(No Model.)

B. F. ORTON.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 311,141. Patented Jan. 20, 1885.

Fig. 2.

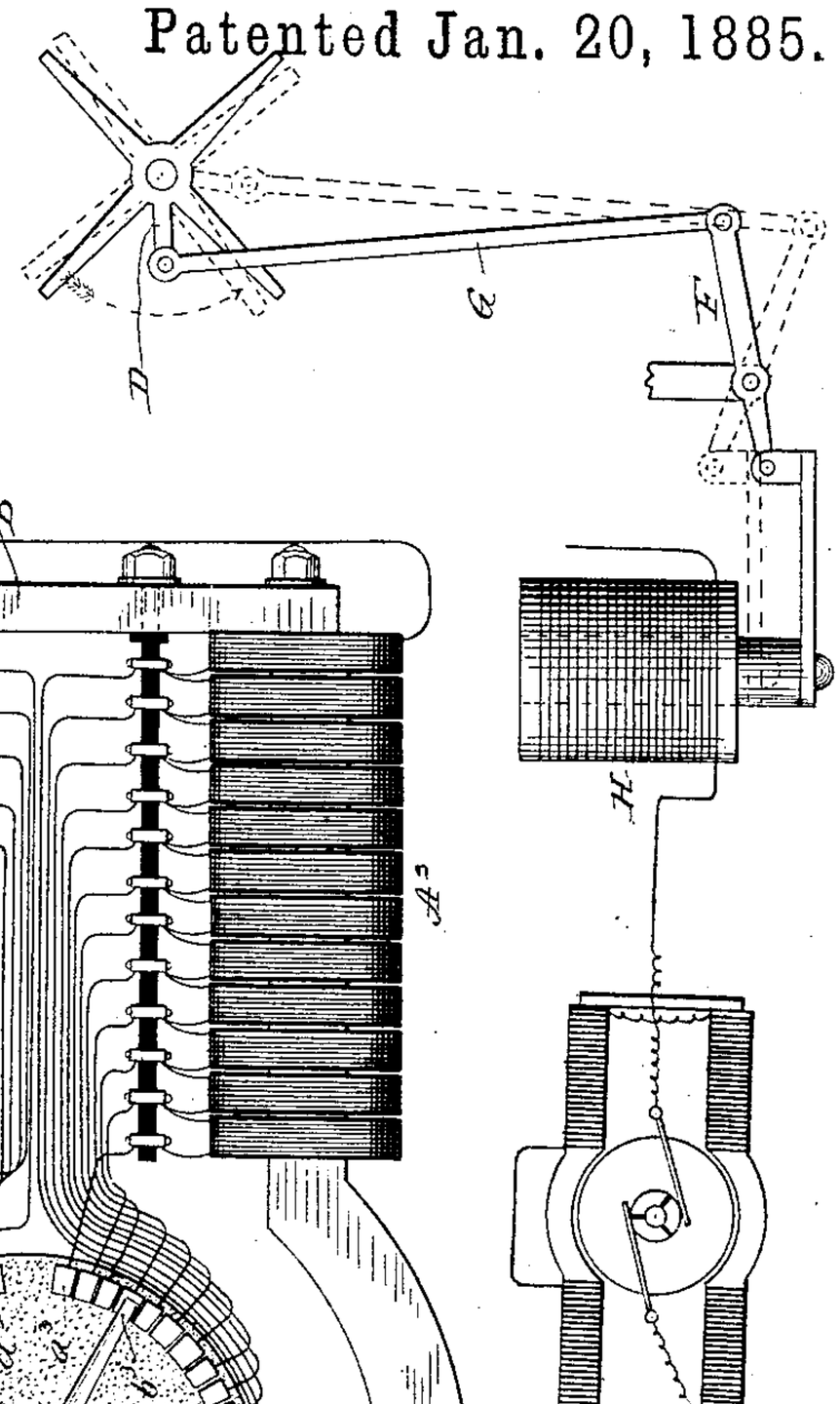
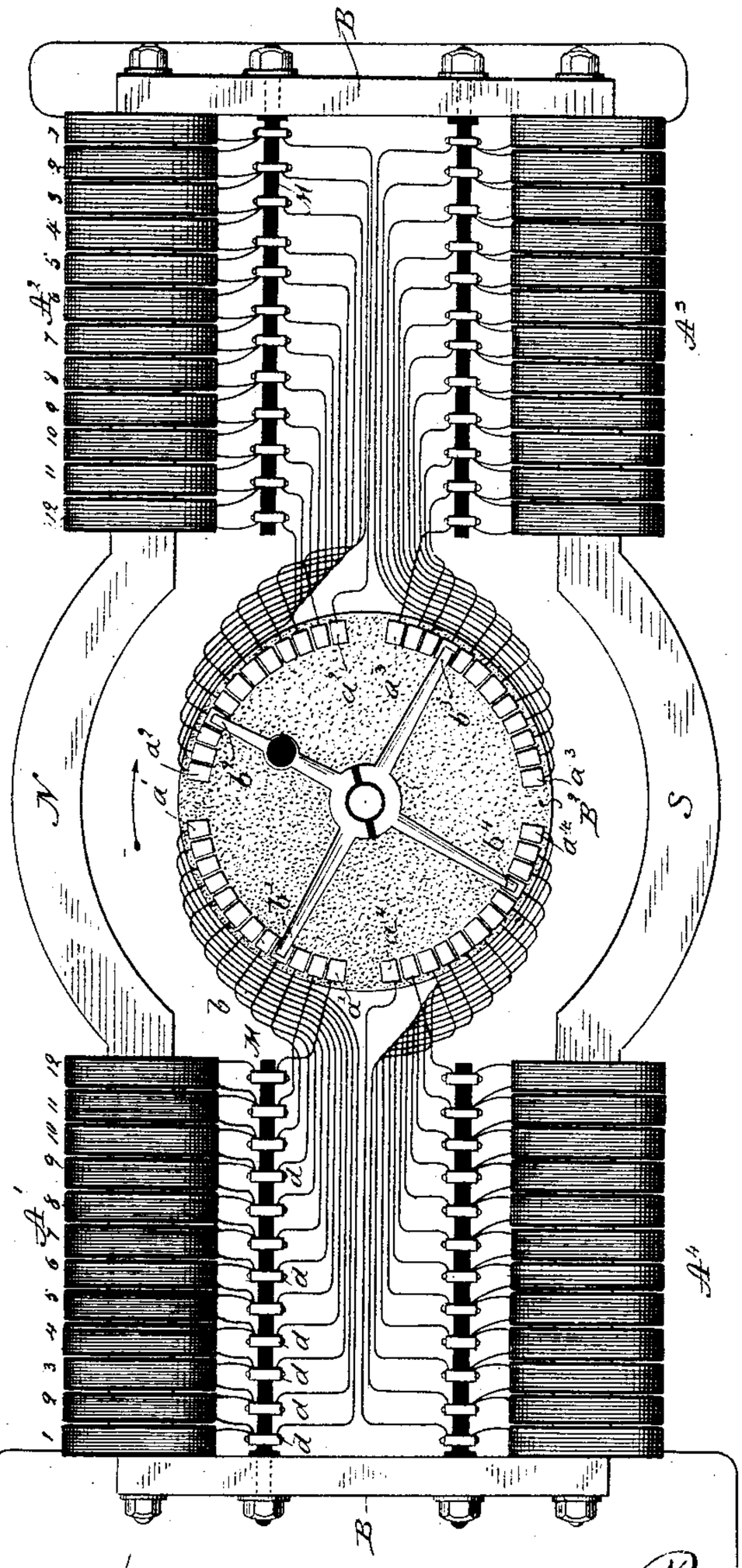


Fig. 1.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. ORTON, OF EAST SAGINAW, MICHIGAN.

REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 311,141, dated January 20, 1885.

Application filed February 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. ORTON, a citizen of the United States, and a resident of East Saginaw, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Regulators for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to means for regulating or governing the current supplied by a dynamo-electric machine either by hand or automatically in accordance with changes in the condition or resistance of the external or working circuit to which the machine furnishes current.

In carrying out my invention I make use of the well-known expedient of varying or adjusting the strength of the magnetic field in which the armature of the machine moves, and this I effect by certain novel and simplified combinations and arrangements of circuits and switch devices, whereby the number of exciting-coils on the field-magnet and the consequent strength of the magnetic field may be determined or adjusted according to the necessities of the case.

My invention consists in the novel combinations and arrangements hereinafter described and claimed, whereby the number of coils on the two or more legs or cores of a field-magnet having a number of cores or legs may be simultaneously varied, so as not to disturb the symmetry of the magnetic field, while at the same time the strength of the field is varied.

My invention consists, also, in certain details of construction that will be specified more particularly in the claims, after being first described in connection with the accompanying drawings, forming a part of this specification.

Figure 1 is a side elevation of a common form of field-magnet having my invention applied to it. Fig. 2 illustrates a detail of construction, and shows the manner of adjusting or operating the switch that serves to determine the number of exciting-coils in action automatically.

$A' A^2 A^3 A^4$ indicate the four legs or portions of a field-of-force magnet, and N S the consequent pole-pieces forming the magnetic field for an armature.

B B indicate ordinary cross-pieces or yokes, to which the cores of the magnet are bolted after the application of the exciting-coils of wire to said cores. The coils on each leg are divided into twelve sections or bobbins, more or less, according to the capacity of the machine and the nicety of the regulation desired. The sections or bobbins are preferably made separately by winding them on a suitable form of the same shape as the magnet-core, from which form they are afterward removed and then slipped into place on the core, or they are wound upon a suitably-shaped spool or support that will fit the core and may be slipped upon the same after the winding is complete. The two ends of each section or bobbin are left free for attachment to binding posts or blocks *d*, to which latter connections are also made from the switch or circuit controlling device, that serves to determine the number of sections in circuit. Opposite ends of adjoining bobbins are connected to the same post or block *d* in such way that, in the absence of other conditions, current may flow through them all, as ordinarily, in the proper direction to give the desired polarity at the pole-pieces N S. The bobbins or sections in each portion $A' A^2 A^3 A^4$ are numbered from 1 to 12, beginning at the outer ends.

B^2 indicates a block or support, preferably of insulating material, fixed in any suitable position, and carrying four sets of contact-pieces insulated from one another to correspond with the four sets of coils on $A' A^2 A^3 A^4$. The contact-pieces, twelve in number, corresponding to the coil-sections on A', and to which said coil-sections are connected by the wires *b*, leading to the binding-posts *d*, are indicated by *a'*, and the contact-pieces, to which the bobbins in $A^2 A^3 A^4$ are respectively connected, by $a^2 a^3 a^4$.

Mounted on a suitable shaft are four contact-making arms or pieces, $b' b^2 b^3 b^4$, adapted to sweep over and make electrical connection with the sets of contact-plates $a' a^2 a^3 a^4$, and arranged symmetrically with relation to the sets of contacts so as to simultaneously rest upon contact-plates connected to bobbins that are at the same distance from the ends of the several legs $A' A^2 A^3 A^4$ and are correspondingly numbered. The arms $b' b^2$ are electrically connected with one another, but are insulated by any suitable means from the arms $b^3 b^4$, which latter are also electrically connected with one another. The contact ends

or portions of the arms are of such form or width as to make contact with one block before breaking contact with a preceding block. The binding-posts *d* are preferably double connectors—that is, have two binding-screws and orifices for the insertion of the connecting wires, one orifice and screw serving for the attachment of adjoining terminals of adjoining bobbins, and the other for the attachment of the wires leading to the insulated contact-plates on the support B^2. The binding-posts *d* are mounted on bars or supports M of insulating material, bolted or otherwise secured to the end pieces, B, and extending in line with the series of bobbins on each leg of the field-magnet. The terminals of the field-magnet circuit are indicated by the signs + and —, and the circuit through the coils passes first to the bobbins on A′, to and through that particular one whose end nearest the pole-piece is in connection through a block, *a′*, with the arm *b′*, then through arm b^2 and the bobbins on A^2, which lie between that one of them whose contact-block lies under the arm b^2, and the terminal bobbin 1, connected through wire *g* with the set of coils on A^3; then through said set of coils, arms b^3 b^4, and coils on A^4 in a similar manner to the negative terminal indicated by the sign —. If the contact-arms b' b^2 b^3 b^4 be turned by the insulated knob on b^2, or by other suitable means, so that the arms make contact with the first one of each series of blocks, a' a^2 a^3 a^4—viz., that one connected to the terminal of bobbin numbered 12 on the several legs A′ A^2 A^3 A^4—it is obvious that all the coils of the field-magnet will be in circuit. If it be desired to reduce the field-magnetism, the arms are turned in the direction of the arrow, thus disconnecting the bobbins on the several legs A′ A^2 A^3 A^4, one after the other, beginning with those nearest the center on every leg, so as not to disturb the symmetry of the field. In the position of the parts shown the three sections on each leg nearest the center are disconnected, but current flows through the remaining sections on each leg in the manner already described. If any section of the coil becomes injured, it may be replaced by simply disconnecting the bobbin terminals from the binding-posts and slipping the bobbins off from the core.

In Fig. 2 means for governing the strength of the field automatically are shown.

H indicates an electro-magnet in the main or principal circuit of the machine, as illustrated diagrammatically; and D, a crank attached to the shaft or spindle carrying the contact-arms. The movable core or armature of the magnet is connected with the crank through a link, G, and a lever, F, or other suitable means, so that when the strength of the magnet increases the core will be drawn up and will turn the spindle or shaft carrying the contact-arms, so as to throw out coil sections on the four legs and reduce the strength of the field-magnet. The motion is multiplied by connecting the core of H to the short arm of the lever F, and the link G to the long arm thereof. Other mechanical devices might be used for the same purpose. The weight of the core and attached parts or a suitable retractor acts to throw the contact-arms back, and place more coils in circuit when the strength of the current in H diminishes.

Other forms of binding-posts besides those shown might be placed upon the arms or bars M, and the invention may obviously be applied to other forms of field-magnets.

What I claim as my invention is—

1. The combination, in a dynamo-electric machine, of two sets of field-magnet coils or sections on separate legs or cores of the field-magnet for said machine, two contact-arms electrically connected and forming the connection between the two sets of coils, two corresponding sets of contacts connected with the coil-sections, all arranged as set forth, so that coils will be simultaneously thrown out of circuit on both cores, and a magnet energized by the current of the machine, and having a movable core connected with the shaft supporting the arms, as and for the purpose described.

2. The combination, with base piece or support B^2, of the four series of concentric contacts, the four contact-arms electrically connected in pairs, and connections from said contacts to coil-sections on the field-magnet legs, each pair of said contact-arms serving as the electrical connection whereby current flowing in the coils on one field-magnet leg finds circuit to the coils on another field-magnet leg, as and for the purpose described.

3. The combination, in a dynamo-machine regulator, of the block B^2, contacts a' a^2 a^3 a^4, arranged concentrically, two double circuit-closers each adapted to complete the circuit between two sets of contacts, and the coils connected with said contacts but insulated from one another, and sectional field-magnet coils connected with the contacts, as and for the purpose described.

4. The combination, with the sectional field-magnet coil and a circuit-controller for determining the number of sections that shall be in circuit, of a series of binding-posts and a suitable support therefor carried by the cross-piece B and ranged parallel with the field-magnet.

5. The combination, with the sectional field-magnet coil, of the circuit-controller having contact-arms mounted on a common shaft, and arranged to move in the arc of a circle over suitable contacts, and a magnet in the main circuit of the machine mechanically connected with said shaft, as and for the purpose described.

Signed at New York, in the county of New York and State of New York, this 28th day of January, A. D. 1884.

BENJAMIN F. ORTON.

Witnesses:

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WM. H. BLAIN.