(No Model.)

W. M. SCHLESINGER.

REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 329,681. Patented Nov. 3, 1885.

Fig. 1

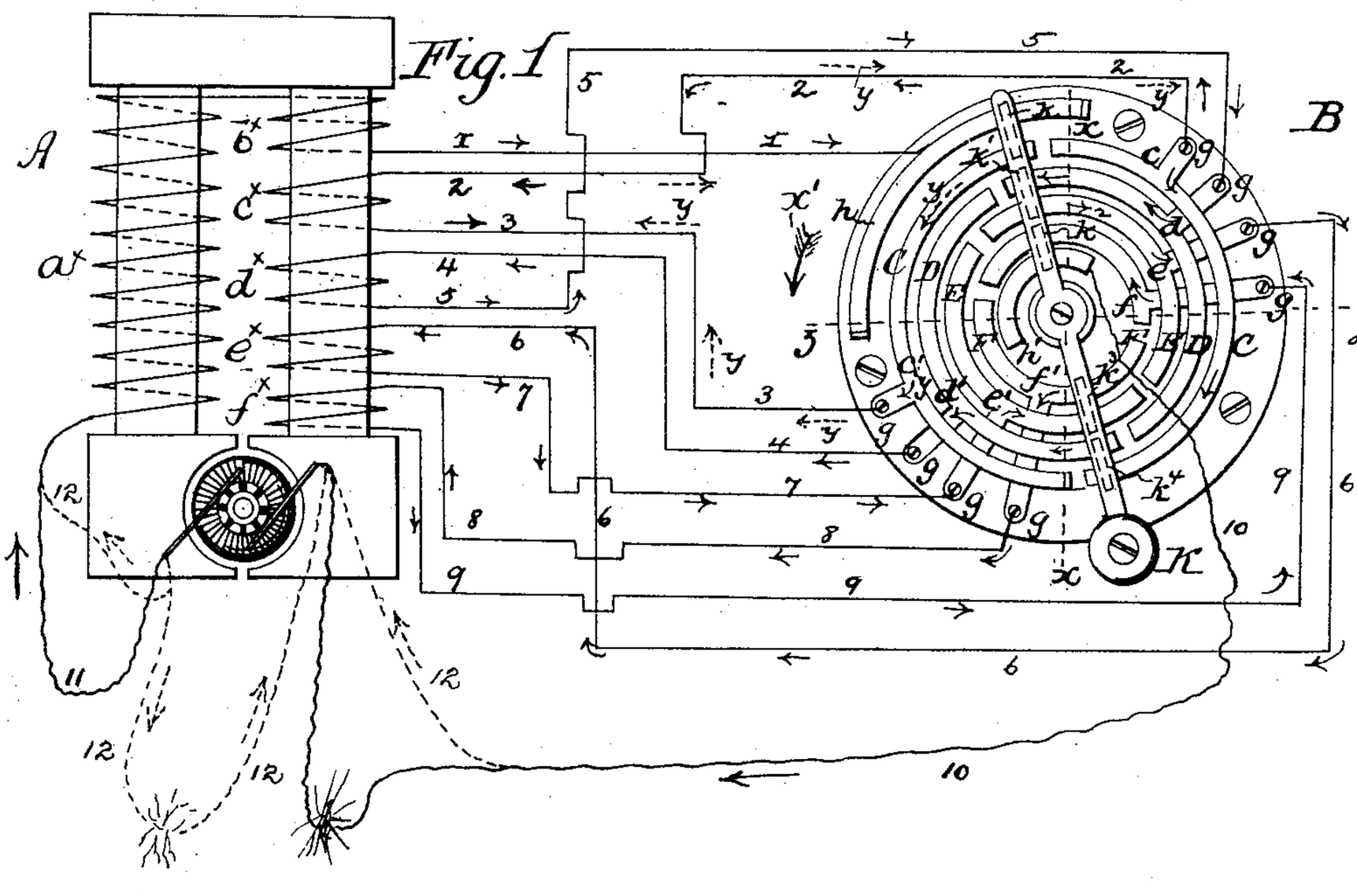


Fig. 2

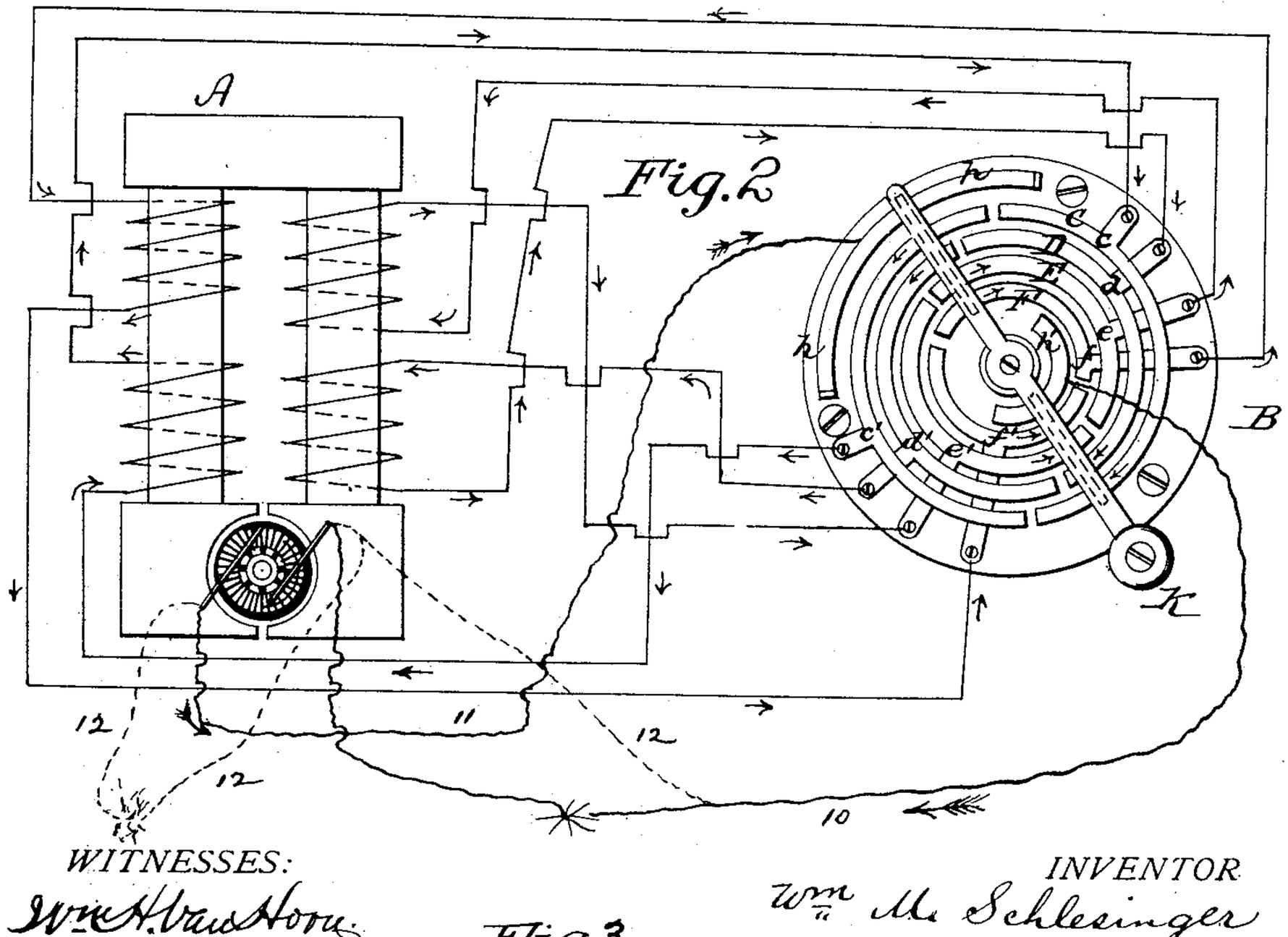


Fig. 3

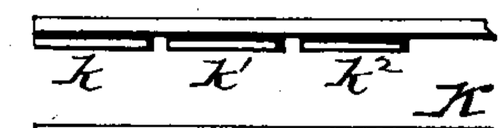
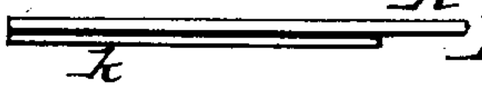


Fig. 4



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REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 329,681, dated November 3, 1885.

Application filed July 1, 1885. Serial No. 170,373. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. SCHLESINGER, a subject of the Queen of Great Britain, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1 is a diagrammatic representation of a dynamo-electric machine, showing the sections or coils of its field-magnets connected in series and in circuit with a circuit-reverser or current-changing switch for changing the direction of the current through said coils or sections, the field-magnets and armature of the dynamo being shown arranged for either a series or a shunt relation with one another. Fig. 2 is a like view showing the field-magnet coils or sections in shunt relation with one another and their circuit-connections with the circuit-reverser; and Figs. 3 and 4 are elevations of a part of the levers or handles for the regulating or switch boards shown in Figs. 1 and 2, respectively.

My invention has relation to that form of dynamo-electric machines wherein the field-magnets are wound in or composed of separate sections, and the ends of each section connected to a circuit-reverser for changing the direction of the current through a greater or less number of the field-magnet sections to vary or regulate the strength of the field-magnets of the dynamo.

As heretofore arranged the ends of each section of the field-magnets lead to or connect with separate circuit-reversers, each of which requires to be separately manipulated to change the direction of the current through the respective field-magnet section in circuit therewith. This separate manipulation of each circuit-reverser requires successive movement of a greater or less number of circuit-reversers whenever a change in the direction of the current in a corresponding number of field-magnet sections is desired, and involves delay and a certain degree of tediousness.

My invention has for its object to avoid this delay and tediousness, or, in other words, to easily and quickly produce a change in the direction of the current through a greater or less number of the field-magnet sections, and this I accomplish by providing a single controlling circuit-reverser which is common to all of said sections.

My invention accordingly consists of the combination, construction, and arrangement of parts, as hereinafter described and claimed.

In the drawings, A represents a dynamo-electric machine, of which the field-magnets may be in series relation to the armature, as indicated by the full-line wires 10 and 11, Figs. 1 and 2, or in shunt relation thereto, as represented by dotted-line wires 12 and 12 in said figures. The wires or coils on the field-magnets are wound in sections which have either a series relation with each other, as shown in Fig. 1, or a shunt relation, as indicated in Fig. 2, and the beginning and end of these sections, or as many as desired, are connected to a current-changing switch or circuit-reverser, (indicated at B,) by and through which the direction of the current may be changed or reversed in one or more of the field-magnet sections without changing their shunt or series relation. As the direction of the current is changed through a section, as described, its magnetic influence is changed or reversed and becomes opposed to that of the other or adjacent sections in which the direction of the current remains unchanged, and these opposing magnetic influences in the adjacent sections neutralize their magnetic action on the field-magnets, or vary the strength of the latter and cause a decrease or diminution in the electro-motive force of the machine. By changing the direction of the current through one, a number, or all of the sections of the field-magnets the electro-motive force of the machine may be decreased from its maximum to its minimum; and by reversing the above-described operation of changing the direction of the currents the electro-motive force of the machine may be restored to its maximum. The electro-motive force of the machine may therefore be regulated or varied as desired by simply moving the handle or lever of the circuit-reverser.

The field-magnets may have any number of sections. In Fig. 1 six sections on the field-

magnets (marked $a^\times$ $b^\times$ $c^\times$ $d^\times$ $e^\times$ $f^\times$) are shown in series relation to one another.

The circuit-reverser B is composed of concentric metal rings C D E F, divided into two sections, segments, or semi-rings *c c'*, *d d'*, *e e'*, and *f f'*, respectively, which are insulated from one another and provided with binding-posts *g*. Outside of these rings is a quadrant, segmental, or other suitably shaped plate, *h*, and inside is a like plate, *h'*. These ring-sections and plates *h h'* are in circuit, or suitably connected to the ends of the field-magnet sections, as shown—*i. e.*, wire 1 of section $b^\times$ connects with plate *h*, wires 2 and 3 of section $c^\times$ with semi-rings *c* and *c'*, respectively, of ring C, wires 4 and 5 of section $d^\times$ with semi-rings *d'* and *d*, respectively, of ring D, wires 6 and 7 of section $e^\times$ with semi-rings *e* and *e'*, respectively, of ring E, and wires 8 and 9 of section $f^\times$ with semi-rings *f'* and *f* of ring F; and from plate *h'* leads a wire, 10, to a brush or one side of the armature of the generator, a wire, 11, connecting the other brush or side of the generator to section $a^\times$, to complete circuit for a series dynamo-electric machine.

K represents a pivoted handle or lever for circuit-reverser B, which handle has on its under side metal plates *k k' k² k³ k⁴*, (see Fig. 3,) insulated from said handle and from each other, and adapted to contact with the sections of rings C, D, E, and F, and with plates *h h'*, as shown, to electrically connect or bridge them and change the direction of the current through field-magnet sections, the intersections between the semi-rings, or sections of the rings C, D, E, and F, being so arranged, or as indicated, that handle or lever K when turned crosses the intersections of one ring only at a time to provide for changing the direction of the current through the sections successively.

When lever or handle K is in position indicated by dotted line *x* in Fig. 1, the current from wire 1 entering plate *h* flows through the first strip, *k*, on lever K to the semi-ring *c*, thence by wire 2 to section $c^\times$, thence by wire 3 to semi-ring *c'*, thence by plate k^4 to semi-ring *d'*, thence by wire 4 to section $d^\times$, thence by wire 5 to semi-ring *d*, thence by lever-strip *k'* to semi-ring *e*, thence by wire 6 to section $e^\times$, thence by wire 7 to semi-ring *e'* and lever-plate k^3 to semi-ring *f'*, thence by wire 8 to section $f^\times$ and wire 9 to semi-ring *f*, and thence by lever-plate k^2 to plate *h'* and wire 10 to the armature of the machine, and by wire 11 to coils $a^\times$ and $b^\times$, completing the circuit through the field-magnets, armature, and circuit-reverser.

In the above described position of the lever the current passes in the same direction through all the sections of the field-magnets, as indicated by the small arrows, and the electro-motive force of the machine is then at its maximum. By moving the lever K to position shown in full lines the direction of current through section $c^\times$ is changed, as indicated by dotted arrows *y*, without changing its series relation with the other sections, and its magnetic influence thereby becomes opposed to that of sections $b^\times$ and $d^\times$, and these opposing magnetic influences act in the well-known manner to weaken or decrease the electro-motive force of the machine. A further movement of lever K in the direction indicated by arrow *x'* successively changes the direction of the current, through sections $d^\times$, $e^\times$, and $f^\times$, to still further decrease the electro-motive force of the machine, which force is at its minimum when the lever reaches the position indicated by dotted line *z*. Reversing the above-described movement of the lever K successively restores or reverses the direction of the current in said sections to increase the electro-motive force of the machine until its limit is reached, which occurs when lever K is brought to the position indicated by dotted lines *x*, as above set forth.

When the field-magnet sections are in shunt-circuit in relation to one another, as illustrated in Fig. 2, the same results are produced by the circuit-reverser; but in this case the plates *k k' k²* for lever K are formed in one piece, (see Fig. 4,) as also are the plates k^3 k^4 for simultaneously bridging or connecting all the semi-rings and plates *h h'*, as shown.

From the foregoing it will be noted that the circuit-reverser B forms a single controlling reverser for all of the field-magnet sections, and that a movement of its lever K will change the direction of the current through a greater or less number of the said sections, as desired.

I have shown my improvements applied to self-excited dynamo-electric machines, or those in which the armature and field-magnets are in series or shunt relation to one another, yet it is obvious that the same may be applied to dynamos having separately-excited field-magnets.

What I claim is—

1. A dynamo-electric machine having its field-magnets wound in sections, in combination with a single controlling circuit-reverser connected with the ends of the field-magnet sections, substantially as and for the purpose set forth.

2. A dynamo-electric machine having its field-magnets wound in sections, in combination with a circuit-reverser common to all of said sections and having a single switch-lever for changing the direction of the current through a greater or less number of said sections, substantially as set forth.

3. A dynamo-electric machine having its field-magnets wound in sections and the ends of each section connected to separate insulated plates grouped in pairs, and a single controlling switch-lever for electrically connecting said pairs to change the direction of the current through a greater or less number of the field-magnet sections, substantially as shown and described.

4. A regulator for sectionally-wound mag-

nets, composed of insulated strips grouped in pairs, each of which is in circuit with the ends of a magnet-section, and of a single controlling switch-lever for electrically connecting said strips to change the direction of the current through a greater or less number of the magnet-sections, as set forth.

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

WILLIAM M. SCHLESINGER.

Witnesses:
S. J. VAN STAVOREN,
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