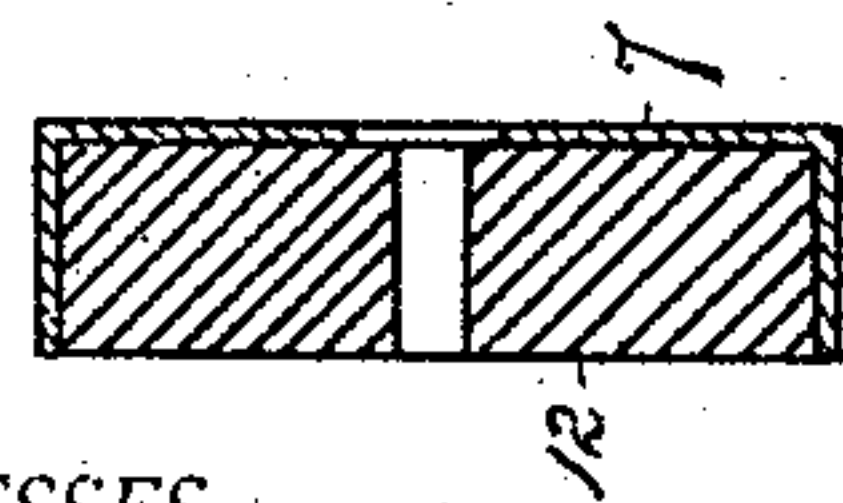
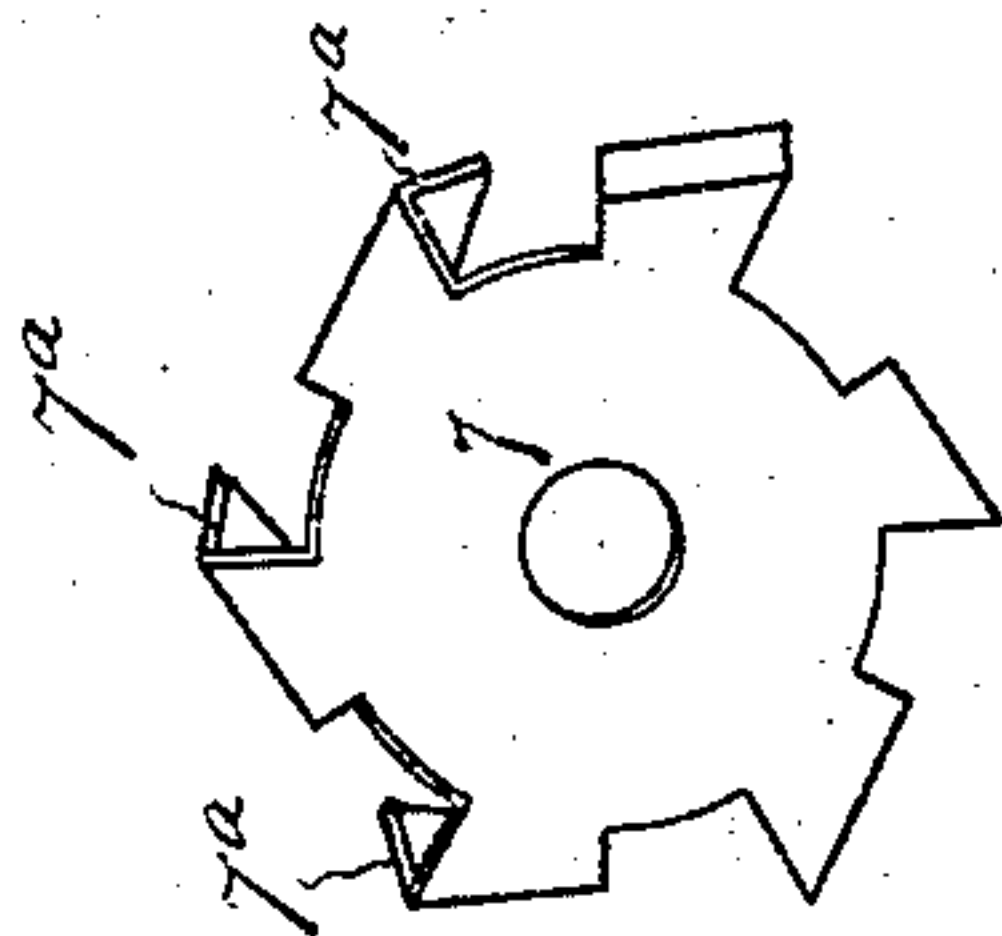
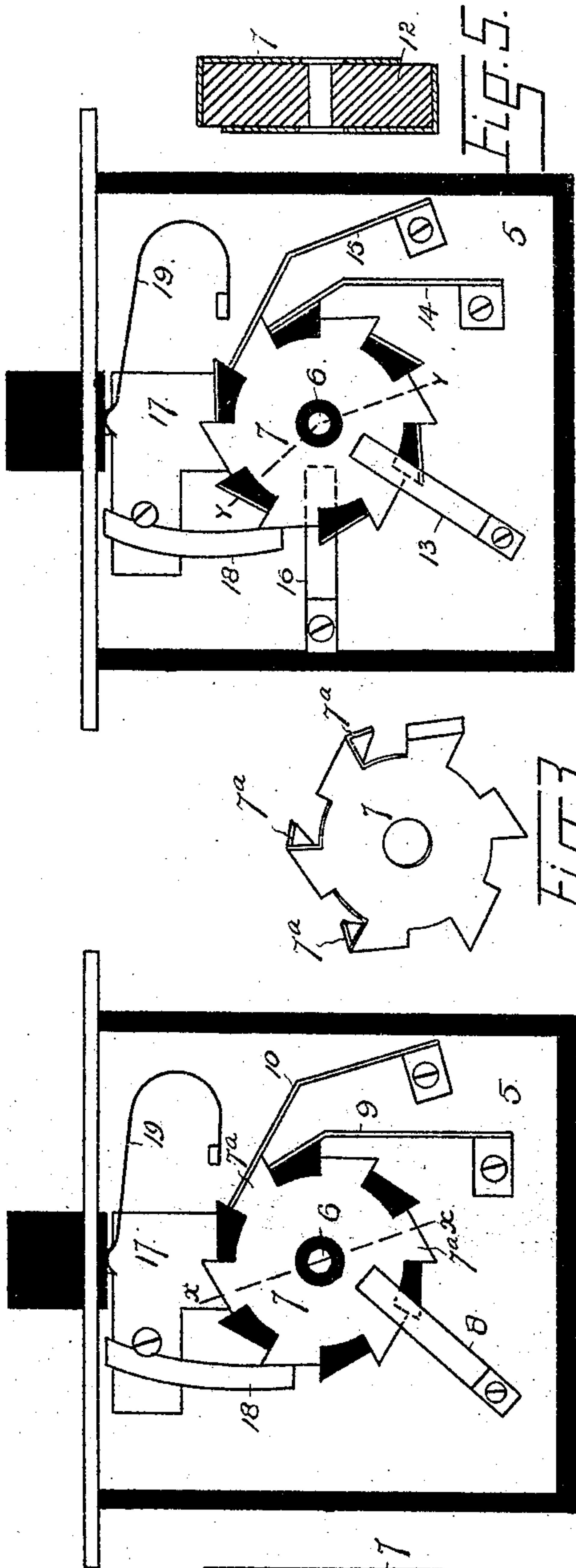


(No Model.)

W. F. BRADNER.
SYSTEM FOR CONTROLLING ELECTRIC LIGHTS.

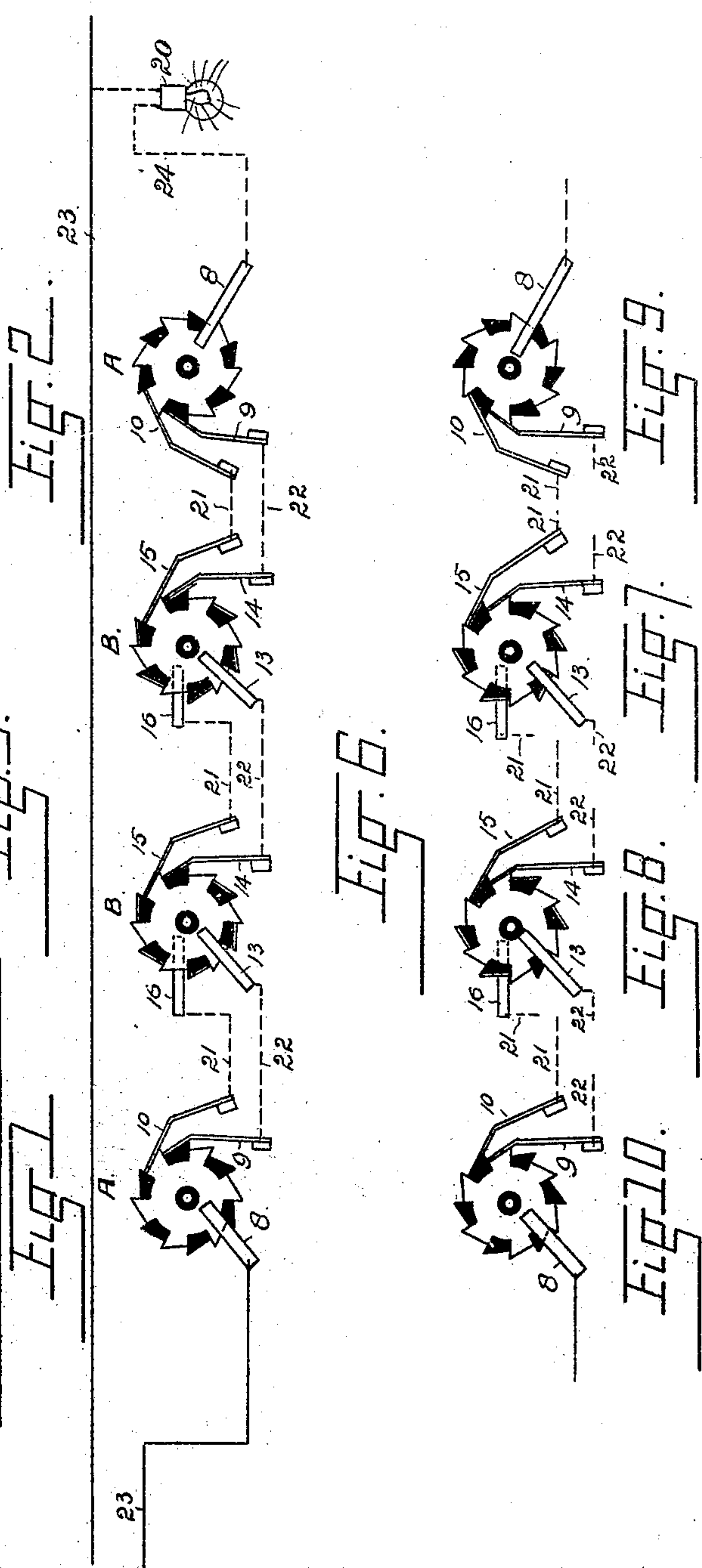
No. 517,812.

Patented Apr. 3, 1894.



WITNESSES:

G. J. Rolland.
Chas. E. Dawson.



INVENTOR
William F. Bradner
BY
A. J. Brien
ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM F. BRADNER, OF DENVER, COLORADO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE ELECTRIC SPECIALTY COMPANY, OF SAME PLACE.

SYSTEM FOR CONTROLLING ELECTRIC LIGHTS.

SPECIFICATION forming part of Letters Patent No. 517,812, dated April 3, 1894.

Application filed May 12, 1893. Serial No. 473,929. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. BRADNER, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Systems for Controlling Electric Lights; and I 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.

My invention relates to an improved system for controlling the electric current, and has for its special object, the controlling of lamps from any number of points in an incandescent circuit.

The invention consists of the features hereinafter described and claimed all of which will be fully understood by reference to the accompanying drawings in which is illustrated an embodiment thereof.

In the drawings, Figures 1 and 2 illustrate suitable switch mechanism for use in my improved system. Fig. 3 is a perspective view of one of the contact plates employed. Fig. 4 is a section taken through the line $x-x$, Fig. 1. Fig. 5 is a section taken through the line $y-y$, Fig. 2. Fig. 6 is a diagrammatic view illustrating the circuit. Figs. 7, 8, 9 and 10 are similar views, further illustrating the circuit.

Similar reference characters indicating corresponding parts or elements in the views, let the numeral 5 designate the switch base plate employed in the construction shown in Figs. 1 and 2. This base is preferably composed of insulating material and is provided with a post 6 upon which is pivoted a toothed insulating block or ratchet disk 12. In the construction shown in Fig. 1, a contact plate 7 of the design shown in Fig. 3 is attached to one face of the disk. This plate is provided with lips 7^a which overlap every alternate tooth of the ratchet. To the base 5 of the switch are attached the three contact brushes 8, 9 and 10. The brush 8 engages the face of the disk covered by the contact plate 7 and is there-

fore always in contact therewith. The brushes 9 and 10 engage the edge of the disk, being so arranged that when one engages a contact lip 7^a the other engages an exposed tooth 12^a of the insulating ratchet. In the construction shown in Fig. 2, a contact plate 7 is applied to each face of the disk 12, whereby every tooth of the ratchet is provided with a contact lip 7^a. This switch has four brushes attached to the base 5 and designated 13, 14, 15 and 16 respectively. It may therefore be called a four-wire switch. The brushes 13 and 16 engage the contact plates 7 on opposite faces of the disk, each being continuously in engagement with its respective plate 7. The brushes 14 and 15 engage the edge of the disk and each is always in engagement with a contact lip of one or the other of the plates, and alternately in contact with the lips of the two plates as the disk is rotated by the use of the push bar 17 carrying the dog 18. This mechanism for actuating the ratchet is given the reverse movement by the spring 19.

In Fig. 6, let A, for convenience, designate switches of the construction shown in Fig. 1, and B, switches of the construction shown in Fig. 2. In my improved system, two switches A are located at suitable points in the circuit, and the switches B intermediately located. Between the switches A and B the circuit wires are double. As many switches B are interposed in this double portion of the circuit as desired, and the number required will depend upon the number of points between the terminal switches A from which it is desired to control the lamps in the circuit.

By the use of the duplex or three wire switches A, it is well known that lamps can only be controlled from two points in the circuit. By running two wires between these two points where the duplex switches are located, and interposing the switches B in this double part of the circuit, the lamp may be controlled from as many additional points as there are switches B. This proposition will be understood by a careful inspection of the diagram shown in Fig. 6, bearing in mind the construction of switches A and B. Only two switches B are shown in this figure (it must be remembered, however, that any desired

number may be employed), two being considered sufficient to illustrate the principle or make the system clear.

Let the numeral 20 designate the lamp or series of lamps which it is desired to control, and 21 and 22 the two wires between the two switches A. Assuming that the switches A are in the position shown in Fig. 1, and that switches B are in the position shown in Fig. 2, the current may be said to pass from the conductor 23 of the main circuit to the lamp and thence through wire 24 to brush 8 of one switch A and thence across the face plate to brush 10 of the same switch, thence through wire 21 to brush 15 of one switch B, thence across the face plate to brush 13 of the same switch, thence *via* wire 22 to brush 14 of the other switch B, thence across the face plate to brush 16 of the same switch, thence *via* wire 21 to brush 10 of the other switch A, thence across the face plate to brush 8 of the same switch and thence to the main circuit wire 23, the circuit being closed and the lamp lighted. Now if the ratchet of either of the switches A, or of either of the switches B is actuated or moved one notch, which can be done by pressing the push bar, the circuit will be broken and the lamp extinguished. Assuming that the ratchet of the switch B farther to the right in Fig. 6 is thus actuated, the current must follow the course shown in Fig. 7 and pass from wire 21 on one side of the switch to brush 15 and thence across the face plate to brush 16 and wire 21 on the opposite side of the switch, and finally to brush 9 of the switch A farther to the left, the circuit being broken since there is no electrical connection between brushes 8 and 9 as will be seen by reference to Fig. 1. If the ratchet of the other switch B, be actuated, the current will pass as indicated in Fig. 8, assuming that the other switches are in positions shown in Fig. 6. In this case the current must pass from brush 14 to brush 13 of the switch and

thence to brush 9 of the switch A. If the ratchet of the switch A farther to the right, be actuated, the current must pass from brush 8 to brush 9 as indicated in Fig. 9 and finally reaching the brush 9 of the other terminal switch A, the circuit being again broken. Again, if the switch A farther to the left be actuated the current would have to pass from brush 9 to brush 8 as indicated in Fig. 10, but as this is impossible if all the other switches are in the position shown in Fig. 6, the circuit is again broken.

Having thus described my invention, what I claim is—

1. In a circuit switch, the combination of a rotating ratchet composed of an insulating disk and two conducting plates applied to its opposite faces, said plates having lips bent to engage the teeth of the disk, the lips of each plate engaging every alternate tooth, and four contact brushes, two of which are continuously in engagement with the respective face plates of the disk while the other two alternately engage the lips of the respective plates as the ratchet is actuated, substantially as described.

2. In a system for controlling electric lights, the combination with the two duplex or three wires switches, two conductors located between said duplex switches, and other switches interposed in the double portion of the circuit, each composed of an insulating, rotating block, two contact plates, and four brushes, two of which are in continuous engagement with the respective contact plates, and the other two alternately in contact with the said plates, substantially as described.

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

WILLIAM F. BRADNER.

Witnesses:

CHAS. E. DAWSON,
J. B. WILLSEA.

It is hereby certified that the assignee in Letters Patent No. 517,812, granted April 3, 1894, upon the application of William F. Bradner, of Denver, Colorado, for an improvement in "Systems for Controlling Electric Lights," should have been described and specified as *The Electrical Specialty Company*, instead of the "The Electric Specialty Company;" and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 29th day of January, A. D. 1895.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.