(No Model.) 6 Sheets—Sheet 1.

E. R. KNOWLES & E. H. PARK.

STAND FOR CONTROLLING ELECTRIC CIRCUITS.

No. 520,788. Patented June 5, 1894.

FIG. 1.

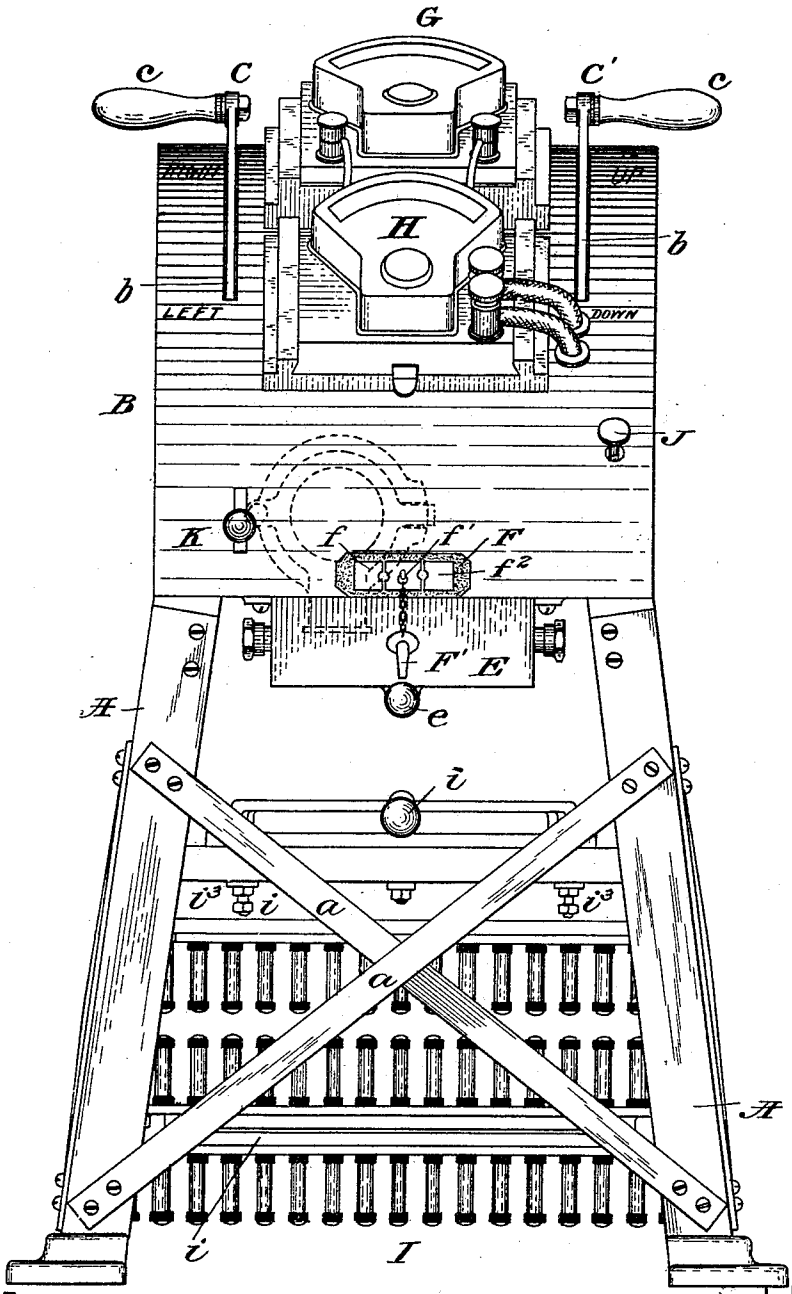

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FIG. 2.

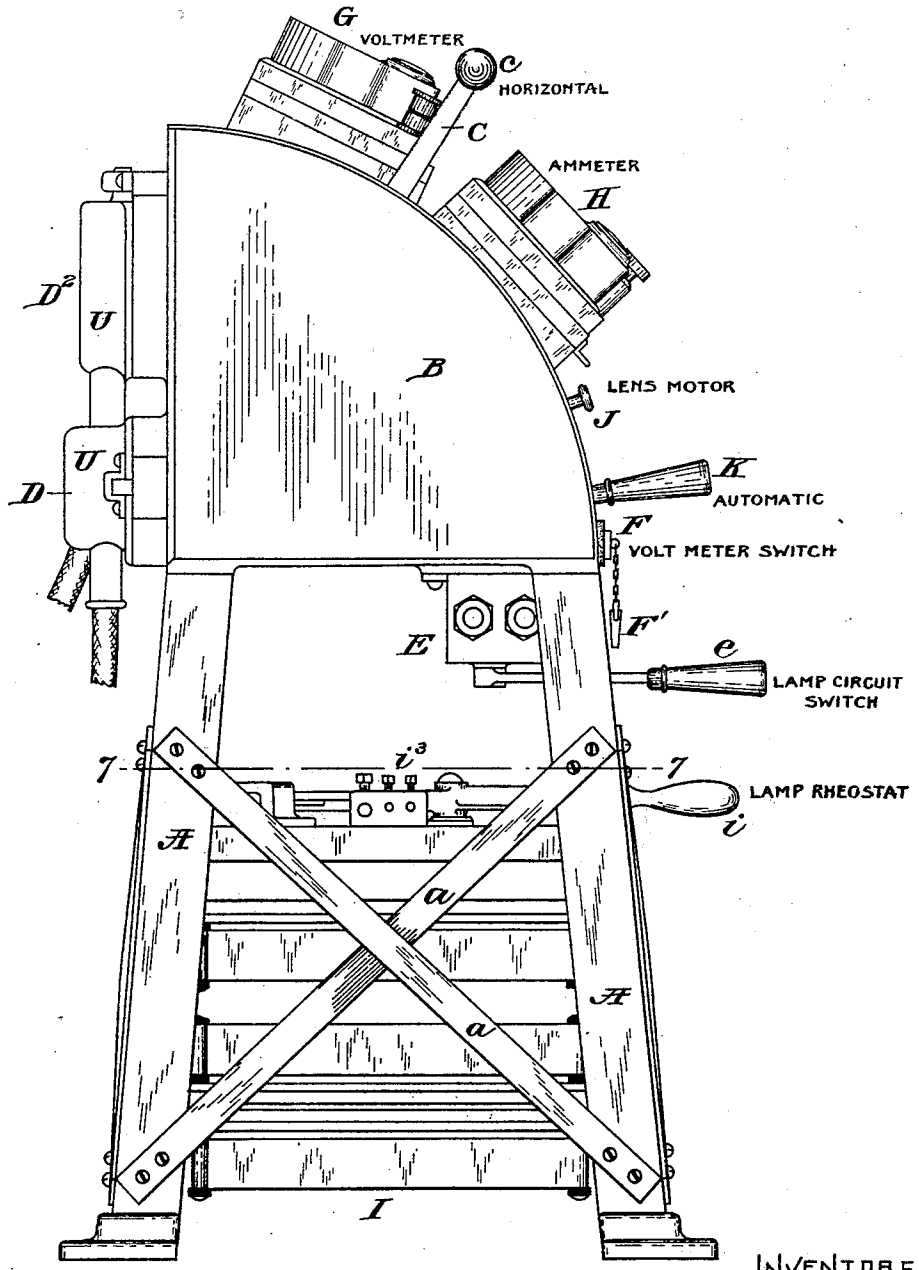

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FIG. 4.

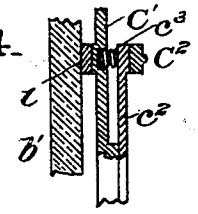


FIG. 3.

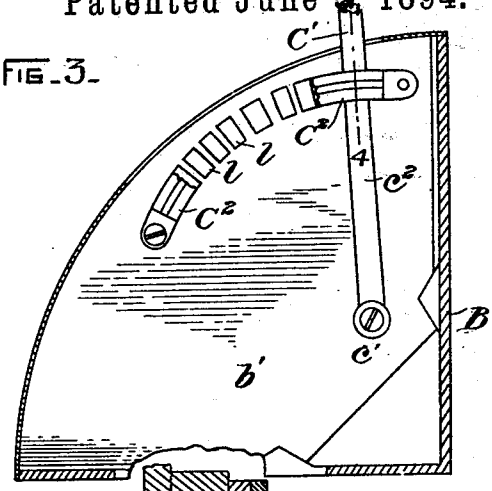


FIG. 5.

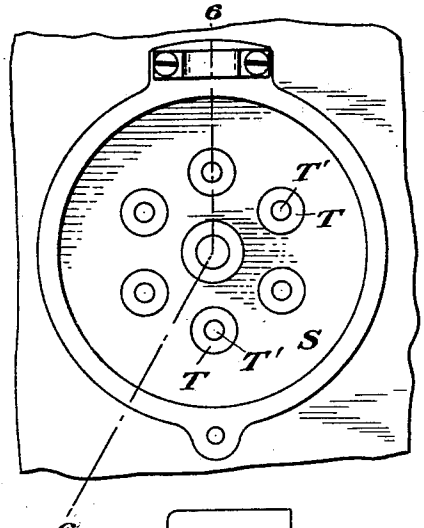


FIG. 6.

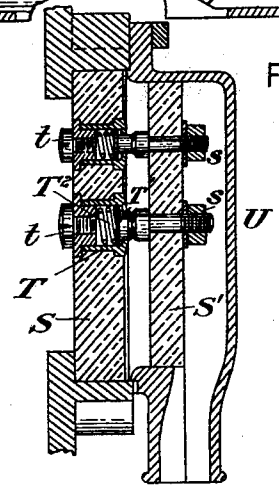
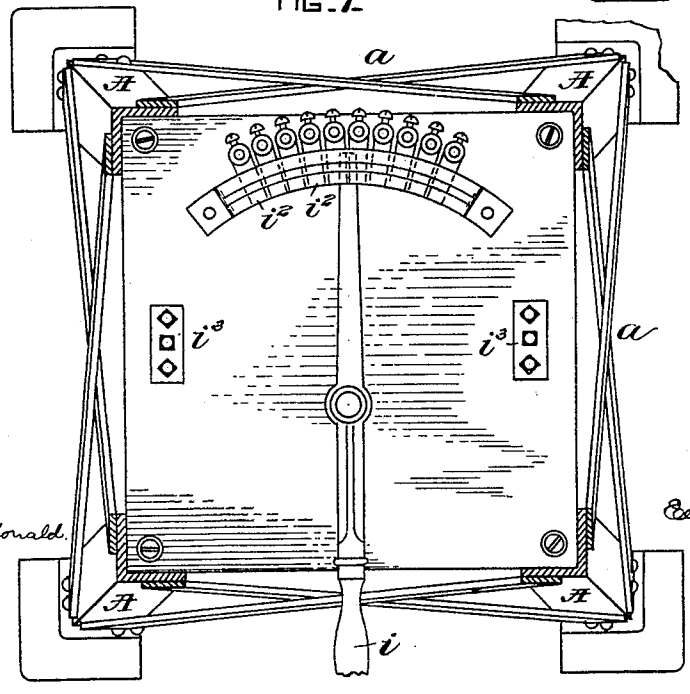


FIG. 7.



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STAND FOR CONTROLLING ELECTRIC CIRCUITS.

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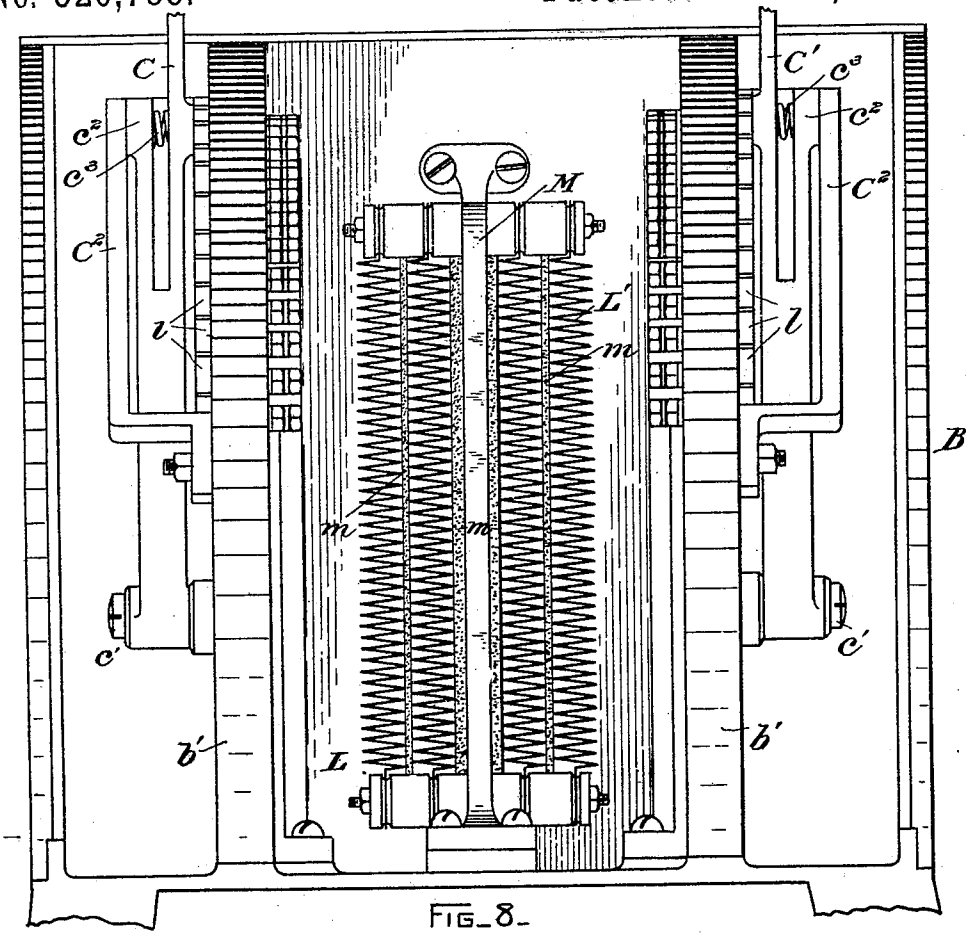

FIG. 8.

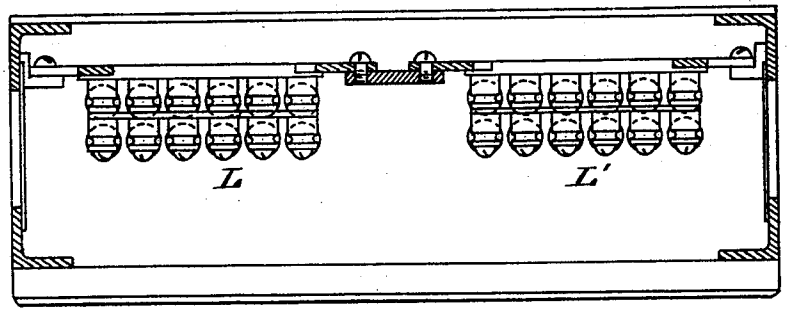

FIG. 11.

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STAND FOR CONTROLLING ELECTRIC CIRCUITS.

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FIG. 9.

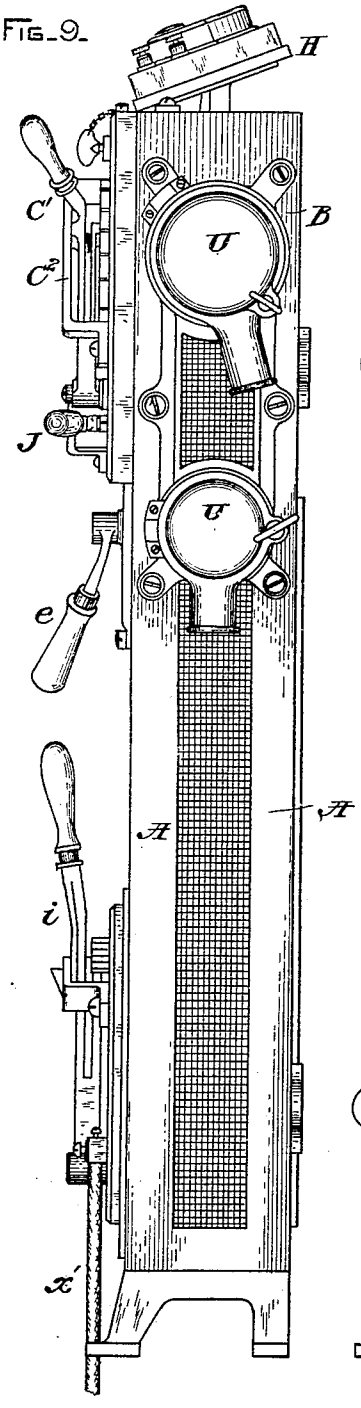
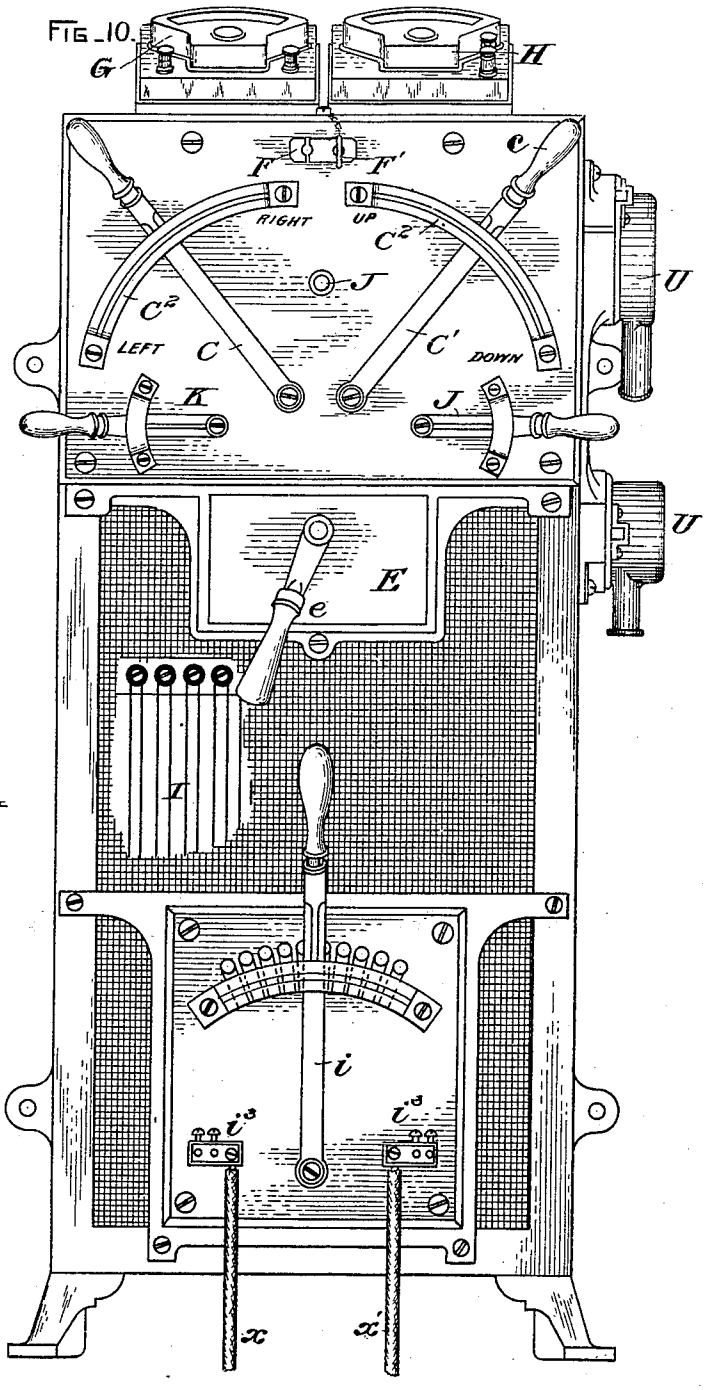


FIG. 10.



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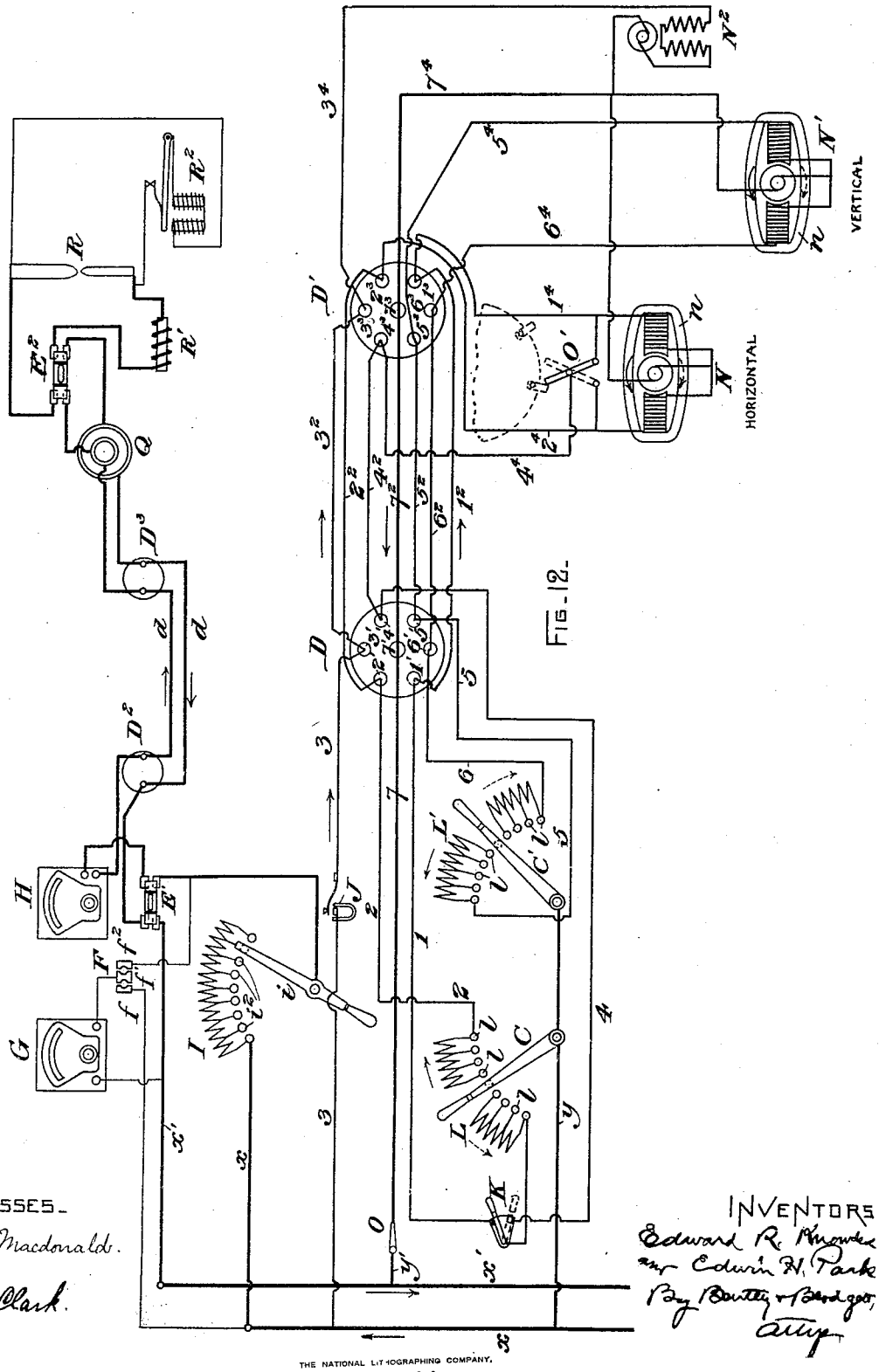

FIG. 12.

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UNITED STATES PATENT OFFICE.

EDWARD R. KNOWLES, OF MIDDLETOWN, CONNECTICUT, AND EDWIN H. PARK, OF MILLBURY, MASSACHUSETTS, ASSIGNORS TO THE SCHUYLER ELECTRIC COMPANY, OF CONNECTICUT.

STAND FOR CONTROLLING ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 520,788, dated June 5, 1894

Application filed March 31, 1893. Serial No. 468,473. (No model.)

To all whom it may concern:

Be it known that we, EDWARD R. KNOWLES, residing at Middletown, in the county of Middlesex and State of Connecticut, and EDWIN H. PARK, residing at Millbury, in the county of Worcester and State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Stands for Controlling Electric Circuits; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to apparatus for controlling currents of electricity supplying power to electric translating devices, such as motors and lamps. While it is useful in controlling, either at a distance or near by, one or more translating devices of any kind, yet it has been more particularly designed to govern an electric search light, or projector, and we shall, for the sake of simplicity, describe it as applied to such use.

In the modern form of electric search light, there are five things to be considered: first, the movement of the projector in a horizontal plane; second, its movement in a vertical plane; third, a vibrating or to-and-fro movement in a horizontal plane; fourth, the adjustment of the diverging lens; and fifth, the regulation of the lamp. The various movements of the projector and lens are effected by one or more electric motors suitably geared, while the lamp is controlled by a rheostat, as usual.

Our invention consists in a compact stand, in which are mounted the several switches, rheostats and measuring instruments for controlling the motors and the lamp, the stand being electrically connected with the projector or other translating device, preferably by means of flexible conductors, so that the stand or the projector can be moved to any convenient part of the vessel or building, without interfering with the operation of the apparatus. For instance, the projector on a vessel may be mounted on a pilot house or turret, or in the top of a mast, or other elevated place, and the controlling stand located below deck in some protected spot, where the operator is in no danger, and yet has perfect control over the movements of the projector, its lamp, and its diverging lens. The parts are so arranged that the movements of the various handles are those most natural for the operator to make, in order to swing the beam of light up or down, or to the right or left hand.

The controlling stand is preferably portable; but it may be constructed to be fastened against the wall at some convenient point. This style is better adapted to places where space is limited, as, for example, on shipboard.

In the drawings,—Figure 1 is a front elevation of a portable stand embodying our invention. Fig. 2 is a side elevation. Fig. 3 is a view of a switch, and rheostat contacts. Fig. 4 is a section on line 4—4, Fig. 3. Fig. 5 is a view of the cable box with the cover removed. Fig. 6 is a section on line 6—6, Fig. 5. Fig. 7 is a sectional plan view on line 7—7, Fig. 2. Fig. 8 is an elevation of the motor rheostats. Fig. 9 is a side elevation of a stationary or wall controlling stand. Fig. 10 is a front elevation of the same. Fig. 11 shows the motor rheostats in the wall stand; and Fig. 12 is a diagram of the circuits.

Taking up first the portable stand, it will be seen that it consists of suitable legs A, preferably of angle-iron, braced, if desired, by diagonal rods *a*. The legs support a case B, quadrant-shaped in vertical cross-section, with the curved side forming the front and top, and containing two parallel slots *b*, to permit the movement of the levers C, C′, which project through the slots and govern the motor rheostats and switches inside the case, as hereinafter described, lever C controlling the movement of the projector in a horizontal plane, and lever C′ its vertical movement. Each lever has a handle *c*. On the back of the case are the cable boxes D, D^2, in which are the several terminals of the circuits in the stand. Under the case is hung the box E, containing a switch E′ operated by the

handle *e* for opening and closing the lamp circuit. Just above this box is a switch-plate F having three terminals f, f', f^2, and a plug F', for closing the circuit through the volt meter G, which, with the ammeter H, is mounted on the case B, in front of the operator. Between the legs A is arranged the rheostat I with its handle *i* for regulating the lamp. A push button J in the front of the casing controls the lens motor, and the automatic vibrating movement of the projector is set in action by the switch-handle K.

Having thus given a general idea of the arrangement, and the uses of the several handles shown in the drawings, it is in order to describe the several parts in detail.

Inside the casing B are two frames or partitions *b'* of insulating material, such as slate, to the outside of each of which is fulcrumed at *c'* the lever C or C'. Each lever has an arm c^2, which bears against the smooth inner face of a stationary quadrant C^2. The arm may be resilient, and in addition thereto, or in lieu of such resiliency, a spring c^3 may be inserted between the arm and the lever, the object being to keep the inner face of the lever tightly pressed against the contact plates *l* which constitute the terminals between the coils of the rheostats L, L'. The two rheostats are mounted on an iron frame M between the partitions *b'*, and the connections between them and the contact plates *l* are made inside the case B. The coils of the rheostats are preferably insulated from each other and from the frame M by sheets of non-conducting material *m*. Each rheostat is divided into two portions, as indicated in Fig. 12, which are not connected with each other, so that the lever in the middle of its throw is disconnected from both portions.

The projector has two motors N, N', one for effecting the horizontal, and the other the vertical, movement. The field magnet of each motor has two pole pieces on opposite sides of the armature, wound in opposite directions so as to present like poles to the armature. The ends of the windings at the two poles are connected and one brush of the armature is connected with this wire. The current is sent through only one field magnet coil at a time, each coil being in circuit with its respective portion of the rheostat L or L'. The armature is in series with both coils, and the current flows through it always in the same direction. The cores of the field magnets are magnetically connected by the frame *n* of the motor, so that whichever pole piece is energized, there will be an opposite polarity induced in the other pole piece. It will be seen that these motors can be instantly stopped and reversed by throwing over the levers C, C'; and without any sparking at the brushes, the wires from the field coils being connected with the outer ends of their respective portions of the rheostats. The coils of the rheostats are so connected with the contact plates that as the lever is moved from the outer end of either portion of the rheostat (the position of maximum speed of the motor) toward the middle of its throw, the resistance is increased, until it reaches a maximum and the motor has the least current just before the circuit is opened by the switch lever passing off the contact plate nearest the middle. By continuing its movement, the lever closes the circuit through the other field coil and through the whole of that portion of the rheostat, the resistance being lessened and the speed increased as the lever moves toward the outer contact plate.

Referring to Fig. 12, it is seen that the current from the main *x* passes by the lead *y* to the levers C, C', thence through one portion or the other of the rheostats L, L' to the wires 1 or 2, 5 or 6, the contact pins 1' or 2', 5' or 6', in the cable box D on the controller stand, thence by conductors 1^2 or 2^2, 5^2 or 6^2 to corresponding contact pins 1^3 or 2^3, 5^3 or 6^3 in the cable box D' on the projector base, thence by wires 1^4 or 2^4, 5^4 or 6^4, to the proper field coils of the motors N, N' in the base of the projector, thence through the armatures of said motors and by wire 7^4 to the contact pin 7^3 in the cable box D', thence by way of the conductor 7^2, contact pin 7' in box D, and wire 7, to the switch O, lead *y'*, and main *x'*.

To accomplish the automatic vibration of the projector through a given arc in a horizontal plane, the revolving standard of the projector has fastened to it two adjustable fingers (indicated in dotted lines in Fig. 12) which engage with a reversing switch O', arranged to turn the current in the wire 4^4 through one or the other of the field coils of the motor N, which effects the horizontal movement. The wire 4^4 connects by contact pin 4^3, conductor 4^2, contact pin 4' and wire 4 with a switch K by means of which the lower portion of the rheostat L can be connected with either the wire 1 or the wire 4 at will. The switch O enables all the motor circuits to be opened and closed at will.

The projector is fitted with a diverging lens, which has a lateral movement across the front of the drum. This is arranged to be actuated by an electric motor N^2 on the projector, connected with the lens frame by suitable gearing. The motor is in a derived circuit from the mains *x*, *x'*, the current passing by the wire 3 to contact pin 3', thence by conductor 3^2, pin 3^3, and wire 3^4 to the motor N^2, and thence to the return wire 7^4. A normally open push button J enables the circuit to be closed at will to start the motor N^2 and move the diverging lens.

The above described circuits and switches give the operator perfect control over the movements of the projector and diverging lens. It remains to describe the lamp-governing devices.

The lamp circuit passes through a rheostat I, preferably made of strips of German silver wound back and forth on pins projecting from rigid frames *i'*, from which the strips are in-

sulated. The frames are supported between the legs A of the stand, and the strips are preferably arranged with their edges in vertical planes, to give a good circulation of air. The connections between the coils are brought to contact plates i^2, over which sweeps the switch lever i, preferably made like the levers C, C'. The terminals of the rheostat are at i^3, by means of which it is connected in circuit with the positive main x, the ammeter H, and one side of a double pole switch E'. The negative main x' is brought to the other side of this switch, which thus controls the lamp circuit, the terminals of which in the controller stand are the pins in the cable box D^2. Conductors d connect these with the corresponding pins in a cable box D^3 on the projector base, whence wires lead to the contact rings Q, from which the current is taken off by sliding contacts on the yoke of the projector and conducted to the double pole switch E^2, carbons R, and lamp magnets R', R^2.

The volt meter G has one binding post connected with one of the mains, and the other post connected with the middle plate f' of the double plug-switch F. One of the other plates is connected with the other main, and the other plate is connected with the conductor leading from the rheostat to the lamp. By means of the plug F', the circuit may be closed through the volt meter across either the generator or the lamp mains.

The cable boxes are constructed as follows: In a suitable frame on the stand is secured a plate S of insulating material, in which are metallic bushings T, having at one end an internal flange. A pin T' has a collar which fits the bushing, and abuts against the flange. A spring T^2 is confined between the collar and a nut secured in the other end of the bushing. A screw-plug t enables the conductor from the motor or lamp rheostat or other source to be connected with the bushing and the yielding pin T'. The cable box cover is a hollow casting U adapted to be fastened to the controller stand over the plate S. It contains a similar plate S', in which are secured fixed contact pins s, the outer ends of which are arranged to register with the pins T', and the inner ends of which have connected to them the several conductors, 1^2, 2^2, &c., which are gathered into a cable. For convenience, two sets of cable boxes are shown, one for the motors and the other for the lamp, but it is evident that all the connections may be made with one set of boxes and one cable.

In the modification shown in Figs. 9, 10 and 11, the change is simply in the arrangement of the parts, to get a more compact apparatus. The casing is tall and flat, the lamp rheostat being arranged vertically. The front and sides may be covered with wire netting to protect the parts and yet allow free circulation of air. The apparatus can be fastened against the wall, and occupies but little room. The front of the case is preferably of slate to afford suitable insulation for the switch handles.

Having thus described our invention, what we claim is—

1. A stand for controlling electric translating devices, comprising one or more rheostats, one or more circuit-controlling switches, an ammeter in circuit with one of said rheostats, a volt meter, and a switch for closing the circuit through said volt meter, either across the supply mains or across the leads to the translating device, at will, substantially as described.

2. A controlling stand for electric translating devices, comprising two rheostats, each divided into two unconnected portions, and each having a switch lever adapted to close the circuit through successive coils of either portion, and a switch for causing the current through one portion of one rheostat to flow through either of two independent circuits, substantially as described.

3. A controlling stand for electric translating devices, comprising a switch lever, a series of contact plates therefor, and a rheostat divided into two unconnected portions, one terminal of each being connected to the end contact plates, and the other plates being connected successively with the successive resistance coils, the adjacent terminals of the rheostats being unconnected, substantially as described.

4. A controlling stand for electric translating devices, comprising a case, two rheostats inclosed therein, switch levers for said rheostats having handles outside of said case, a rheostat supported between the legs of the stand, a switch suspended under the case and in circuit with said rheostat, and a switch controlling the circuit through one of said rheostats, substantially as described.

5. A stand for controlling electric circuits, comprising a case containing two rheostats, each divided into two portions and each portion included in a separate circuit, a switch lever for each rheostat adapted to close one or the other of the circuits through successive coils, and a switch adapted to turn the current from one of said circuits through an independent circuit, substantially as described.

6. The combination with a case B of two slate partitions b', a frame M arranged between said partitions, two rheostats L L' supported on said frame, contact plates $l\,l$ mounted on said plates, and levers C C' fulcrumed on the outer side of said partitions and making contact with the plates $l\,l$, substantially as described.

7. In a stand for controlling electric circuits, the combination with an insulating plate, of metallic bushings inserted therein, pins sliding in and projecting from one end of said bushings, screw plugs inserted in the

other ends of the bushings, and springs, confined between said screws and the pins, substantially as described.

8. In a stand for controlling electric circuits, the combination with the stationary insulating plate S carrying spring pins T′, of the movable box U containing the insulating plate S′ carrying rigid pins *s*, substantially as described.

9. A stand for controlling electric circuits, comprising the oppositely arranged rheostats L L, the levers C C′ for controlling them, the rheostat I, its switch lever *i*, the circuit-controlling switch E′, the ammeter H, the volt meter G, and the double plug-switch F, substantially as described.

10. A stand for controlling an electric search light, comprising a double rheostat and switch lever for controlling the vertical movement of the projector, a similar rheostat and switch for controlling the horizontal movement, an additional switch for the automatic vibratory movement, a push button for controlling the lens motor, and a rheostat and switch for the lamp circuit, substantially as described.

11. A stand for controlling an electric search light provided with reversible motors for producing respectively the vertical and the horizontal movements of the projector, comprising a reversing switch for each motor, and a rheostat for each motor composed of two unconnected oppositely arranged portions controlled by the switch, substantially as described.

12. A stand for controlling an electric search light provided with a reversible motor for producing the horizontal movement of the projector, and having a separate motor circuit containing a reversing switch, said stand comprising a rheostat and switch for controlling the motor, and another switch for closing the circuit through said separate motor circuit and reversing switch, substantially as described.

13. A stand for controlling an electric search light, comprising a suitable inclosing case, a volt meter and ammeter mounted on top of said case, a motor-controlling switch lever on each side, moving in a vertical plane, switch handles for the lens motor and the automatic horizontal movement located below the motor switch handles, a double pole switch for the lamp circuit, located below the case, and a lamp rheostat and switch handle supported between the legs of the stand, substantially as described.

14. In an apparatus for controlling electric circuits, the combination with a supply main, of four separate parallel circuits, each containing a rheostat, and two switch levers, each controlling two of said circuits, and adapted to connect either of them with the supply main through the rheostat, substantially as described.

15. In an apparatus for controlling electric circuits the combination with a supply main of four separate parallel circuits, each containing a rheostat, two switch levers, each controlling a pair of said circuits, a reversing switch in a bridge across one pair of circuits, and a switch adapted to cut out one of said circuits, and close a parallel circuit through said reversing switch, substantially as described.

16. In an apparatus for controlling electric circuits, the combination with a supply main of six separate parallel circuits, two switch levers, each controlling a separate pair of circuits through a divided rheostat, a switch controlling a fifth circuit in derivation from one of said first four, a reversing switch in said fifth circuit controlling a shunt across one of said pairs of circuits, and a normally open push button in the sixth circuit, controlling a motor therein, substantially as described.

In testimony whereof we hereunto set our hands in the presence of two witnesses.

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J. A. KENISTON.

Witnesses for Edwin H. Park:
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