

(No Model.)

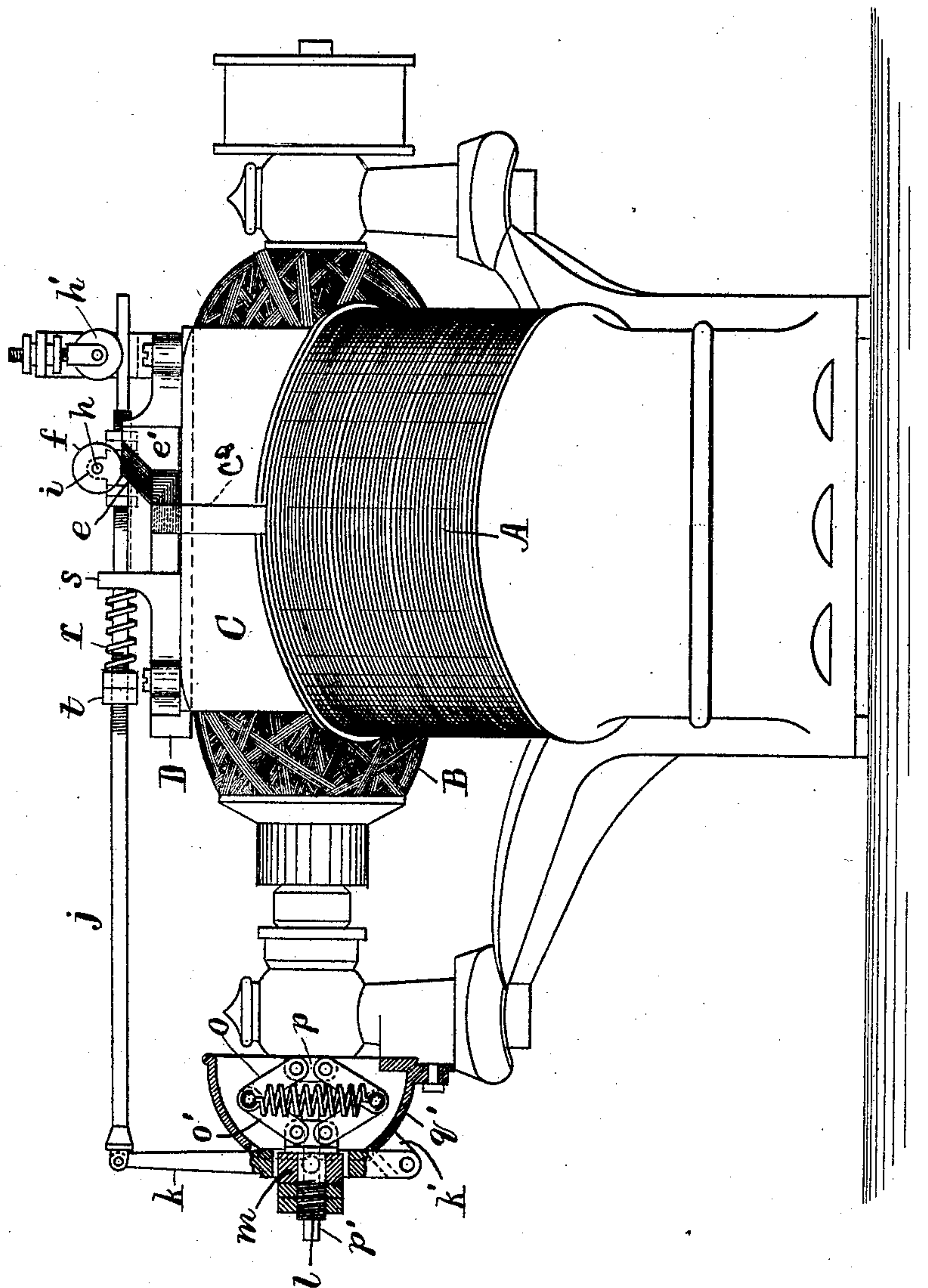
2 Sheets—Sheet 1.

W. BAXTER, Jr.
GOVERNING DEVICE FOR ELECTRIC MOTORS.

No. 466,028.

Patented Dec. 29, 1891.

Fig. 1.



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(No Model.)

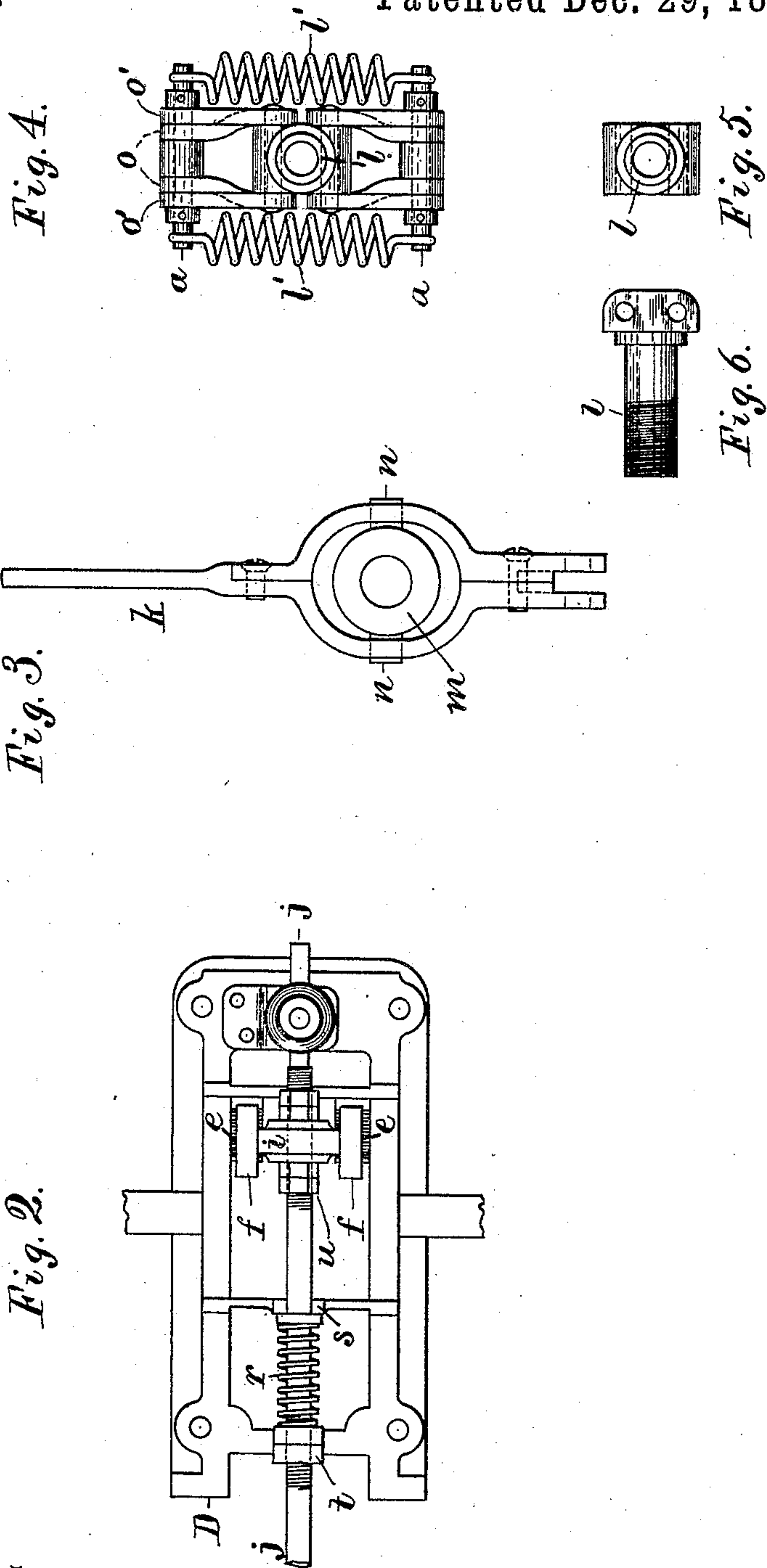
2 Sheets—Sheet 2.

W. BAXTER, Jr.

GOVERNING DEVICE FOR ELECTRIC MOTORS.

No. 466,028.

Patented Dec. 29, 1891.



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UNITED STATES PATENT OFFICE.

WILLIAM BAXTER, JR., OF BALTIMORE, MARYLAND.

GOVERNING DEVICE FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 466,028, dated December 29, 1891.

Application filed April 14, 1891. Serial No. 388,826. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BAXTER, Jr., a citizen of the United States, residing at the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Governing Devices for Electric Motors, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to obviate, so far as possible, the end-thrust of a governor applied to a motor-shaft and to improve the bearing of the contact-pieces actuated by the said governor.

The construction will be understood by reference to the annexed drawings, in which—

Figure 1 is a side elevation of an electric motor provided with my improvements. Fig. 2 is a plan of the shunt-box with part of the governor-rod. Fig. 3 is an end view of the governor-lever and the parts connected directly therewith, viewed at the left hand of Fig. 1; and Fig. 4 is an end view of the governor. Fig. 5 is an end view, and Fig. 6 a side view, of the governor-sleeve.

The shunt-box shown herein is like that shown in my patent, No. 384,116, dated June 5, 1888, except that I have substituted for the shunt-block a pair of rollers to make a rolling contact with the springs which are connected with different sections of the field-coils. The governor resembles, in part, that shown in my patent, No. 384,117, dated June 5, 1888, but is intended to obviate the end-thrust produced by the opposition of the tension-spring shown therein as applied to a lever connected with the governor-weights.

In my present construction the centrifugal force of the governor weights or links is nearly balanced by springs connected directly to opposed pairs of links, and the force required to move the governor-lever and the attached shunting-rollers is thus made very light and the end-thrust upon the motor-shaft is substantially removed.

In the drawings, A represents the field-magnet; B, the armature; C, one of the pole-pieces, and D is a shunt-bridge casting affixed to the top of the same to sustain the shunting devices, by which the current may be switched into a greater or less number of the field-coils.

In Figs. 1 and 3, *e* are springs connected with the different sections of the field-coils and having their ends sustained adjacent to one another by any convenient means, as by slits *e'* in a block *g*, affixed to the bridge-casting D. *f* are the contact-rollers mounted upon pivots *h* upon a carrier *i*, the carrier being affixed to a rod *j*, which is linked to the top of the governor-lever *k*. A presser or roller *h'* is mounted adjustably in contact with the rod to hold the contact-rollers *f* firmly against the springs *e*. The springs have their bases all in a line parallel with the movement of the rod *j*, and are bent in such line so as to be inclined at their free ends, which overlap one another to make a series of contacts in a sort of flat yielding surface. The ends of the springs are shown in Fig. 2 formed transverse to their length, and the roll moves over such springs longitudinally, so that the end of each spring may preserve its full bearing across the cylindrical surface of the roller, however much the spring is depressed thereby. The bending of the spring under the pressure of the roll operates equally upon all parts of the end of the spring, owing to the longitudinal movement of the roll over the latter, and the bearing of the spring upon the roll is therefore maintained uniform, so as to preserve the durability of the contact-surfaces.

o o' are the governor-links formed of suitable weight and hinged together. The links *o* are pivoted to a collar *p*, attached firmly to the motor-shaft *p'*, and the links *o'* are pivoted to a sliding sleeve *l*, fitted movably upon the shaft *p'* and carrying between shoulders a collar *m*, to which the governor-lever *k* is jointed by pins *n*. A guard *q'*, formed as a hollow shell, is affixed to the motor-frame and sustained about the rotary parts of the governor to protect them from accident, and one end of the governor-lever is pivoted to a lug *k'* upon such guard. The upper end of the lever is pivoted to the rod *j*, which is provided with jam-nuts *t*, and a spring *r* is applied to the rod between the jam-nuts and an abutment *s*, affixed to the pole-pieces C.

The centrifugal force of the governor-links, when rotated by the collar *p*, operates to throw their common joint *a* outward and to draw the movable sleeve *l* toward the collar *p*. Such

movement shifts the lever h and presses its head toward the pole-pieces C and the shunt-box upon the bridge, moving the contact-rollers f over the ends of the springs e , and thereby changing the electrical connections in the desired manner.

As shown in Figs. 1 and 4, the tension springs l' are affixed to the pivots a at the expanding joint of the governor-links, and are constructed to very nearly balance the centrifugal force of the links when the motor is running at normal speed.

The roll-carrier i is adjustable upon the rod j by jam-nuts u or other suitable means, and the rolls f may therefore be adjusted when the governor-links are in such normal position to bear upon the desired springs in the shunt-box to maintain the magnetic field at the proper intensity. The springs l' not being readily adjustable, I have provided the springs r to resist the centrifugal force of the governor-links, and then adjust the resistance of such spring in any desired degree by shifting the jam-nuts t upon the rod j . The use of such auxiliary spring thus enables me to modify the action of the governor and to vary the normal speed of the motor when desired, or to render the governor more sensitive to an increase or diminution of such normal speed.

It will be seen that the placing of the main resistance-springs l' at right angles to the motor-shaft p' entirely obviates the tendency to end-thrust upon the shaft, which thrust is produced when the resistance-spring is applied to the governor-lever, or operates in any manner upon the sliding sleeve l , as the force required to move such sleeve longitudinally against the resistance reacts directly upon the collar p , to which the governor-links are also attached and which is connected rigidly with the motor-shaft. Such end-thrust necessarily causes friction wherever it is sustained in the construction of the motor, and where the governor is applied directly to the governor-shaft a very material reduction in the friction of the entire motor is secured by balancing the centrifugal force of the governor-links in the manner described.

It is immaterial how the contact-roll be pressed upon the contact-springs or how the electrical current be conveyed to or from the roller, as it is well-known that an electrical connection may be made to the roller by a spring pressing upon the sliding rod j , or by other means, if desired, or the current may simply pass from one set of contact-pieces to the other through the rollers and their intermediate pivot, as described above.

It is obvious that the auxiliary spring r may be applied to the governor-lever at any other point, instead of mounting it upon the rod j . Its effect upon the speed of the motor would be substantially the same, except that it operates in the position shown to neutralize the lost motion of all the parts in the governor and the connected sleeve and lever h , and

thus renders the operation of the shunting devices (connected with the rod) more prompt and accurate than if the spring were omitted.

The auxiliary spring is in practice made very much lighter than the resistance-springs l' , and operates partly to take up the lost motion, as just stated, and by means of its adjustability, through the shifting of the nuts t , renders the speed of the motor capable of regulation, as is often desired.

The contact-rolls f may be mounted upon the same pivot h , as shown in Fig. 1, and the pivot made to connect the rolls electrically, so as to close the electric circuit through any of the springs with which the opposite rolls are in simultaneous contact, or the rolls may be insulated from one another and may be connected electrically with the carrier i and j in any convenient manner.

Only one of the magnet pole-pieces is shown in Fig. 1 with the magnet-coils wrapped upon the core, as shown at C' , with the bundle of connections c^2 , which unite different sections of the field-coils with the springs e ; but the means of making such connections is not shown more specifically herein, as I have already made a special form of such connection the subject of my previous application, Serial No. 247,418, for patent in shunt-boxes, and because it is wholly immaterial to my present improvements how the field-coils be connected with the contact-surfaces in the shunt-box, or how the field-coils and armature be operated, or what construction of shunt-box be used.

My governor improvements are especially adapted for use with a constant-current motor or dynamo, and may be employed whether the armature be placed in series with the field-coils or whether the armature and field-coils be connected by a shunt winding or compound winding, the electrical connections made by the contact-rollers being arranged in each case to modify the effect of the current upon the magnetic field in the desired manner. Any number of rollers may be used, as may be required to form the desired electrical connections. In the case of the dynamo the roller f , instead of being moved by the action of a centrifugal governor, would be actuated by any suitable means, as an electro-magnetic governor affected either by the electro-motive force in the case of a constant-potential dynamo or by the strength of the current in a constant-current dynamo.

I am aware that a solid roll has been used in connection with solid contacts, but it is well known that the bearing of a roll upon such contacts will not in practice remain so uniform or perfect as a bearing upon springs. I am also aware that cylindrical or conical brushes have been formed by dishing thin plates of sheet metal and slitting them radially, and I therefore disclaim such methods of construction.

Having thus set forth the nature of my invention, what I claim is—

1. In a governing device for electric motors,

the combination, with the rod reciprocated by the governor, of a pivoted roller carried thereby and a series of inclined spring-contacts having the line of their bases parallel with the movement of the rod and their points projected in the path of the roller and the roller traversed over such springs longitudinally, substantially as herein set forth.

2. In a governing device for electric motors, the combination, with the rod reciprocated by the governor, of a carrier upon the rod, two rollers pivoted thereon and connected electrically, two series of inclined spring-contacts with the lines of their bases parallel with the movement of the rod and their points projected in the paths of the two rollers and the rollers traversed over such springs longitudinally, and a guide for holding the rod and rollers in a fixed path, substantially as herein set forth.

3. In a governing device for electric motors, the combination, with governor-links rotated with their supporting-shaft, of a resistance-spring applied to the joint of such links and operating transversely to the shaft, a collar attached to the shaft and connected with one end of the links, a sleeve movable upon the shaft and attached to the other end of the links, a governor rod actuated by such sleeve, a metallic roller moved by such governor-rod, and a series of spring-contacts arranged, substantially as set forth, and operating to make successive contacts with the roller when moved by the rod, as and for the purpose set forth.

4. In a governing device for electric motors,

the combination, with governor-links rotated with their supporting-shaft, of a resistance-spring applied to the joint of such links and operated transversely to the shaft, a collar attached to the shaft and connected with one end of the links, a sleeve movable upon the shaft and attached to the other end of the links, a governor-lever actuated by such sleeve, a metallic roller moved by such governor-lever, and a series of electrical connections arranged to make successive contacts with the roller when thus moved, as and for the purpose set forth.

5. In a governing device for electric motors, the combination, with governor-links rotated with their supporting-shaft, of a resistance-spring applied to the joint of such links and operating transversely to the shaft, a collar attached to the shaft and connected with one end of the links, a sleeve movable upon the shaft and attached to the other end of the links, a governor-lever actuated by such sleeve, a metallic roller moved by such governor-lever, and a series of electrical connections arranged to make successive contact with the roller when thus moved, and an auxiliary spring operating upon the governor-lever and adjustable to vary the speed of the governor, as and for the purpose set forth.

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

WM. BAXTER, JR.

Witnesses:

ADAM NEUS, Jr.,

C. R. GALLAGHER.