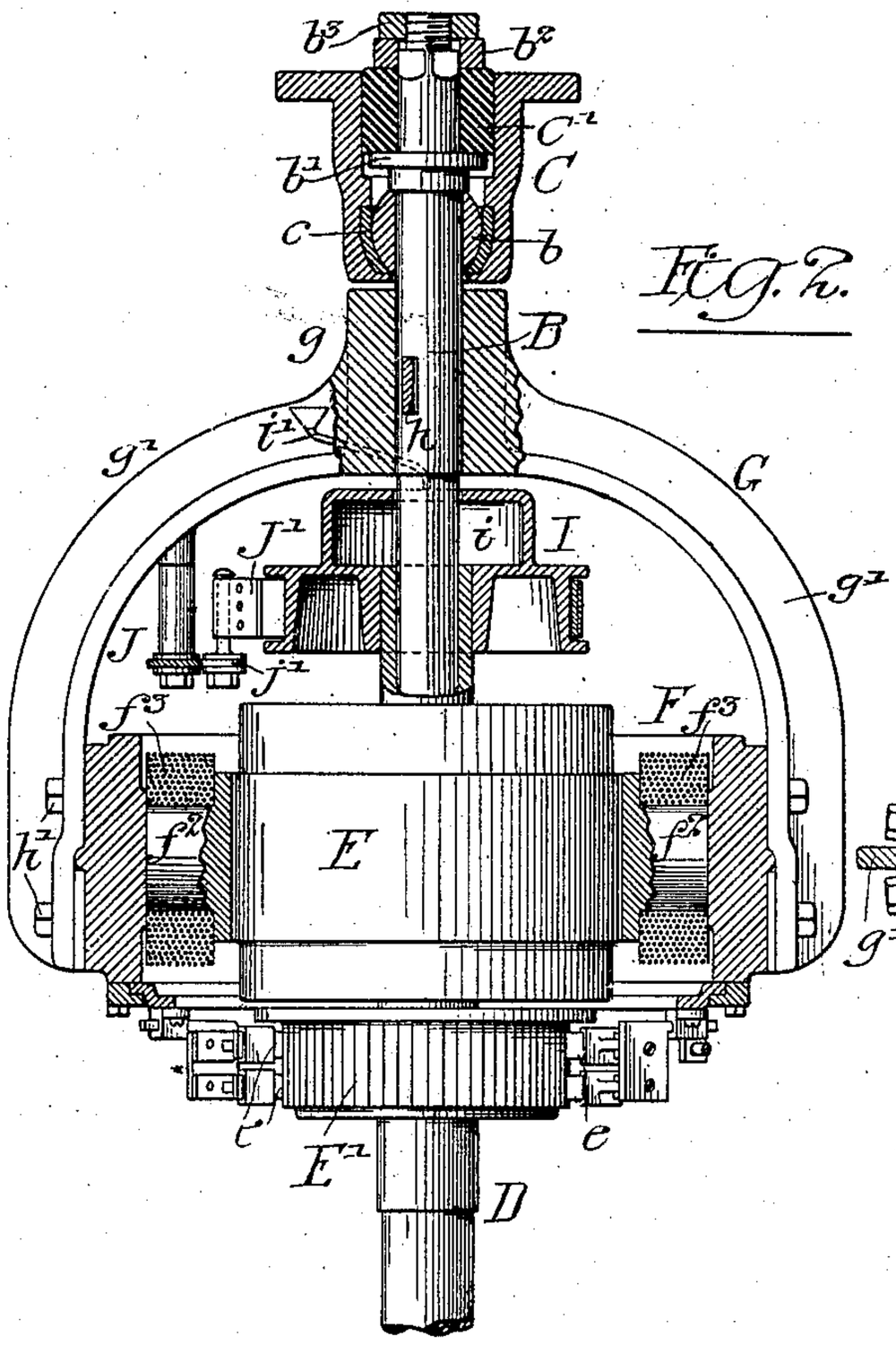


Fig. 3.

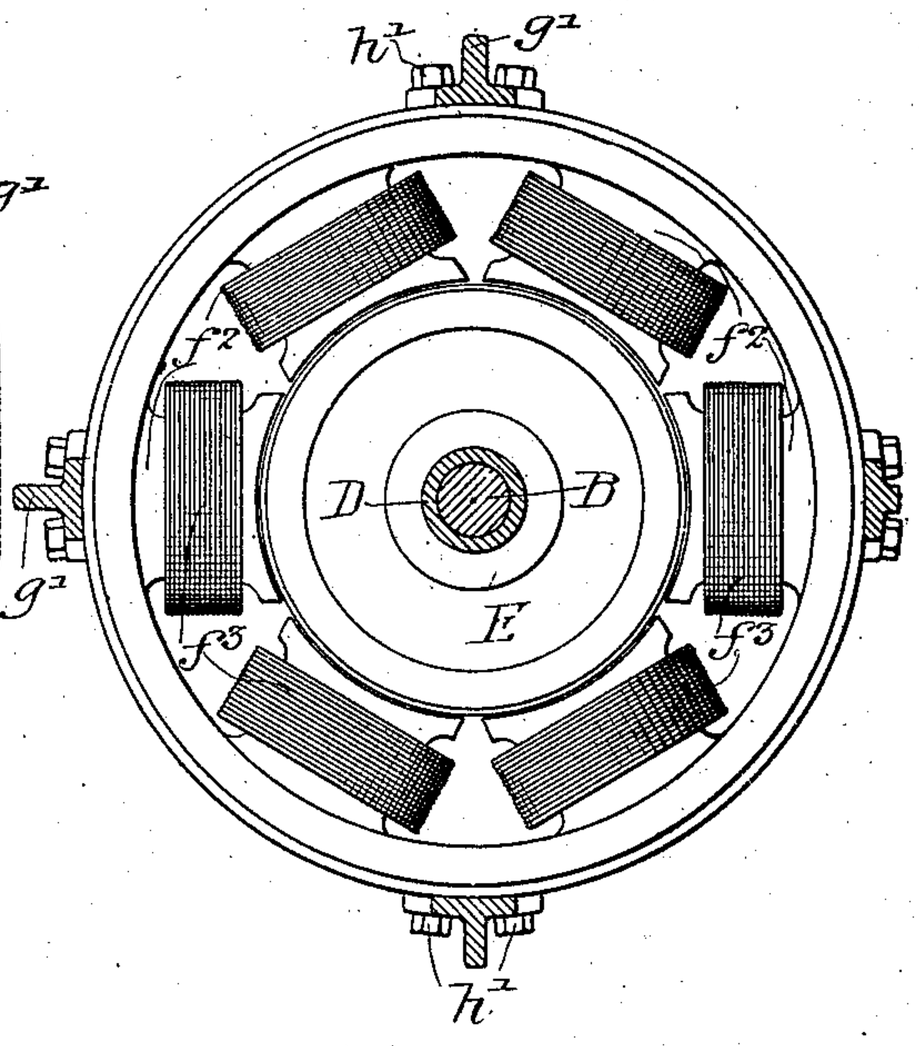
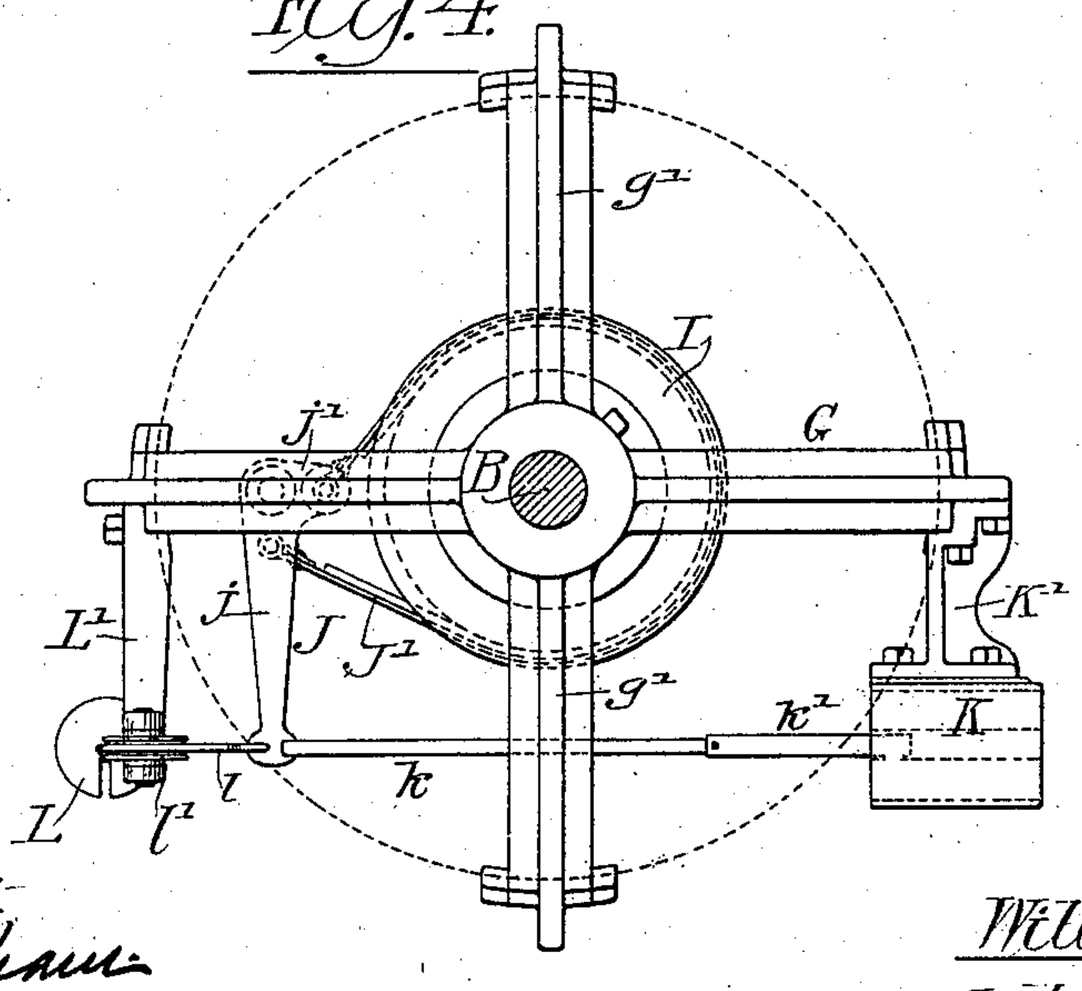


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM L. D'OLIER, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRICAL DRIVE FOR CENTRIFUGALS.

SPECIFICATION forming part of Letters Patent No. 762,988, dated June 21, 1904.

Application filed November 9, 1901. Serial No. 81,719. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. D'OLIER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Drives for Centrifugals, of which the following is a specification.

My invention consists of electrically-controlled braking means for automatically retarding the motor and centrifugal when the current through the motor has been interrupted.

Centrifugal machines as now commonly constructed and employed are mounted to rotate at a rapid rate about a vertical shaft or axis, such shaft having such connection with a base or fixed object that it may deflect or be deflected out of a truly vertical position without in any way interfering with the operation of the centrifugal machine. It often happens that the mass of material being treated within the centrifugal machine is so distributed that its center of gravity is not in the same vertical line with that of the centrifugal machine itself. In consequence when the centrifugal and material are rotating at a high speed there is force acting tending to deflect the centrifugal and its driving-shaft from a truly vertical position. It is to permit the centrifugal and the material contained in it to assume some such deflected position in order to relieve the centrifugal and the shaft from dangerous strains that the method of supporting a shaft or driving-axis above referred to is resorted to.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side elevation of my motor as applied to a centrifugal machine. Fig. 2 is a view, partly in section and partly in elevation, of the electric motor and the suspension means for the entire apparatus. Fig. 3 is a sectional plan view on the line 3 3, Fig. 1. Fig. 4 is a sectional plan view on the line 4 4, Fig. 1.

Referring to Fig. 1, A is the usual casing of a centrifugal machine as now commonly employed in the arts. B represents a fixed inner shaft or spindle hung from the main bearing C, which is mounted upon or secured to some fixed object. It is upon this inner shaft B that both the centrifugal and the electric motor are mounted and hung. *b* is a spherical enlargement of the shaft B or a ball surrounding said shaft. This ball *b* constitutes a bearing whose remaining element is the bushing *c*, secured in the lower end of the casing C. On the shaft B and above the ball *b* is a flange *b'*, between which and an adjustable collar b^2 is a mass of resilient material C', such as rubber and the like. This resilient mass C' fits the bore in the upper portion of the casing C and may be compressed at will by forcing downwardly b^2 by means of the nut b^3. From this structure it is readily seen that in case centrifugal is deflected from the truly vertical position the shaft B will rotate upon its bearing-surface *b*, and thereby compensate for the tendency of the centrifugal to deflect. The motion of the shaft B is opposed by the resilient material C', which must be compressed at one side or the other when such shaft is deflected from the vertical. By compressing the material C' more or less the opposition which it offers to the movement of the shaft B may be graduated and varied.

Surrounding the shaft B is the hollow shaft or quill D, upon which is mounted the centrifugal machine and by which the centrifugal machine is driven. The inner stationary shaft B operates as a bearing. Mounted upon this same quill D is the armature E of the electric motor, the method of mounting being the usual spider keyed to the shaft or any other of the numerous means well known in the art.

E' represents the commutator of the motor, and *e e* represent the brushes.

F represents the yoke or field ring of the motor, from which extend the poles f^2 here shown six in number and supplied with the usual windings f^3.

It is necessary for the satisfactory operation of the electric motor, both as to its torque efficiency and regulation, that the armature E always be in the same relation with respect to the poles f^2, both as to distance from said poles measured in a diametrical direction and also as to the amount of surface of the armature embraced by the pole-faces. It is to this end that I provide the supporting-frame G,

whose cross-section is that of a T-bar or any suitable substance, and which is bolted at its four lower extremities to the field-ring F and keyed at its hub *g* by the key *h*. In consequence the field-frame is stationary and always in fixed relation with respect to the stationary shaft B; but the armature E is mounted upon the quill D, which is also always in fixed relation with said inner shaft B, and in consequence the armature E and the field of the motor remain always in the same position with respect to each other, regardless of the amount the shaft B may be deflected from a truly vertical position due, to the unsymmetrical loading of the centrifugal device. From the structure just described it is seen that the field-ring is hung from the frame G, secured to the fixed shaft B.

Mounted between the upper end of the armature E and the hub *g* is the flanged brake-wheel I, secured to the quill D.

J′ represents the brake-strap, which embraces nearly the entire circumference of the wheel I and is secured at its one end to an arm *j* and at its other end to an arm *j*″ of the brake-lever J, which is pivoted to a support from one of the arms of the frame G. The arm *j* of the lever J is connected by the rod or link *k* with the iron plunger *k*′ of the solenoid K, which is mounted upon the bracket K′, extending from another arm of the frame G. There is also secured to the arm *j* a cord or rope or chain *l*, which passes over a pulley *l*′ on the bracket L′, secured to the frame G. At the lower end of the cord *l* is the weight L. The weight L exerts a force upon the brake-lever J, turning it about a pivot and drawing the brake-band J′ tightly against the periphery of the brake-weeel I, thus stopping the centrifugal and motor or decreasing its speed. When current is passing through the armature of the motor, however, the solenoid K, which is wound with relatively large conductor and connected in series with said armature, is energized and sucks or draws in the plunger *k*′, thus lifting the weight L and relieving the brake-lever J, which releases the strain from the brake-band and removes the friction from the brake-wheel I. Thus while the electric motor is operating the centrifugal the braking effect is removed, and the brake is lifted or removed by the solenoid K upon the instant of turning current on the electric motor to start the apparatus in a manner very similar to that practiced in connection with electric elevator apparatus.

Integral with the brake-wheel I and extending beyond the end of the shaft or quill D is the reservoir *i* to receive oil or other lubricating substance which is fed through the funnel-tube *i*″ through the opening in the upper end of *i*, concentric with the shaft B. When the centrifugal machine is in motion, the lubricating material is thrown against the outer side walls of *i* and maintained there, so that relatively small amounts are constantly passing downwardly between the shaft B and the quill D.

It is to be understood that I may locate the brake-wheel I below the armature between said armature and the centrifugal A. It is also to be understood that the bearing C may be brought down close to the armature E—as, for example, in the position occupied by the brake-wheel I, as shown in the drawings. In such case the hub *g* of the frame G would be above and outside of the bearing C in the same relative position as the hub *g* and the brake-wheel I, as shown in the drawings herein.

Though I have shown an electric motor of the direct-current type, it is to be understood that I may employ an alternating-current motor of any type, such as the induction-motor; but in any event I employ the general structure herein shown and described to maintain the fixed and rotating portions of the motor always in the same relative position with respect to each other.

What I claim is—

1. The combination in a device of the character described, of a frame, a shaft fixed thereto, the fixed element of a motor supported by said frame, a hollow shaft rotatable on said fixed shaft and operatively connected to the rotatable element of said motor, a brake-drum fixed to said hollow shaft, a lever pivoted to the frame, a brake-band connected to the lever and coöperating with said drum, means tending constantly to apply said brake, and means for opposing said first-mentioned means for releasing the brake.

2. The combination in a device of the character described, of a frame, a shaft fixed thereto, the fixed element of a motor supported by said frame, a hollow shaft rotating on said fixed shaft and operatively connected to the rotatable element of said motor, a brake-drum fixed to said hollow shaft, a lever pivoted to the frame, a brake-band connected to the lever and operative upon said drum, a weight operative upon said lever to set the brake, and means operating to release said brake during the operation of the motor.

3. The combination in a device of the character described, of a frame, a shaft fixed thereto, the fixed element of a motor carried by said frame, a hollow shaft rotating on said fixed shaft and operatively connected to the rotatable element of said motor, a brake-drum fixed to said hollow shaft, a lever pivoted to said frame, a brake-band connected to the lever and operative upon said drum, a weight operating to set the brake, and a solenoid in series with the motor for releasing said brake during the energization of said motor.

4. In combination, a centrifugal machine, a motor for driving the same, a fixed deflectable shaft, a hollow shaft embracing the same, the rotatable element of a motor and said centrif-

ugal secured to said hollow shaft, a brake-drum secured to said hollow shaft, a frame secured to said fixed shaft and supporting the fixed motor element, a brake-strap coöperating with said brake-drum, a lever pivoted to said frame for controlling said brake-strap, and a solenoid secured to said frame for controlling said lever, said solenoid being connected in circuit with said motor.

5. In combination, a fixed deflectable shaft, a hollow shaft embracing said fixed shaft, the rotatable element of a motor secured to said hollow shaft, a frame secured to said fixed shaft, the fixed element of said motor supported by said frame, a brake-drum secured to said hollow shaft, a brake-strap coöperating with said brake-drum, a lever for controlling said brake-strap pivoted on said frame, means for actuating said lever to set the brake when the current through the motor is interrupted, and a solenoid in the circuit of said motor and mounted on said frame for actuating said lever when the motor is in operation.

6. In combination, a deflectable shaft, a motor supported thereby, a brake-drum connected to the rotatable element of the said motor, a brake-strap coöperating with said brake-drum, a frame deflectable with said shaft, a lever for controlling said brake-strap pivoted to said frame, and electromagnetic means mounted on said frame for controlling said lever.

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

WILLIAM L. D'OLIER.

Witnesses:

WILL. A. BARR,

JOS. H. KLEIN.