(No Model.) 2 Sheets—Sheet 1.

G. F. CARD.

GOVERNOR FOR ELECTRO DYNAMIC MACHINES.

No. 411,783. Patented Oct. 1, 1889.

Fig. 1.

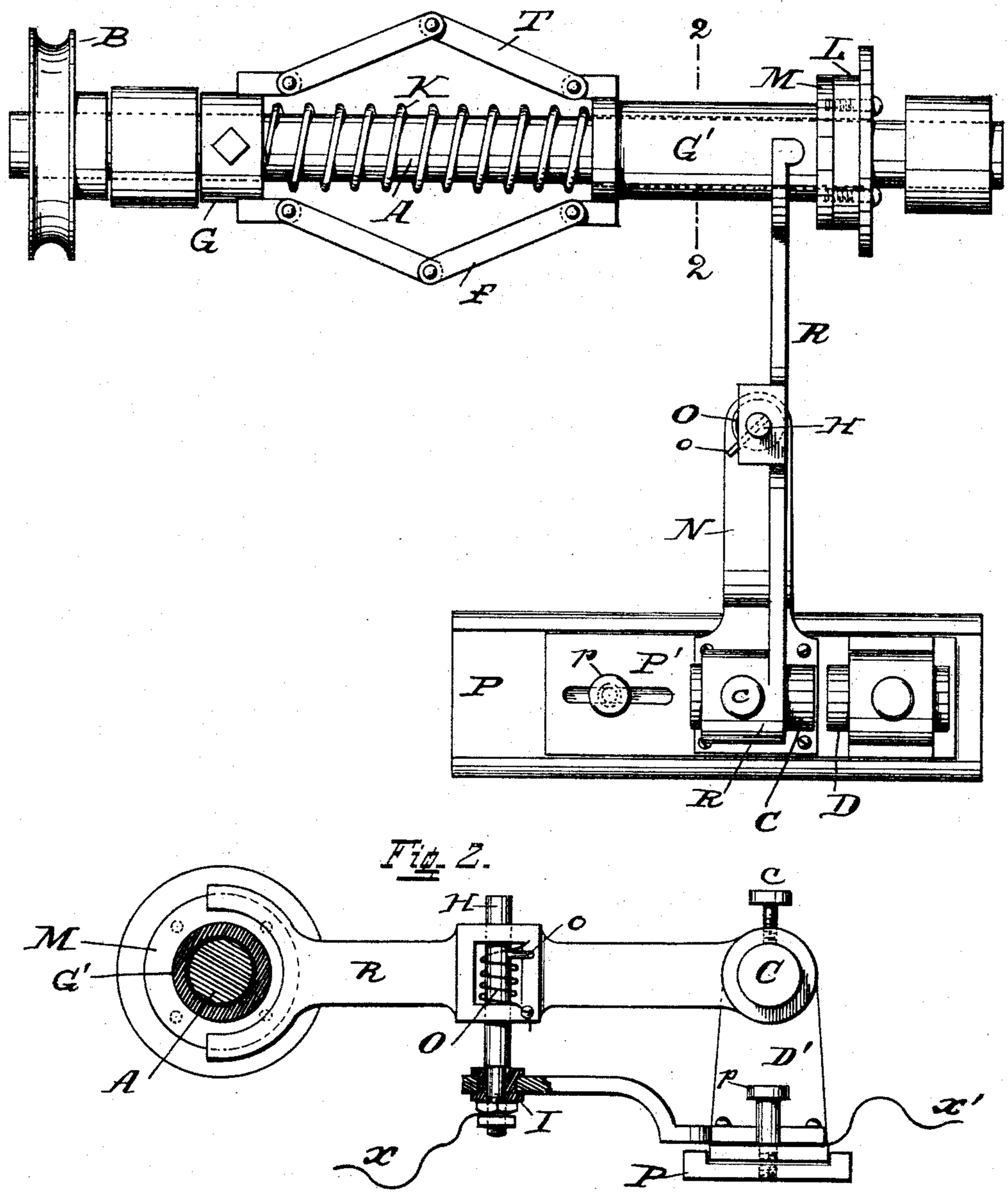

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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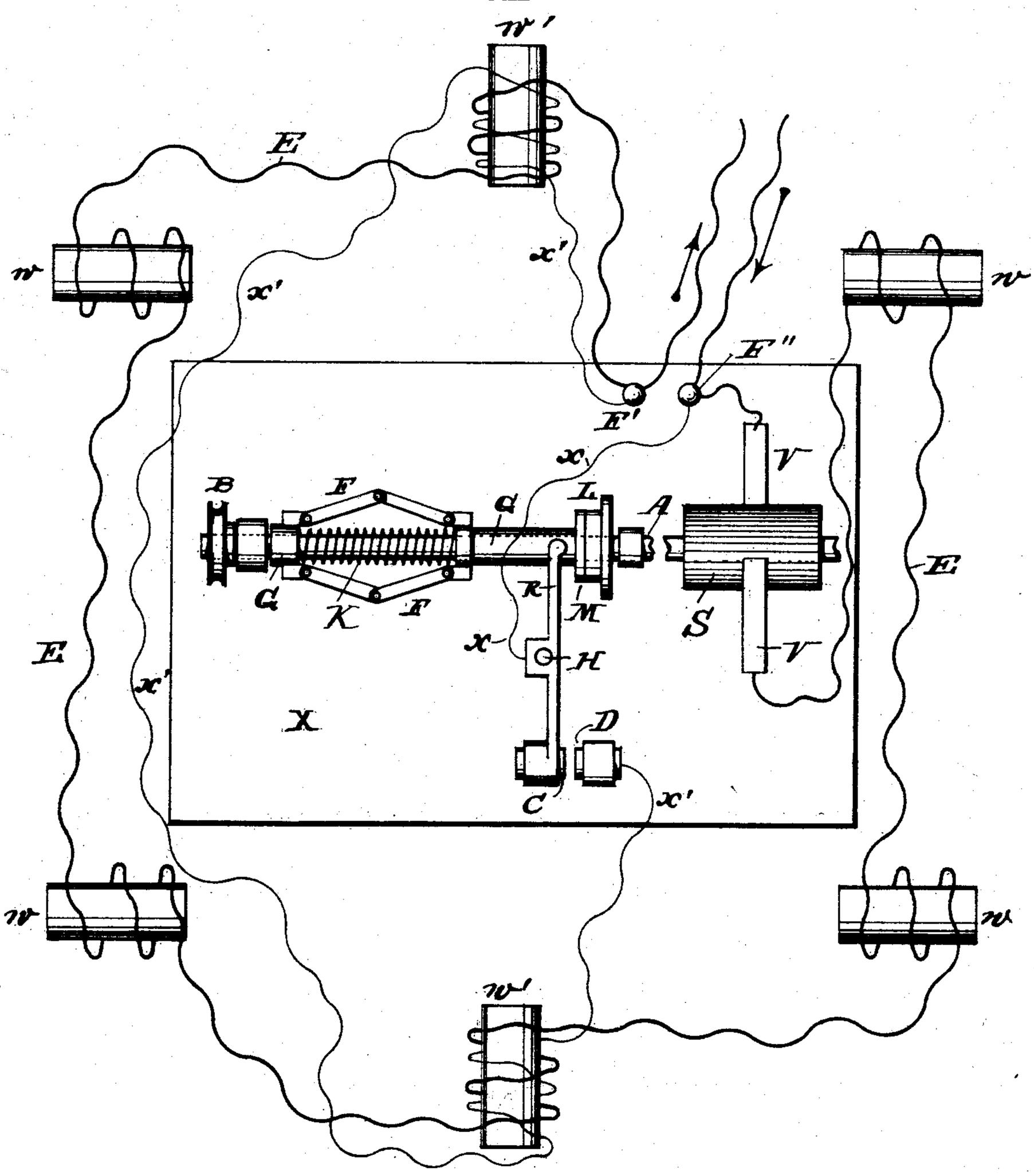
Fig. 3.



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Inventor
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UNITED STATES PATENT OFFICE.

GEORGE F. CARD, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE GEORGE F. CARD MANUFACTURING COMPANY, OF CINCINNATI, OHIO.

GOVERNOR FOR ELECTRO-DYNAMIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 411,783, dated October 1, 1889.

Application filed February 1, 1889. Serial No. 298,318. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. CARD, a citizen of the United States, residing at Covington, in the county of Kenton and State of Kentucky, have invented a certain new and useful Improvement in Governors for Electro-Dynamic Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improvement in governors for electro-dynamic machines arranged to automatically maintain a sensible uniform speed of armature rotation under changing loads, current forces, &c., and whose construction is further such as to promptly bring the armature to rest either upon its rotation dropping below a given range of velocities or upon a disablement of the centrifugal regulator.

My present invention is an improvement on the one shown and described in my pending application filed October 29, 1888, Serial No. 289,384.

My improved governor is applicable to that class of electric motors or dynamic machines in which a differential circuit is used to check or govern the motion of the machine caused by the direct circuit or windings. In the normal running condition of the machine this differential circuit is open and currentless and inert, but is capable of being automatically closed either by a speed of the armature in excess of the maximum velocity assigned to it or for which it is gaged, or by the opposite action of slowing down toward a stop, or also by the disorganization of the centrifugal mechanism of the governor itself. Whenever, from either cause named, said differential circuit becomes the path of a current, its reversely-directed windings tend to neutralize and, if maintained long enough, to even overpower the magnetism of the direct windings.

In the accompanying drawings, Figure 1 is a top plan view of my improved governor. Fig. 2 is a vertical section taken through the line 2 2, Fig. 1. Fig. 3 is a diagram of the motor-circuits, showing the differential field-magnet coil.

Like letters of reference indicate identical parts in all the figures.

Supported upon any suitable base X is a field-magnet having several pairs of cores *w w*, arranged in any convenient manner, upon which is wound the wire E of a normally-closed circuit, which conveys the driving-circuit. Besides the direct-winding field-cores, one pair—say *w′ w′*, Fig. 3—are wound in a reverse direction, with a comparatively-low resistance-wire *x′*, which, with wire *x*, forms a normally-open loop with the direct-winding wire, which when closed shunts part of the current in a direction opposite to the driving-current. This shunt-circuit *x x′* is known as the "differential circuit," the wire *x* conveying the current from the direct-winding wire at F through the pin H, insulated at I to the carbon C, and the wire *x′* connected through the standard with the carbon D, and thence wound in a reverse direction around one pair of the field-magnets and thence connecting with the direct-winding wire at F′.

A is a shaft revolved by a belt passing over the pulley B and over the driving-shaft of the machine, so that the rotation of the shaft A always corresponds with the speed of the motor.

F is a centrifugal regulator hinged at the ends to the collars G G′.

K is a spring, which tends to keep the regulator F in a collapsed condition.

On the collar G′ is a disk L, to which is fastened a ring or disk M, of some fibrous substance—such as wood, paper, or the like—or any convenient non-conducting material.

C D are two carbons connected with the wires *x x′*, and which when brought together close the differential circuit. The carbon D is supported upon the standard D′ on the plate P. Sliding horizontally on the plate P is a smaller plate P′, held in place by the set-screw *p*. To this plate P′ is attached an arm N, on the outer end of which is pivoted near its center a lever R. To one end of this lever is attached the carbon C, held tightly by the set-screw *c*. To give this lever a somewhat firm position, but yielding elastically to any pressure, the spring O is provided with the stop-pin *o*, by which the position of the lever

can be adjusted and fixed. By the plate P′ and set-screw *p* the arm carrying the lever R is adjusted at any point desired to regulate the distance between the outer end of the lever and the disk M. If it is desired to give the motor a wide scope of velocity, the lever is moved farther from the disk. As the velocity of the machine increases to the maximum assigned to it, the centrifugal regulator F draws the collar G′ forward and with it the disks L and M, bringing the disk M against the outer end of the lever R, forcing the other end and the carbon C toward or against the carbon D, and closing the differential circuit, which at once neutralizes the direct current and reduces the speed of the motor. As this speed is reduced the regulator F collapses and moves the disk M back, and the spring O causes the lever to resume the position shown in Fig. 1, separating the carbons C D and again breaking the differential or neutralizing circuit.

By the construction and arrangement no metal surfaces are brought together to cause wearing or sparks, the motion of the lever is elastic, its action prompt, and the varying resistance peculiar to carbon makes the action of the governor very delicate and sure.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a governor for an electro-dynamic machine or motor, the combination, with a differential neutralizing circuit, of an elastically-pivoted lever and two carbon points for making or breaking the differential circuit, so arranged that a velocity of the machine beyond the maximum fixed moves the lever and closes the circuit through the carbon points until the velocity is reduced, substantially as and for the purpose described.

2. In a governor for an electro-dynamic machine or motor provided with a differential or neutralizing circuit, the carbons C D, one of which is stationary and the other attached to a lever R, said lever pivoted at or near its center and actuated by the regulator F to govern the speed of the machine, substantially as and for the purpose described.

3. The lever R, elastically pivoted at or near its center, in the manner described, in combination with a centrifugal regulator operating to close the differential circuit at speeds above the maximum, substantially as and for the purpose described.

4. In a governor for an electro-dynamic machine or motor provided with a differential or neutralizing circuit, the regulator F, in combination with the collar G′ and non-conducting disk M, and lever R, carrying the carbon C, substantially as and for the purpose described.

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Witnesses:
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