

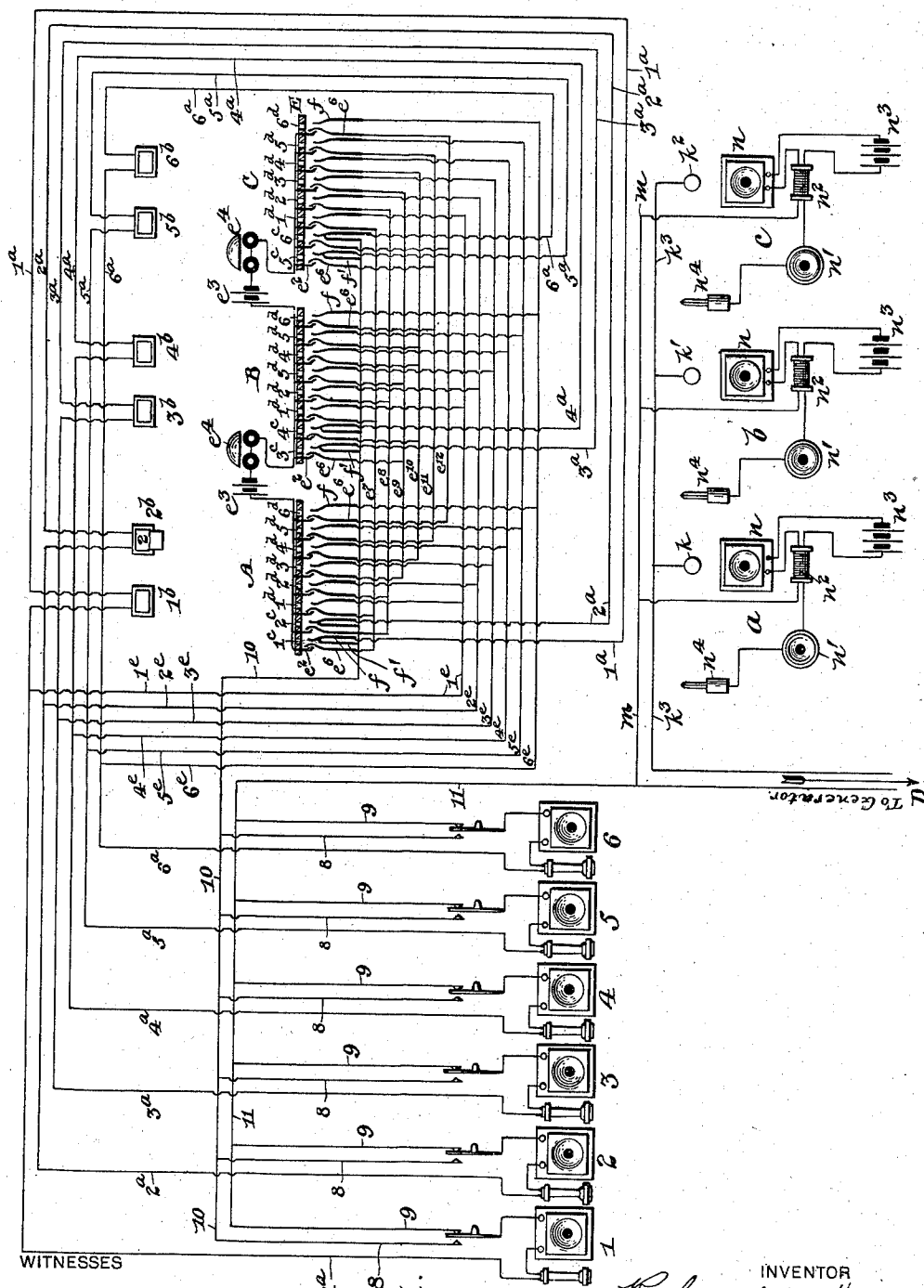
(No Model.)

2 Sheets—Sheet 1.

R. McG. ANDREWS.
MULTIPLE SWITCHBOARD.

No. 565,823.

Patented Aug. 11, 1896.



Witnesses
Geverance.
N. S. Hockman.

Fig. 1.

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Robert McG. Andrews
By his Attys
Mason Fennick & Lawrence

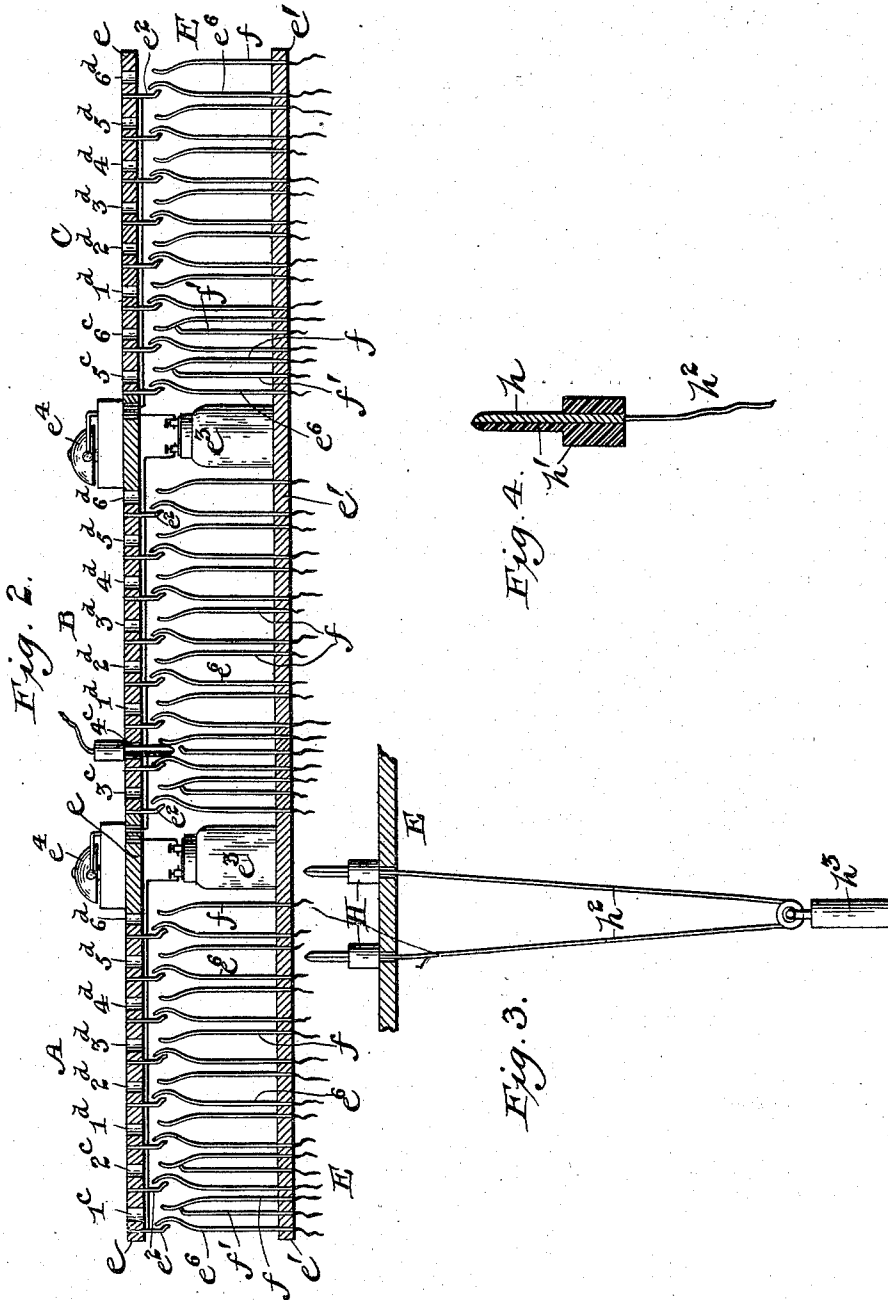
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Wm. Finckh

UNITED STATES PATENT OFFICE.

ROBERT MCGUIRE ANDREWS, OF RICHMOND, VIRGINIA.

MULTIPLE SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 565,823, dated August 11, 1896.

Application filed April 17, 1896. Serial No. 588,002. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MCGUIRE ANDREWS, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Multiple Switchboards; and I do hereby 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.

My invention relates to improvements in telephone systems, and has more particular relation to multiple switchboards for such systems.

The invention consists of certain novel constructions, combinations, and arrangements of parts, all of which will be hereinafter more particularly set forth and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 represents a diagrammatical view of the circuits and connections of my improved multiple switchboard. Fig. 2 represents a central vertical longitudinal section through my said switchboard. Fig. 3 represents a transverse section through said switchboard, illustrating the manner of mounting the connecting-plugs; and Fig. 4 represents a detail central vertical section through one of the connecting-plugs.

In the drawings, 1, 2, 3, 4, 5, and 6 represent the respective telephones of six different subscribers; A, B, and C, the three sections of the switchboard, one section for each central operator; *a*, *b*, and *c*, the respective telephones of said operator, and D the generator for ringing the call-bells of the subscribers from the central station.

Each of the subscribers' telephones has three wires connected to it, the main wires 1^a, 2^a, 3^a, 4^a, 5^a, and 6^a, respectively, call-wires 8 8, and return-wires 9 9. Each of the wires 8 is connected to a common call-wire 10, and each of the wires 9 is connected to a common return-wire 11. Each main wire is independent and connects with its own independent connection on the switchboard, as hereinafter more particularly described. Said main wires are also in circuit with independent drop-indicators 1^b, 2^b, 3^b, 4^b, 5^b, and 6^b, respectively,

the use of which will be hereinafter more fully described.

The multiple switchboard, as before stated, is composed of three sections, A, B, and C, respectively, and comprises a table or board E, placed in either a horizontal or a vertical position. This table is formed with a top *e* and a bottom *e'*, so placed as to leave an adequate space between them for the accommodation of the spring-jacks or contact-pieces. Each section of the board is provided with eight apertures or plug-holes. The first two apertures 1^c 2^c of section A from the left represent the subscribers 1 and 2, which the operator of said section has in charge. The remaining six apertures 1^d, 2^d, 3^d, 4^d, 5^d, and 6^d respectively represent the six subscribers.

Section B is arranged in substantially the same manner, except that the first two left-hand apertures 3^c 4^c represent the subscribers 3 and 4, which are under this operator's special care.

The third section is also like the first, with the exception that the first two left-hand apertures 5^c 6^c represent the subscribers 5 and 6.

Below each one of the eighteen apertures of the switch and attached to the under side thereof is arranged a small angular test-spring *e*², all of said springs having electrical connection with each other, and a battery and single-stroke bell *e*³ and *e*⁴, respectively, being in the circuit between each of the sections A, B, and C. Large test-springs *e*⁶ are secured to the bottom *e'* and project upward in proximity to the small test-springs, so as to be brought into contact with the same upon a plug being inserted in the aperture above it. These large test-springs of the apertures 1^c and 1^d are all connected to a common wire *e*⁷; those of apertures 2^c 2^d to a similar wire *e*⁸; those of apertures 3^c 3^d to a wire *e*⁹; those of wire 4^c 4^d to a wire *e*¹⁰; those of wire 5^c 5^d to a wire *e*¹¹, and, lastly, those of the apertures 6^c 6^d to a common wire *e*¹².

It will be observed from the above that if the apertures 2^c and 4^d of section A were in use the insertion of a plug in any one of the apertures of a corresponding number in the other sections would complete the circuit through the medium of the contacting test-springs and would thus sound either one or

the other of the single-stroke bells and indicate that the wires controlled by those particular apertures were in use. The same of course holds good of any of the other apertures in the respective sections.

The apertures 1^c, 2^c, 3^c, 4^c, 5^c, and 6^c I term the "call" apertures, while all the remaining apertures I prefer to designate "called" apertures, because of the fact that the latter apertures represent the subscribers called, while the former apertures represent the subscriber calling.

Contacting springs $f f$, having outwardly-flared upper ends, are attached to the bottom e' and project upward in proximity to each aperture of the switchboard, so that when a connecting-plug is inserted in an aperture it will contact with the spring f below it and at the same time bring the test-springs together. The springs f , mounted on bottom e' below the call apertures 1^c, 2^c, 3^c, 4^c, 5^c, and 6^c are connected to the respective main wires 1^a, 2^a, 3^a, 4^a, 5^a, and 6^a. Each of the springs f , below the called apertures 1^d, 2^d, 3^d, 4^d, 5^d, and 6^d of each section is connected to its respective wire by wires 1^c, 2^c, 3^c, 4^c, 5^c, and 6^c. These wires communicate with the main wires between the respective subscribers' telephones and the indicating - drops. Call-springs $f' f'$ are also mounted on bottom e' between the springs $f f$ and the large test-springs. These springs are bent at an angle at their upper ends and normally contact with the springs f , so as to complete the call-circuit of the subscriber. All of these springs $f' f'$ are connected to the call-wire 10 to establish this last-mentioned circuit. When a plug is inserted in any one of the apertures in the board, it engages the flared end of the contact-spring and pushes it to one side out of contact with the said call-spring.

The operator of each of the sections A, B, and C is provided with a number of pairs of connecting-plugs H H for bringing the different subscribers of his section into communication. Each plug comprises a metallic portion h and an insulating portion h' . The metallic portions of the plugs are connected by a flexible conductor or cord h^2 . This cord is in turn connected to a weight h^3 under the table, passing through a suitable aperture in the top of the table to make such connection. The office of this weight is to pull the plugs back out of the way when not in use. When the plugs are used by the operator, they are so inserted in the apertures in the table that the metallic portions h contact with the springs f and thus complete the circuit through the plugs and their connecting-cord, the insulated portion of the plugs simply pushing the test-springs together. Ringing plates k k' k^2 , respectively, are provided on the switchboard, one for each section, and all of these plates are connected to a common wire k^3 , that communicates with one pole of the generator D, the other pole of said generator being connected to the return-wire 11.

Each of the operators' telephones a , b , and c is connected to a common wire m , which is in turn connected to the wire 11. Each of said telephones comprises a transmitter n , receiver n' , induction-coil n^2 , battery n^3 , and listening-plug n^4 , the latter being of a construction similar to one of the connecting-plugs.

The operation of the system and devices is as follows: When a telephone of one of the subscribers is to be used, it is first necessary to press a button on the side of the same and turn the generator-crank at the same time. The pressing of the button connects his telephone with the call-wire and the main wire, and the proper indicating-drop is operated at the central station to inform the operator that he is being called. Suppose, for instance, that subscriber No. 3 should call central. The circuit would be from the subscriber's telephone, through main wire 3^a, drop 3^b, contact-spring f of aperture 3^c, call-spring f' of said aperture, and call-wire 10, back to the telephone. The operator of section B, seeing the drop 3^b down, inserts his listening-plug n^4 in aperture 3^c, thereby breaking connection between the contact-spring f and call-spring f' and making connection through his telephone-circuit, the wire m , return-wire 11, telephone 3, main wire 3^a, and wire 3^c, thus cutting out a portion of the main wire and the drop 3^b. He is enabled to establish this circuit through the main and return wires from the fact that when the subscriber had finished calling him he had released the button connecting the telephone with the call-circuit and thus brought the main and return wires into circuit. After the operator has ascertained whom the subscriber wants, say No. 5, she inserts one of a pair of plugs in called aperture 5^d and touches the other plug of said pair to the ringing-plate. As she touches said plate the current from the generator D passes through the main wire and return-wire to No. 5 telephone and rings him up. After touching the plate with his plug she inserts it in the call-aperture 3^c, and the two subscribers are thus in communication. The circuit in this case is through No. 3's main wire 3^a, spring f under aperture 3^c, the plugs and connecting-cord, spring f' under aperture 5^d, wire 5^c, wire 5^a, telephone 5, and from thence to telephone 3 by way of wire 8 8 and the return-wire connecting the same. When they have finished talking, either one or the other of the subscribers gives the crank of his telephone a turn without pressing the button, and the drop, which has been put up in the meantime by the operator again falls, signifying that they have finished talking. Should No. 3 call No. 4, the operator would plug up No. 3's call and No. 4's called aperture, not No. 4's call-aperture. If while No. 3 and No. 5 were talking any other operator has inserted a plug in any of the apertures representing Nos. 3 or 5, the test-springs coming together would have completed the circuit through one or the other of the single-

stroke bells, and thus have signified that these particular numbers were in use.

I do not care to limit myself to the exact construction of plug H shown in the drawings, as the same may be made with an upper annular insulating portion for contacting with the test-spring, and a lower metallic point for contacting with the main spring, said point communicating, through the body of the plug, with the connecting-wire.

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

1. In a multiple switchboard, the combination with a suitable apertured board divided into sections, a small test-spring below each aperture, an electrical connection between all of said springs, a sounding device in said circuit between each section, a large test-spring also mounted below each aperture and adapted to be brought into contact with its respective test-spring by the insertion of a plug, electrical connections between all of said large test-springs representing the same subscriber, contacting springs also mounted below each aperture, suitable circuit-wires for connecting them to the telephones, and connected plugs for insertion in said apertures, substantially as described.

2. In a multiple switchboard, the combination with an apertured board divided into sections of call-springs and main-circuit springs arranged below the apertures and adapted to be normally in contact with each other, call-wires connecting the telephones and the call-springs, and main wires connecting the main-circuit springs with the telephones, test-springs below each aperture and normally out of contact with each other, but adapted to be brought together by the insertion of a plug, and connecting-plugs for insertion in the apertures to break the circuit with the call and main-circuit springs and connect the desirable main-circuit springs and the test-springs, substantially as described.

3. In a multiple switchboard, the combination with an apertured board divided into sections, small test-springs below each aperture of each section, an electrical connection between all of said springs, an indicating device in said circuit between each section, large test-springs also mounted below each aperture and connected together in independent circuits representing each subscriber, main-wire-contacting springs also mounted below each aperture, call-springs also mounted below a certain number of the apertures of each section and normally contacting with the main-wire spring of said apertures, and wires for connecting the main contact-springs and the call-springs with the telephones, substantially as described.

4. In a multiple switchboard, the combination with an apertured board divided into sections and having suitable main-circuit connections, of a test-circuit comprising small

test-springs arranged below each aperture and all included in an indicator-circuit, and large test-springs also below each aperture and normally out of contact with the small test-springs, and wires for connecting in independent circuits the large test-springs of all of the sections that represent the same subscriber, and connected plugs for insertion into the said apertures for completing the main and test circuits, substantially as described.

5. In a telephone system, the combination with the several subscribers' telephones, of main wires for each communicating independently with contacting springs on the switchboard at the central exchange, an indicator for each of said wires at the exchange, a common call-wire connected to each of the subscribers' telephones and to the central switchboard, a common return-wire connected to each of the subscribers' telephones and to a generator at the central station, ringing-plates also connected to said generator, means for connecting any subscriber on the switchboard and the ringing-plates, and central phones connected to the return-wire and provided with plugs for insertion into the switch, substantially as described.

6. In a multiple switchboard, the combination with an apertured board divided into sections, small test-springs below each aperture, wires for connecting the said test-springs of each section, indicating devices between each section, large test-springs below each aperture and all of them representing the same having electrical connection, main-wire-contacting springs below each aperture and electrically-connected plugs for insertion in the apertures to contact with the test-springs and the contacting springs, substantially as described.

7. In a telephone system, the combination with an apertured switchboard divided into sections representing the several subscribers' telephones, of main wires for each communicating independently with contacting-springs on the switchboard at central, a common call-wire connected to each of the subscribers' telephones and to the switchboard, a common return-wire connected to each of the subscribers' telephones and to a generator at the central station, ringing-plates connected to said generator, independent telephones for the operators of the respective sections and connected to the return-wire, means for connecting any one of said telephones with any circuit of its respective section of the switchboard, and devices for connecting the subscribers on the switchboard and the ringing-plates, substantially as described.

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

ROBERT MCGUIRE ANDREWS.

Witnesses:

D. A. RITCHIE,
SOL CUTCHINS.