(No Model.) 3 Sheets—Sheet 1.

R. R. BOWKER.

ELECTRIC DISTRIBUTING SYSTEM.

No. 562,209. Patented June 16, 1896.

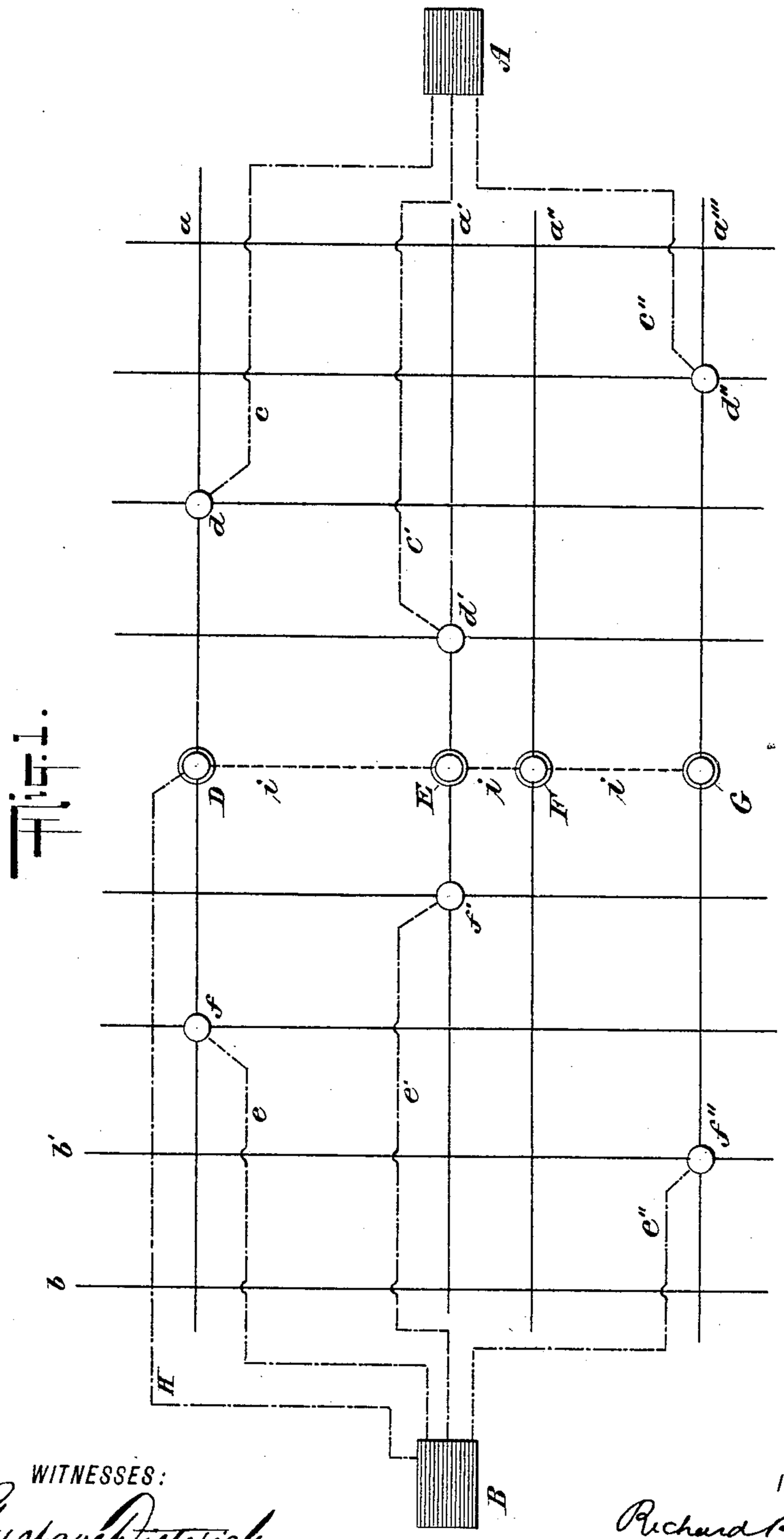

Fig. 1.

WITNESSES:

Gustave Patterich.

John Kehlenbeck.

INVENTOR

Richard R Bowker

BY

Baker Benjamin

his ATTORNEY.

(No Model.) 3 Sheets—Sheet 2.

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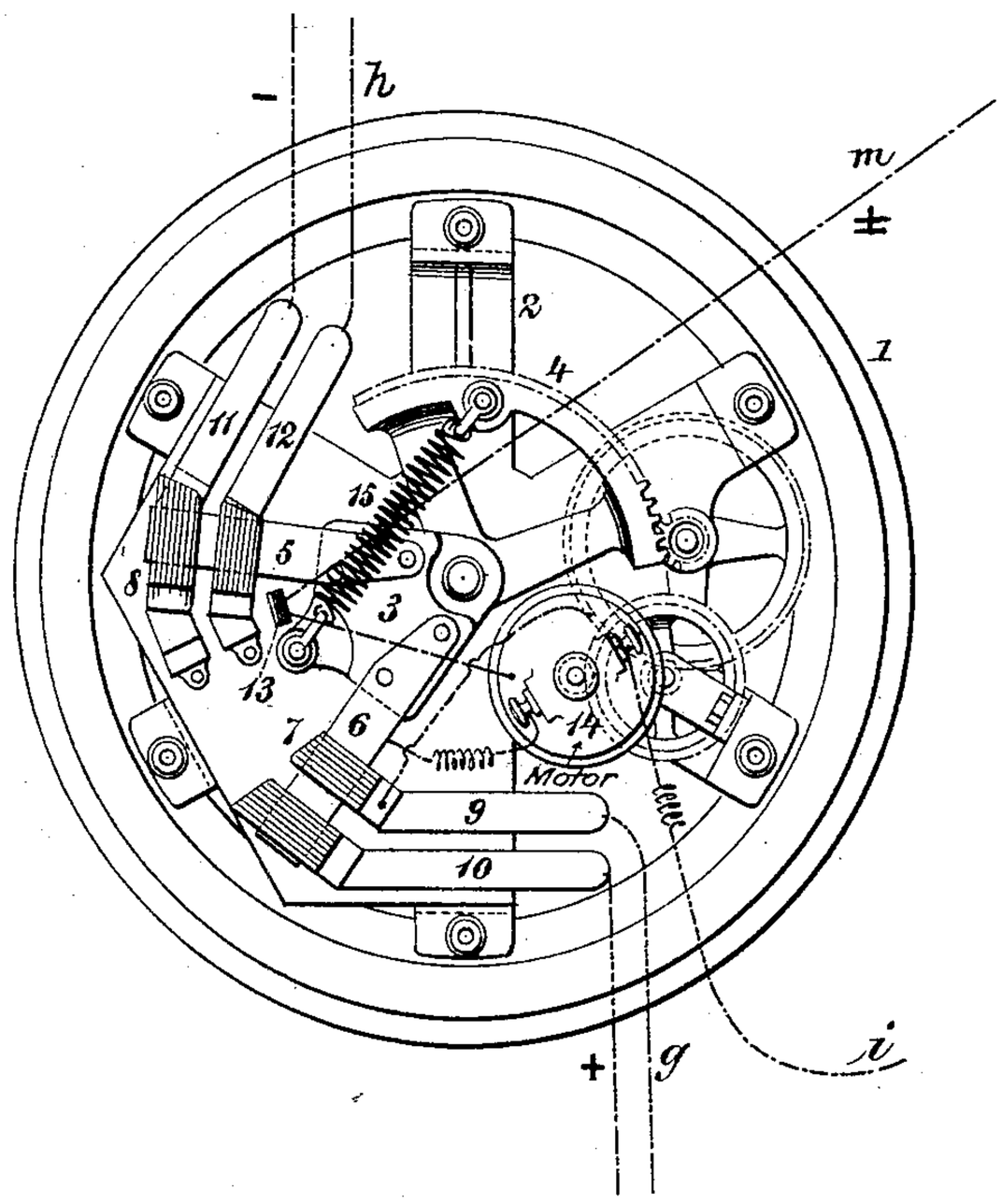
Fig. 2.



WITNESSES:

Gustave Dieterich.

John Kehlenbeck.

INVENTOR

Richard R. Bowker

BY Paul Benjamin

his ATTORNEY.

(No Model.)

3 Sheets—Sheet 3.

R. R. BOWKER.

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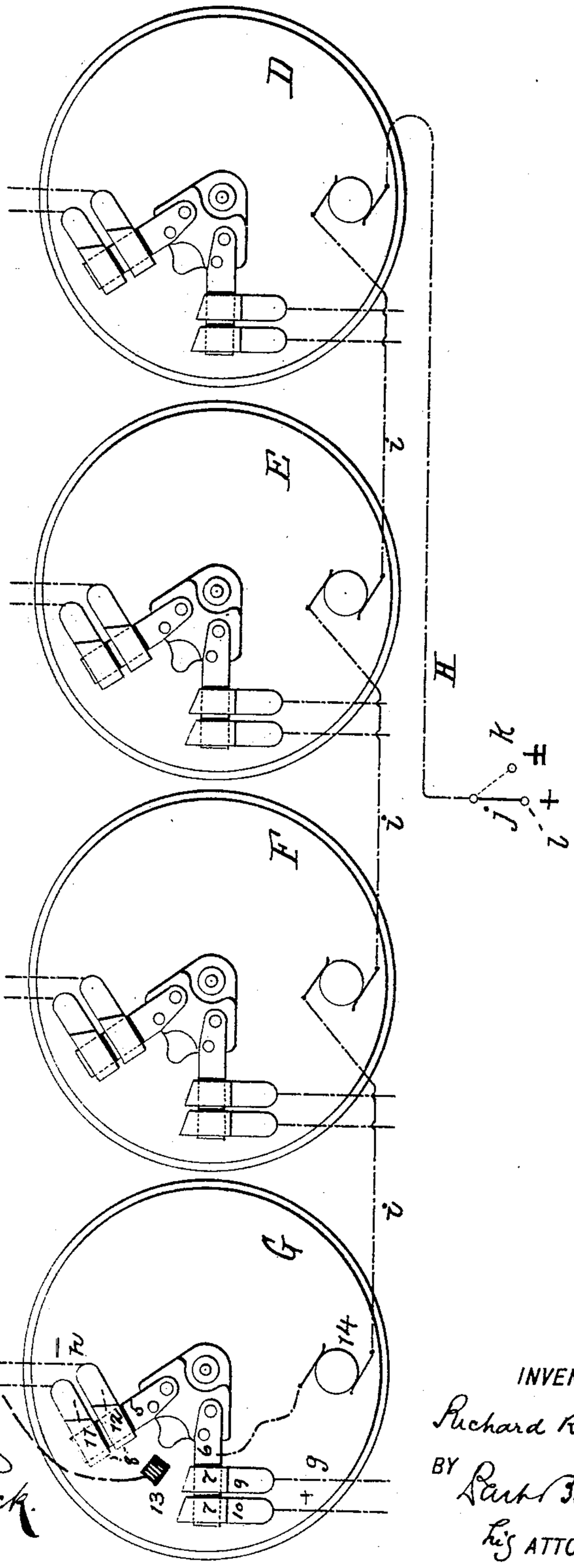

Fig. 3.

WITNESSES:

Gustave Dieterich.

John Kehlenbeck.

INVENTOR

Richard R. Bowker

BY Lester Benjamin

His ATTORNEY.

UNITED STATES PATENT OFFICE.

RICHARD R. BOWKER, OF BROOKLYN, NEW YORK.

ELECTRIC DISTRIBUTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 562,209, dated June 16, 1896.

Application filed February 27, 1896. Serial No. 581,006. (No model.)

To all whom it may concern:

Be it known that I, RICHARD R. BOWKER, of the city of Brooklyn, Kings county, and State of New York, have invented a new and useful Improvement in Electric Distributing Systems, of which the following is a specification.

The invention relates to an electric distributing system such as is used in the electric-lighting plants of cities; and it consists more particularly in the construction of said system whereby a portion of a network of street-conductors may be cut off from a supply-station or whereby a network of street-conductors receiving current from two stations may be electrically divided into two parts receiving current from said stations, respectively.

In the accompanying drawings, Figure 1 is an electrical diagram showing two electric-lighting stations and a network of street-conductors receiving current from both. Fig. 2 is a plan view showing the construction of the controllable switch-box which I prefer herein to employ. Fig. 3 is a diagram showing the mode of connection of the several controllable switch-boxes.

Similar numerals and letters of reference indicate like parts.

Referring first to Fig. 1, let A and B represent two electric-lighting stations, located at a distance from one another. *a a' a'' a'''* and *b b'*, &c., represent street-conductors forming a network to which current is supplied by the stations A and B. The station A delivers its current to its section of street-conductors through feeders, as *c c' c''*, which communicate with junction-boxes, (indicated by the circles *d d' d'';*) and the station B supplies current to its network through the feeders *e e' e''*, communicating with the junction-boxes *f f' f''*. In the network supplied respectively by the two stations A and B and in the conductors *a a' a'' a'''* I place controllable switch-boxes D, E, F, and G. The switch-box D is connected by wire H to the station B; and the other switch-boxes, E, F, and G, are electrically connected to one another by wire *i*. The construction therefore is such that all the switch-boxes D, E, F, and G may be operated simultaneously from station B by wire H *i* to break connection in the conductors *a a' a'' a''';* or, in other words, to divide the whole network of street-conductors shown into two parts, one of which receives current only from station B while the other part receives current only from station A. Thus I can regulate the extent of the area of the network which each station shall supply at will; or, where there is only a single station, I may in the same way cut off from it any portion of the network to which I may desire no further supply of current shall be sent. The invention is especially useful, however, in the case of two stations both feeding into the same extended network. If through any cause the supply capacity of one station becomes reduced, it may happen that undue load may fall upon the other station, and as a consequence the intensity of the lights in the entire network becomes greatly impaired. This effect is prevented by my present invention, because the moment that it is known that the capacity of a given station is lessened, the controllable switch-boxes are at once operated to cut off that station and its network from the distributing system.

While I may use any form of controllable switch-box capable of producing when connected with the street-conductors the result which I have pointed out, I prefer to use a special form of box, which is fully described by John Van Vleck in an application for Letters Patent simultaneously pending herewith, Serial No. 574,190. I will now set forth a sufficient description of the said box for the purposes of the present application.

Referring more particularly to Fig. 2, I will first describe the construction of the box which is represented at G in Fig. 3, this being the last box in the series. 1 is the cylindrical casing of the box, within which there is disposed a six-armed spider 2. Passing through the center of this spider is a shaft which carries a loose plate 3 and a loose toothed sector 4. The plate 3 carries the switch-arms 5 and 6, which enter between spring-contacts 7 and 8, carried, respectively, by metal bars 9 and 10 and 11 and 12. The positive conductor *g* of a street-conductor, such as *a*, is connected to the plates 9 and 10, the negative conductor *h* to the plates 11 and 12, and hence the switch-arm 6, when in contact with the pair of spring-contacts 7, estab-

lishes connection between the parts of the positive conductor *g*, and the switch-arm 5, when in contact with the plate 8, establishes connection between the parts of the negative conductor *h*. 13 is a metal clip which is connected to the neutral conductor *m*, which is also a part of the main *a*. 14 is an electric motor of any suitable construction, the field-circuit of which is permanently connected between the positive conductor *g* and the neutral conductor *m*; that is, between the plate 9 and the clip 13. The other end of the armature-circuit connects to the wire *i*, which communicates with one terminal of the armature of the similar motor which is arranged in the controllable switch-box *f*, Fig. 3. The other terminal of the motor in the box F connects with one terminal of the armature of the motor in switch-box E and the other terminal of the armature in switch-box E connects with one terminal of the armature in switch-box D. The other terminal of the armature of switch-box D connects by wire H with the switch-arm *j* at the distant station B. Therefore the armatures of all of these switch-boxes D E F G, Fig. 3, are connected in series. The construction of the boxes D, E, and F is the same as that of the box G with the exception that the clip 13 and connection thereto of the neutral conductor are omitted in D, E, and F, as indicated in Fig. 3, so that, as will now be explained, the controllable switch-box G is the regulating switch-box for all that may be connected in series with it. The switch-arm *j* at station B may make contact with a point *k* or a point *l*, these points connecting, respectively, with a neutral and a positive conductor. Between the plate 3 and the pivoted sector 4 extends a spiral spring 15. A train of gearing is interposed between the armature-shaft of the motor 14 and the toothed sector 4, so that said sector is turned by the rotation of the motor.

Still considering Fig. 2 and now also Fig. 3 the operation of the device is as follows: The position of the moving parts in the boxes being as shown in Fig. 2, when the switch-arm *j* is placed on contact-point *k* the circuit is completed through the motors in all of the boxes D, E, F, and G; and the current therein rotates the armatures in such direction as through the train of gearing to rotate the toothed sector 4 from left to right, so as to bring the spring 15 into the position shown in Fig. 2. The spring then acting on the plate 3 draws the switch-arms 5 and 6 out of contact with the contact-plates 8 and 7, and thus breaks the circuit in the positive and negative conductors *g* and *h* in every conductor *a a' a'' a'''*. By the same means, however, the switch-arm 6 in the end box G of the series is brought into contact with the clip 13; therefore, both the terminals of the armatures in all the boxes are rendered neutral and all of the motors stop. The circuit is now broken between the parts of the network and will remain so until the controllable switch-boxes D, E, F, and G are again operated to close said circuit. In order to do this, the switch-arm *j* at station B is moved into contact with the point *l*, this point being positive. Hence it follows that the current passes through the motor-armatures in an opposite direction to that of the current which hitherto moved them; and hence all turn in the opposite direction and move the sectors 4 from right to left, thus through the springs 15 retracting the arms 5 and 6 into contact with plates 7 and 8 and so closing the circuits.

While I have described the controllable switch-boxes D E F G herein as arranged in series, and so that one box, as G, may regulate the operation of all the others, it is to be understood that I do not limit myself to this series arrangement. Instead thereof I may use controllable switch-boxes each similar to G and each connected by its own controlling-wire from one station, so that boxes may be operated simultaneously over the four wires or in any successive order. Of course also I may use any desired number of switch-boxes, as D, E, F, and G.

I claim—

1. In an electric distributing system, a supply-station, a network of street-conductors receiving current therefrom and controllable switch-boxes interposed in series in said street-conductors, and a controlling-circuit including the actuating apparatus of said switch-boxes and operated from said station, whereby when said switch-boxes are controlled to break circuit a portion of said network of conductors may be electrically cut off from said supply-station, substantially as described.

2. In an electric distributing system, two supply-stations a network of street-conductors receiving current from both stations and a series of controllable switch-boxes interposed in said street-conductors and a controlling-circuit including said switch-boxes and operated from one of said stations; whereby said network may be separated into two parts not in electrical connection, each part receiving current from one of said stations, substantially as described.

3. In an electric distributing system a supply-station B, a network including street-conductors as *a*, *a'* and *b*, *b'* &c., controllable switch-boxes, as D, E, F, G arranged in series and included respectively in said street-conductors, and a controlling-circuit H I including the actuating apparatus of said boxes and operated from said station B, whereby when said boxes are operated to break circuit in said street-conductors all of the network not included between said station and said series of boxes is electrically disconnected from said station, substantially as described.

4. In an electric distributing system, two supply-stations A, B a network including street-conductors as *a*, *a'* &c., and *b*, *b'* &c.,

a series of controllable switch-boxes included respectively in said conductors and located at a distance from said stations, and a controlling-circuit H *i* including said boxes and operated from one of said stations; whereby when said boxes are operated to break circuit in said conductors, said network is electrically divided into two parts, one part receiving current from station A and the other part from station B, substantially as described.

R. R. BOWKER.

Witnesses:
T. R. MOLLER,
I. A. VAN WART.