

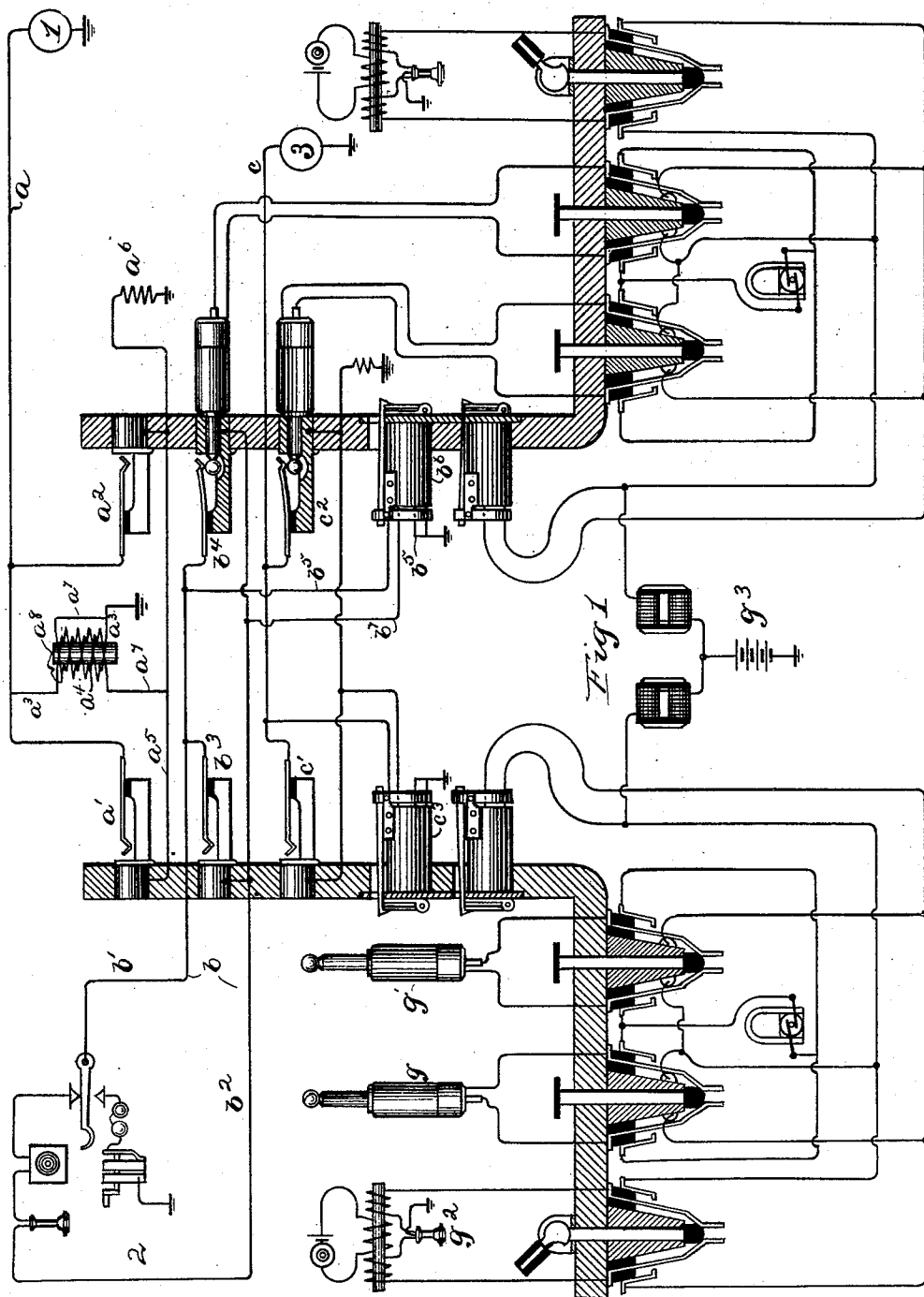
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.
MULTIPLE SWITCHBOARD SYSTEM.

No. 484,612.

Patented Oct. 18, 1892.



Witnesses:
George L. Cragg.
M. James Tuller.

Inventor
Charles E. Scribner
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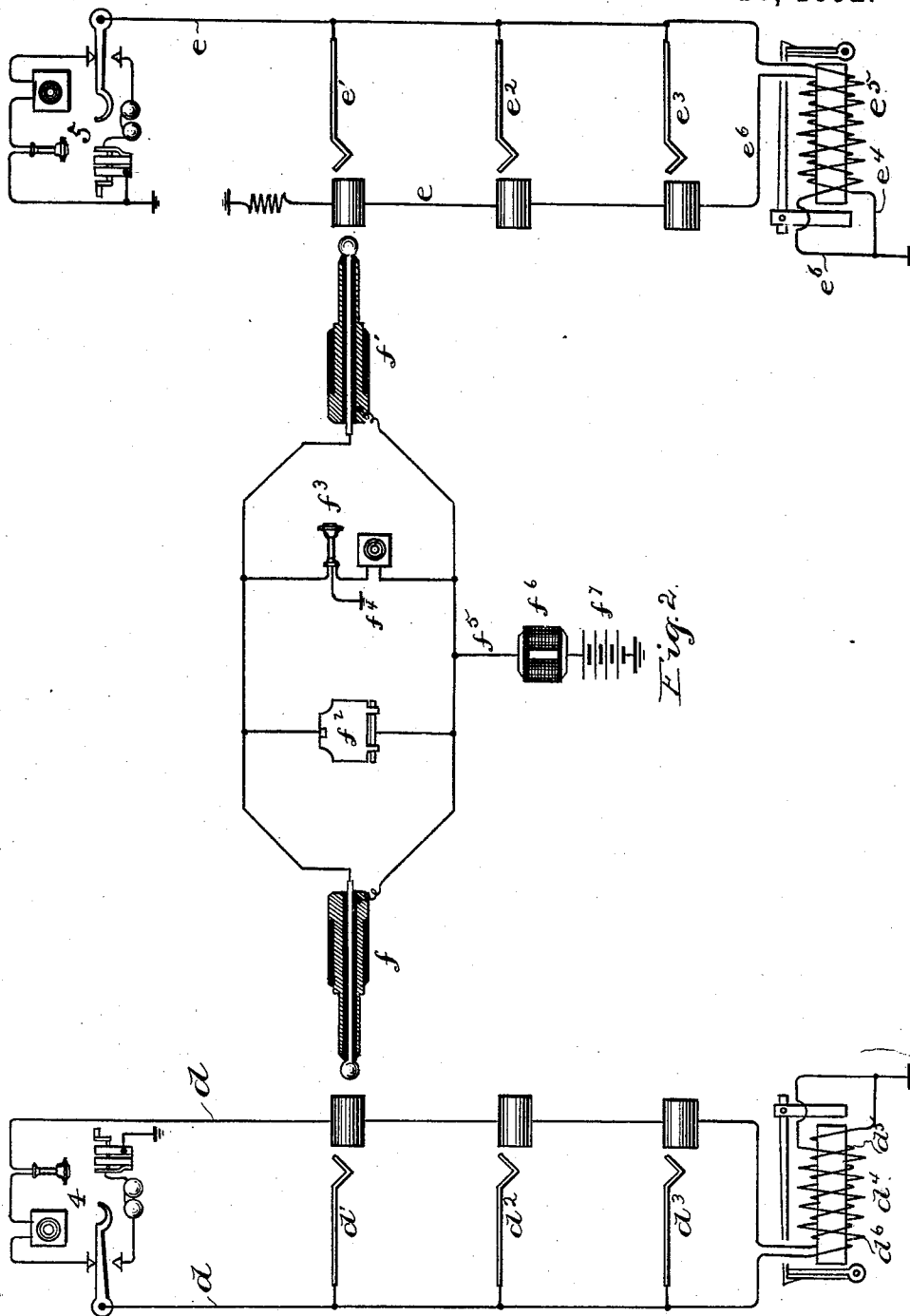


Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

MULTIPLE-SWITCHBOARD SYSTEM.

SPECIFICATION forming part of Letters Patent No. 484,612, dated October 18, 1892.

Application filed January 21, 1892. Serial No. 418,823. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Multiple-Switchboard Systems, (Case No. 283,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to that class of telephone-exchange systems in which the telephone-lines are permanently connected each with the springs and the test-pieces of the different switches thereof and the individual annunciator permanently connected in a circuit leading to ground from a portion of the line between the springs of the switches on one side and the test-pieces of the switches on the other side.

The object of my invention is to so arrange the circuits of the individual annunciators with respect to the circuits of the operator's outfits at the different boards that when any two lines are connected together current sent from either subscriber's station, as for clearing-out purposes, will not throw down the individual annunciator of either of the lines.

My invention consists more particularly in winding each individual annunciator differentially and connecting the branch of the line connected with the springs of the switches through one of the differential windings and the branch or portion which connects the test-pieces through the other of the differential windings. The circuits are so arranged that when the telephone at a station is hung on the switch and the generator turned current will be sent from ground at the said station over the portion of the line connected with the springs of the switches and thence through one winding of the individual annunciator to ground, and the annunciator is thus operated. When two lines are connected, the circuits are such that if the generator is operated at either station, current will pass through both coils of each of the annunciators and the magnets thereof will thus be rendered practically neutral and neither annunciator will be thrown down.

My invention will be more readily under-

stood by reference to the accompanying drawings, in which—

Figure 1 is a diagram illustrative of three telephone-lines connected with switches on each of two switchboards, including differentially-wound individual annunciators and keyboard apparatus at each of the boards. Fig. 2 is a more simple diagram of the circuits of two telephone-lines and of an operator's outfit.

The telephone-line *a* of station 1 of Fig. 1 extends to the springs of the switches *a'* *a*² of the line, and by the branch *a*³ through the winding *a*⁴ of the individual annunciator to ground. The portion or branch *a*⁵ of this line is connected with the frames or test-pieces of the switches *a'* *a*² and to ground through resistance *a*⁶ at the central office. The branch connection *a*⁷ extends from this wire *a*⁵ through the other differential winding *a*⁸ of the individual annunciator to ground.

At station 2 I have shown the circuits of the subscriber's outfit. The telephone-line *b* extends in two branches *b'* *b*² to the central office. The branch *b'* is permanently connected with the springs of the switches *b*³ *b*⁴. The branch *b*⁵ from this limb extends through one of the windings of the individual annunciator *b*⁶ to ground. The other limb or return portion *b*² of the metallic circuit of station 2 is connected permanently with the frames or test-pieces of the switches *b*³ *b*⁴. A branch *b*⁷ from this limb *b*² extends through the other winding of the individual annunciator *b*⁶ to ground. The circuit of the telephone-line *c* of station 3 is connected with the switches *c'* *c*² and with the individual annunciator *c*³ in the same manner as the circuit *a* of station 1 is connected with its switch *a'* *a*² and its individual annunciator, heretofore described.

In Fig. 2 the metallic circuit *d* of station 4 is shown connected with its switches *d'* *d*² *d*³ and with the differential windings of individual annunciator *d*⁴ after the manner of circuit *b* of station 2, Fig. 1, heretofore described.

The telephone-line *e* of station 5, Fig. 2, is grounded after the manner of line *a* of station 1, Fig. 1. This line *e* is permanently connected with the springs of switches *e'* *e*² *e*³,

and is provided with a branch connection e^4 through one of the windings of the individual annunciator e^5 . The portion of this line connecting with the test-rings of the said switches is provided with a branch e^6 , extending through the other winding of said individual annunciator e^5 to ground.

The plugs $f f'$ of the outfit shown in Fig. 2 are of usual construction. The clearing-out annunciator f^2 is in a bridge between the sleeve-strand and tip-strand of the cords. The telephone f^3 when in circuit is bridged between the same strands, the center of the coil of the telephone being provided with a grounding-branch f^4 in a well-known way in order that the telephone may be used for testing. The branch f^5 extends through the usual retardation-coil f^6 and thence through a test-battery f^7 . The test-battery may be common to as many sets of cords as may be convenient.

When the telephone—as, for example, the telephone at station 4—is hung on the switch and the generator operated, current will be sent through one winding only of the individual annunciator d^4 , and hence the shutter will be thrown down. Suppose, however, that the plug f were inserted in one of the switches of the line of station 4—for example, switch d' . The tip of said plug would rest against the spring of said switch, and the sleeve of said plug would be in contact with the test ring or frame of said switch. In such case, suppose the telephone at station 4 hung on the switch so as to connect the switch-lever with the ground branch including the generator, and suppose the generator to be operated. Current would be sent over line d to the spring of switch d' , and there the current would divide, one path leading through one winding of the individual annunciator d^4 and the other path through the other winding thereof, and in such case the annunciator will not be operated. Suppose that not only the plug f were inserted in switch d' , but also that the plug f' were inserted in the switch e' of the line e of station 5. In the latter case current would be sent also in derived circuit through both of the windings $e^4 e^6$ of individual annunciator e^5 of said line e .

I will now trace the circuits which would be then formed from the generator at station 4. First, the circuit would be from ground at station 4 to the point of division at the spring of switch d' , from thence one branch would be the permanent branch through coil d^5 of individual annunciator d^4 . The other path would be traced from the spring of switch d' to the tip of plug f , and thence through the clearing-annunciator f^2 , and thence back to the sleeve of switch f , and thence to the test-piece of d' , and thence through the other winding d^6 of the individual annunciator d^4 to ground. Assuming now, as before stated, that plug f' is inserted in switch e' , the wire between the strands of the cords, which wire

includes the clearing-out annunciator f^2 , will be, accurately speaking, a bridge-wire. The current will therefore pass to the tip of plug f' , and thence to spring of switch e' , and thence through the coil e^4 of the individual annunciator e^5 to ground; also, current will pass from the other end of the bridge including the clearing-out annunciator f^2 to the sleeve of plug f' and thence, as before described, through the differential winding e^6 of individual annunciator e^5 .

As shown in Fig. 1, the lines of station 2 and 3 are connected upon the second board in the manner assumed with respect to the lines of stations 4 and 5 of Fig. 2. Suppose the operator at the first board, having received a call from the subscriber of station 1, has inserted plug g in switch a' and received an order for connection with one of the lines b or c , we will say line b . The operator by applying the tip of plug g' to the frame of switch c' and listening at her telephone g^3 , connected in a bridge between the strands of the cords of plugs $g g'$, will close circuit from test-battery g^5 upon the line, and will know that the line called for is busy. If, however, a line not in use were tested, she would get no sound in her telephone, and would know that the line was free. This test-circuit is old and well known. It is, however, specially adapted for use in connection with my invention herein, which relates, as before stated, more particularly to the manner of arranging the circuits of the individual annunciators.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a telephone-line extending from the subscriber's station to the central office, of two or more switches, one portion of the line being permanently connected with the springs of said switches and the other portion or branch thereof being connected with the test-pieces of said switches, and an individual annunciator included between said branches or portions of the telephone-lines, said individual annunciator being wound differentially and provided with a branch connection to ground, substantially as specified.

2. A telephone-line connected with an individual annunciator at the central office in two branches or limbs, each branch or limb including a different differential winding of said individual annunciator, whereby current sent over one limb will operate the annunciator, while current sent over both limbs will render said individual annunciator neutral and prevent the operation thereof, substantially as specified.

3. A telephone-line extending from the subscriber's station to the central office, one portion thereof being connected with the spring or springs of one or more switches and the other portion thereof connected with the test-piece or test-pieces of the same switches, and an individual annunciator wound differen-

tially, one differential winding being included in one portion of the telephone-line and the other differential winding thereof being included in the other portion thereof, said differential coils being provided with a ground connection, in combination with a connecting device for insertion in one of the switches and a clearing-out annunciator connected in a bridge between the contacts of said connecting device, whereby current sent to line from subscriber's station will be directed through both the differential windings of the individual annunciator, substantially as specified.

4. The combination, with two telephone-lines, each connected with switches on different switchboards, and each including a different individual annunciator wound differentially and provided with a ground connec-

tion, as described, of an operator's outfit including a pair of double-pointed plugs and cords and an individual annunciator bridged between the two sets of said cords, whereby on connecting two lines together current sent from either subscriber's station will be sent in derived circuit through both of the windings of each of the individual annunciators to render the same neutral while the clearing-out annunciator will be operated, substantially as specified.

In witness whereof I hereunto subscribe my name this 14th day of December, A. D. 1891.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,
M. JEANE TALLETT.