(No Model.)

G. H. WHITTINGHAM.

GOVERNOR FOR ELECTRIC MOTORS.

No. 408,333. Patented Aug. 6, 1889.

Fig. 1.

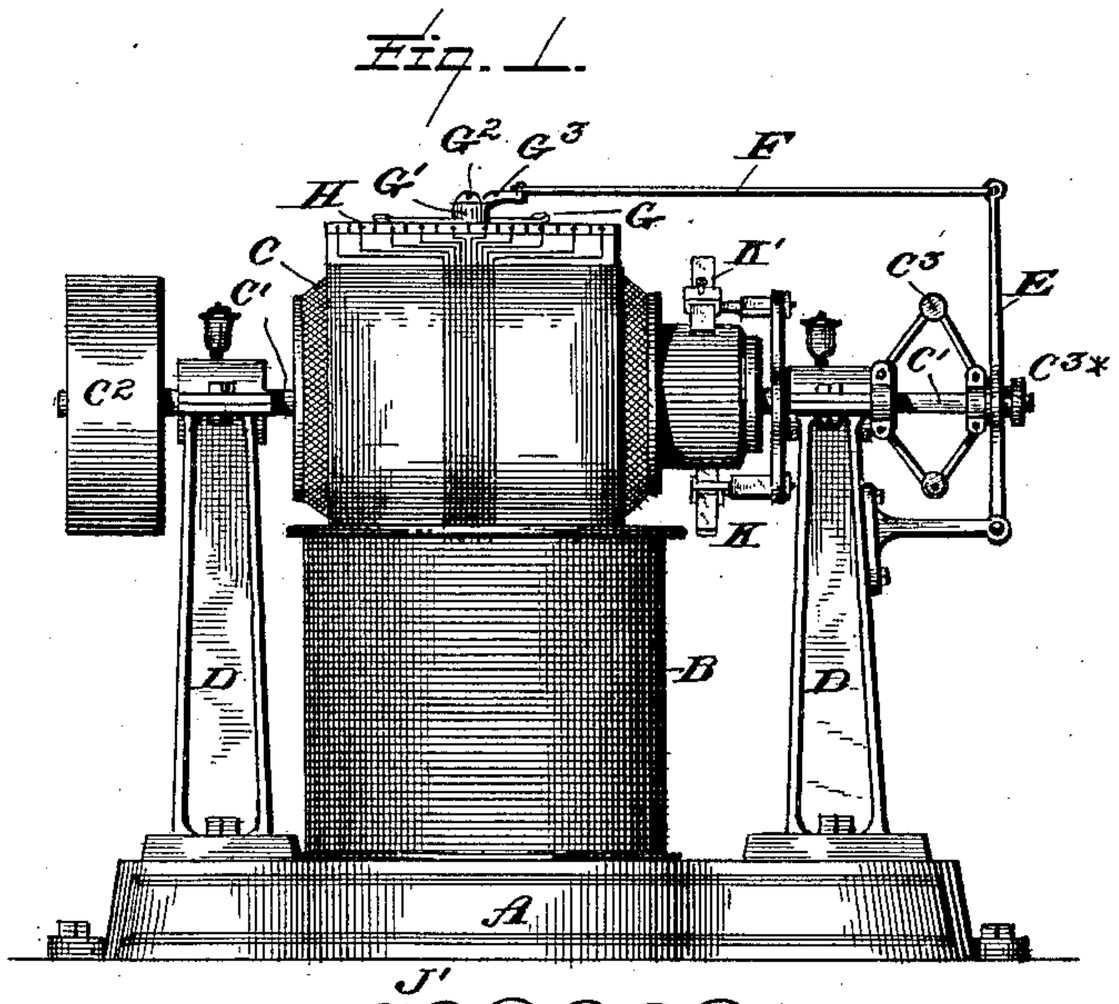
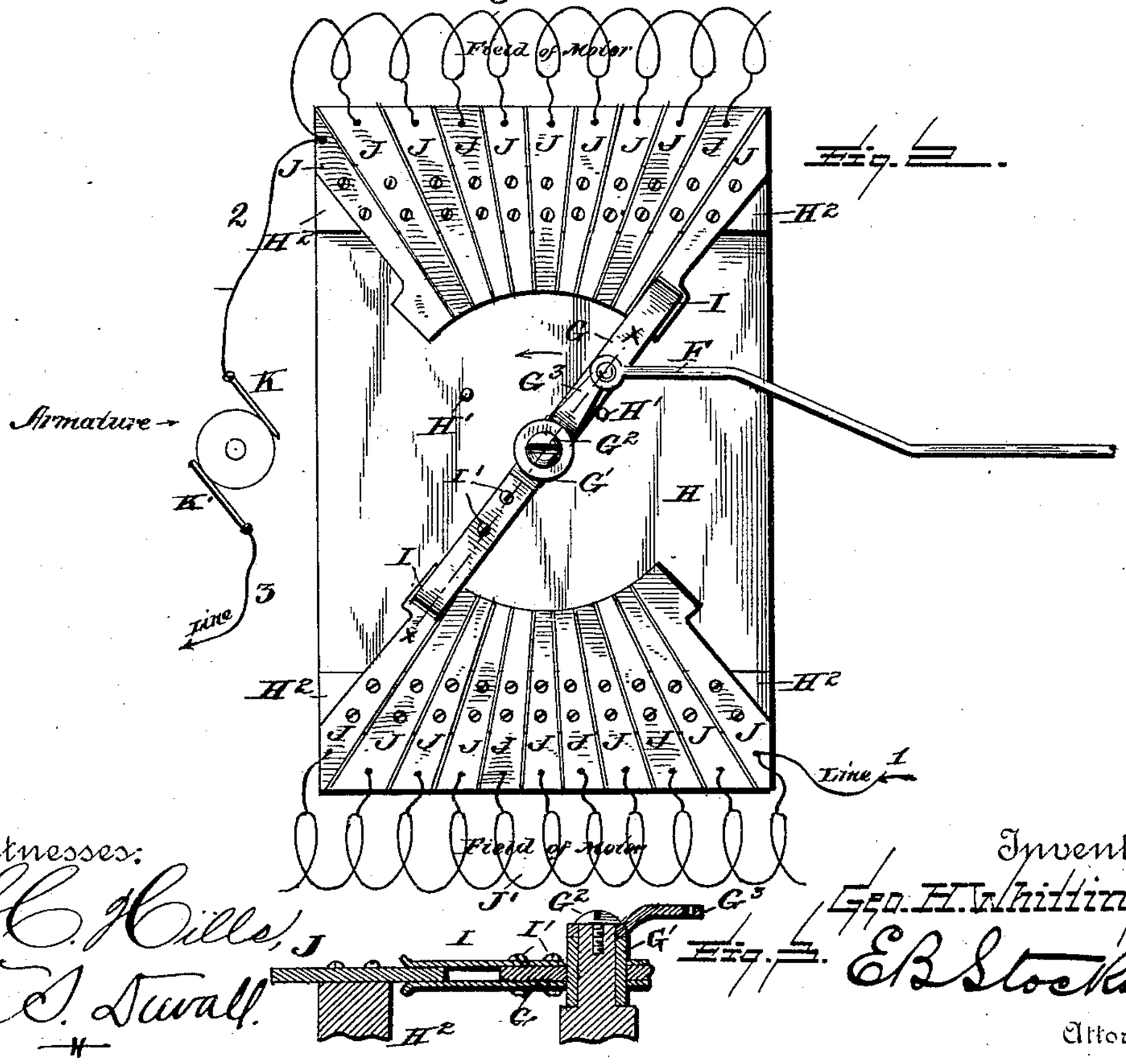


Fig. 2.



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GOVERNOR FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 408,333, dated August 6, 1889.

Application filed October 9, 1888. Serial No. 287,657. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. WHITTINGHAM, a citizen of the United States, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Electric-Motor Governors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to an electric-motor governor, the object being to provide an electrical device or devices to be used in connection with a centrifugal or other mechanical governor in such a manner that as the variations in the speed of the motor shall affect the mechanical governor it in turn shall serve to vary the strength of the field of the motor. By such a construction and arrangement of the mechanisms employed a motor when relieved of a portion of its load or of the work it is performing will increase its speed of rotation, which increase, being communicated to the mechanical governor, will serve to reduce the magnetic strength of the field of the motor. On the other hand, should load or work of the motor be increased, the motor will naturally rotate with a reduced speed, which, being communicated to the governor, will cause it to increase the strength of the field.

One of the principal objects of the invention is to provide electrical devices co-operating with the mechanical governor, which will not be liable to become fused at the contact-points, and which shall be subject to the operation of the mechanical governor in such a manner as to shunt the supplying-current in accordance with the variations of the load of the motor.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of an electric-motor governor constructed in accordance with my invention. Fig. 2 is a plan. Fig. 3 is a section on line *x x* of Fig. 2.

Like letters refer to like parts in all the figures.

A represents any suitable base, upon which the field-magnets B and armature C of an electric motor are mounted and are operatively connected and D are standards provided with bearings for the shaft C′ of the armature. This shaft C′ is extended and provided with a belt-pulley C^2 and a centrifugal or other governor C^3, having connection with an oscillating lever E, which connection may be of any suitable construction permitting the rotation of the governor upon the shaft and the reciprocation of one of its collars $C^{3\times}$ along the same as the balls of the governor approach or recede, in accordance with the speed of the rotation of the shaft. A connecting-rod F extends from the upper end of the oscillating lever E, and is pivotally connected with a rock-arm or pivotally connected with a shunt-arm G. In this instance the shunt-arm comprises a hub G′, mounted on the pivot G^2, seated in a bridge H of non-ducting material, extending from one of the field-magnets to the other and insulated therefrom.

From the hub G′ there extends an arm G^3, to which, as shown, the connecting-rod F is pivotally secured. Said rod, however, may be secured directly to the shunt-arm G at one or the other side of its pivot. Stops H′, projecting upwardly from the bridge H and into the path of the shunt-arm, are employed to limit the movement of said arm. Each end of the shunt-arm G terminates in contact-plates I, secured to the arm by screws I′, or in any other suitable manner, one upon the upper and the other upon the lower surface of the arm.

At each end of the bridge H is a block H^2, upon which is arranged a series of conductive strips or plates J, insulated from each other and terminating at their inner ends on a curved line, conforming to the path of the ends of the shunt-arm G, the terminal plates I of which embrace the upper and lower surfaces of the strips or plates J, with which said shunt-arm plates I are in contact. Each of the plates J is electrically connected by wire or other means J′ with a layer, or a portion of a layer, or it may be a collection of layers, of the coils of the field-magnet.

The line 1, by which the current of electricty is conducted to the motor, is connected with the first of the series of plates J at that end of the bridge, while the line 2, by which the current is further conducted, is connected

with the diagonally-opposite plates J at the opposite end of the bridge. This line 2 extends to one of the brushes K of the motor, and from the other brush K′ the line 3 extends, by which the current is conducted from the motor.

The operation of my invention is as follows: Taking the shunt-arm in the position shown in Fig. 2, the full strength of the current is being supplied to the motor. Now if the labor of work of the motor is reduced, the full strength of current necessarily increases the rapidity of the rotation of the armature of its shaft. This causes the balls of the governor C^3 to recede from the shaft, and by means of the mechanical connection of the governor E the latter is caused to oscillate toward the motor, and through the medium of the connecting-rod F to swing the shunt-arm G on its pivot in the direction indicated by the arrows in Fig. 2. The current then, instead of passing through the diagonally-opposite plates J of the opposite series and the shunt-arm connecting the same, will pass through a pair or pairs of the diagonally-opposite plates J, which are electrically connected with less than all the layers of the field-magnet, and therefore the strength of the field-magnet will be reduced, and the speed of rotation will be correspondingly reduced. The position of the shunt-arm plates I upon the bridge-plates J is therefore controlled continuously when the motor is in motion by the action of the mechanical governor, the strength of the field-magnets decreasing in proportion as said governor moves the shunt-arm a greater or less distance in the direction indicated by the arrows in Fig. 1, and the supply of electricity being increased proportionately as the mechanical governor moves said arm in the opposite direction. By reason of the broad surface of the contact-plates I J the burning or fusing of the same is rendered practically impossible.

The outline of the free ends of the contact-plates need not necessarily be curved, and in such case the shunt-arm may be mounted to move in a line other than curved along over the plates of each opposite series by suitable connection with the governor.

Having described my invention and its operation, what I claim is—

1. The combination, with the field-magnet and armature of an electric motor, of a series of contact-plates arranged on each pole of the field-magnet and electrically connected with the layers of the coils thereof, and an intermediate shunt-arm electrically connected with the opposite series of plates and mechanically connected with a governor arranged to receive motion from the shaft of the armature, substantially as specified.

2. The combination, with each pole of the field-magnet of an electric motor, of a series of insulated contact-plates, each electrically connected with the coils of one side of the magnet, and an interposed shunt-arm having contact-plates adapted to bear upon opposite surfaces of said contact-plates, and means for moving the shunt-arm plates along the series of contact-plates, substantially as specified.

3. The combination with the field-magnet of an electric motor, of an insulated bridge, a series of insulated plates at each end of the bridge terminating in a curved line and electrically connected with the coils of the field-magnet, a shunt-arm pivoted on the bridge and terminating in contact-plates, and stops projecting from the bridge to limit the movement of the arm, substantially as specified.

4. The combination of the magnet B, bridge H, having the blocks H^2, the insulated projecting strips J, electrically connected with the coils of the field-magnet, and the shunt-arm G, mounted on the pivot G^2, seated on the bridge and having the contact-plates I, arranged to embrace the plates J, substantially as specified.

5. The combination, with the magnet B, bridge H, and plates J, mounted on said bridge, of the shunt-arm G, pivoted on said bridge and having the plates I, pivot G^2, and the stops H′, projecting from said bridge, substantially as specified.

6. The combination of the insulated plates J, the shunt-arm G, pivoted between them, the rock or crank arm G^3, attached thereto, rod F, and lever E, connecting said arm G^3 with the governor C^3, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE H. WHITTINGHAM.

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