No Model.)

M. G. KELLOGG.

MULTIPLE SWITCHBOARD FOR TELEPHONE EXCHANGES.

No. 542,262. Patented July 9, 1895.

Fig. 1.

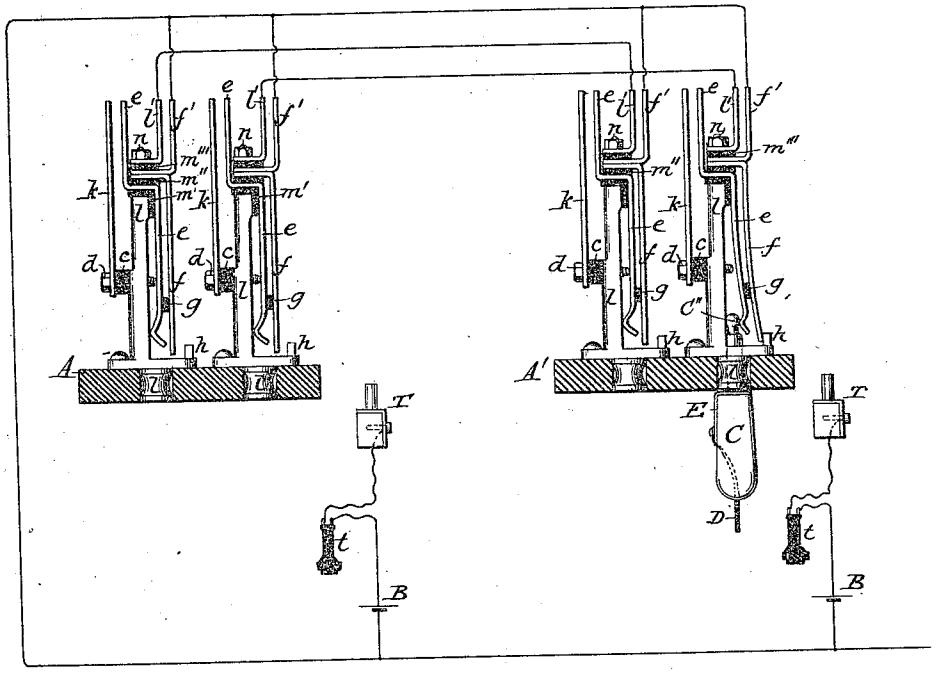


Fig. 2.

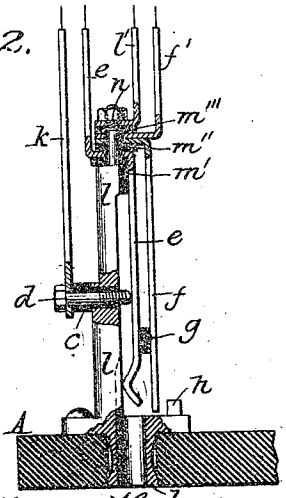
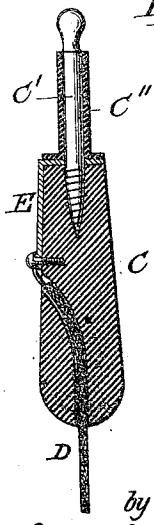


Fig. 3.



Witnesses,
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UNITED STATES PATENT OFFICE.

MILO G. KELLOGG, OF CHICAGO, ILLINOIS.

MULTIPLE SWITCHBOARD FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 542,262, dated July 9, 1895.

Application filed December 21, 1889. Serial No. 334,519. (No model.)

To all whom it may concern:

Be it known that I, MILO G. KELLOGG, of Chicago, Illinois, temporarily residing at Stuttgart, in the Empire of Germany, have invented certain new and useful Improvements in Multiple Switchboards for Telephone-Exchanges, 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 more especially to the multiple-switchboard system described in my Patent No. 308,315, dated November 18, 1884, and similar systems.

It consists of a compound spring-jack switch, hereinafter described and claimed, designed to be used in the switchboards of the central office of a telephone-exchange. The organization whereby the two pairs of contacts are operated on the insertion of a switch-plug is, however, novel aside from any particular system to which the switch may be adapted, and though I show and describe the switch in connection with a particular system I do not limit myself to the special connection of the contacts in my switch, whereby the desired operations in the particular system shown herein are accomplished.

In the accompanying drawings, representing my invention, Figure 1 represents a side view of sections of two multiple switchboards, to which the same lines are connected, and a diagram of the local circuits, connections, and test apparatus to be used with them. Fig. 2 shows an edge view of one of the switches. Fig. 3 shows a switch-plug adapted for use with the switches.

In the drawings like parts are indicated by the same letters of reference.

I place as many boards in the central office as are found necessary or desirable in order to operate the exchange. On each board is a spring-jack switch for each line of the exchange.

A A′ are broken sectional views of the frameworks of the switchboards adapted to receive the spring-jack switches.

l is the metal frame of the switch, having a hole through its front and adapted to receive a switch-plug and operate the switch parts.

d is a metal contact screw or point passing through the frame *l* and insulated from it by the insulation *c*, which also passes through *l*.

e is a contact spring or piece, which is also insulated from the metal frame *l*, and is in contact with the point *b* of screw *d* when the wedge or plug is not inserted into the switch. When the wedge or plug is inserted into the switch the contact between point *b* and spring *e* is broken, as shown in board A′.

b and *e* are a pair of contacts, and as I use them in opening and closing a subscriber's telephone-line I call them the main line contacts of my switch.

k is a connecting-piece in electric connection with screw *d*.

h is a contact-point, in this instance connected with the metal frame of the switch, as shown.

f is a contact spring or piece, which is insulated from the frame *l*, and also from the contact-spring *e*, and is in contact with the point *h* when the wedge or plug is inserted into the switch. When a wedge or plug is not in the switch, the contact between the point *h* and spring *f* is open, as shown.

h and *f* are a pair of contacts, and as I use them in opening and closing a local circuit in my multiple switch-board system, I call them the "local" contacts of my switch.

g is an insulating-piece attached to spring *e*, to maintain the insulation between *e* and *f* and to crowd the spring *f* into connection with point *h*, when by the insertion of the plug the spring *e* is crowded away from the point *b*.

f′ is a connecting-piece in electric connection with spring *f*.

l′ is a connecting-piece in electric connection with the framework *l*.

m′, *m″*, and *m‴* are insulating-pieces, which insulate springs *e* and *f* from each other and from the frame *l*. An extension of *l* passes through these pieces and has a screw-thread cut on it. *n* is a nut which fits this thread and holds the parts in place, as shown.

I have shown a plug inserted into the right-hand switch shown on board A′.

Fig. 3 shows a wedge or plug adapted for use with my spring-jack switch. C is the handle of the plug, and is made of some insulating material, as hard rubber. C′ is a solid metal cylinder with round end, as shown.

C″ is a rubber cylinder surrounding the metal cylinder, except at the rounded end, as shown. D is a flexible insulated conducting-cord in electric connection with the metal cylinder C′ through the metal strip E.

It will be seen that when there is no plug in the switch there is electric contact between the points *b* and *e*, and that the points *h* and *f* are open to each other, and also that the switch-frame is insulated from all these points except the contact *h* thereon.

It will also be seen that when a plug is in the switch the electric contact between *b* and *e* is broken, and that the contact between *h* and *f* is made, and that the metal cylinder of the plug is in contact with the spring *e* and that the metal switch-frame is insulated from the parts *b e* and the plug-contact, and is in connection with *f* through the contact *h*.

The point *b* and spring *e*, with the plug and cord, constitute the main-line switch in my system. The point *h* and spring *f*, whereby the local circuit is automatically closed by the insertion of the plug for switching the main line, constitute a local circuit-closer. The metal switch-frame *l*, being always insulated from the other working parts of the switch, except the contact *f*, when a plug is inserted, and from the plug, except through the arrangement of circuits hereinafter shown, constitutes a test-plate in my system of multiple switchboards, and I call its front end, which extends to the front of the board, a "test-contact," and this test-contact is in electrical connection with the point *h*.

T are the test-plugs, and *t* are the test-receiving instruments, one plug and one instrument for each switch-board.

B B are test-batteries.

The connections of the main lines through the main-line contact-points on the several boards are as shown.

I have not represented the operator's cord system and apparatus in detail, as well-known forms of apparatus may be used for switching the lines.

The local test circuits and connections are as follows: All the contact-pieces *f f* of the switches on the several boards are connected together and are connected to one side of each of the test-receiving instruments. All the metal frames of the switches of a line (to which are electrically connected the contact-pieces *h* of their respective switches) are connected together. To the other side of each test-receiving instrument from that mentioned above is connected its test plug or device by a cord of such length that the plug can readily be brought into contact for testing with any metal piece *l* at its board. In the circuit of each test-receiving instrument between its test-plug and the point where it is connected with the group of contact-pieces *f f* of the exchange is an electric battery.

When a line is tested at any board by the test-plug being applied to the metal frame *l* of the line tested and the line is switched at any board the test-receiving instrument will sound or respond, the test-circuit being complete through the frame of the switch tested to the frame of the switch that is switched or plugged and its pair of local contacts *h f* to one side of the test-battery B. When on the test being made the line is not switched there is no complete circuit, none of the contacts *h f* being closed, and the instrument will not sound or respond. The operator can therefore determine on testing whether or not any line is switched for use.

By the construction and arrangement of the parts as shown and described above the switch and test apparatus is less complicated and is more condensed than is found in other apparatus constructed for use in multiple-switchboard systems which have independent local test-circuits for the lines.

I claim as my invention—

1. A spring jack switch, adapted to receive a switch-plug, consisting of a metal frame through the front of which is the switch hole, a contact spring or piece placed with its length parallel to the axis of the hole, a second-contact spring insulated from and parallel with the first contact-spring and operated by it to be pressed into contact with a contact point or piece while a plug is in the switch hole, substantially as set forth.

2. A spring jack switch, adapted to receive a switch plug, consisting of a metal frame through the front of which is the switch hole, a contact-spring or piece insulated from the metal frame and placed with its length parallel to the axis of the hole, and a second contact spring or piece insulated from the first contact-spring and normally insulated from the metal frame, placed parallel to said first spring and operated by it to be pressed into connection with said metal frame while a plug is in the switch hole, substantially as set forth.

3. A spring jack switch, adapted to receive a switch plug, consisting of a metal frame through the front of which is the switch hole, a contact-point insulated from the metal frame, a contact-spring or piece insulated from the metal frame, placed with its length parallel to the axis of the switch hole and normally in contact with said contact-point, and a second contact-piece or spring insulated from the first contact spring normally insulated from the metal frame, and placed parallel to the first spring, said first spring being operated by the plug, on its insertion, to be pressed away from its normal connection with its contact-point and to press the other contact-piece into connection with the metal frame, substantially as set forth.

4. In a spring jack switch, a contact-spring or piece placed with its length parallel to the axis of the switch hole, a second contact-spring or piece insulated from and parallel with the first contact spring and a contact-point normally insulated from both contact-springs said switch being adapted to receive a switch plug, which on its insertion, moves the first

contact-spring which presses the second contact-spring into connection with said contact-point, substantially as set forth.

5. In a spring jack switch, a contact-spring or piece placed with its length parallel to the axis of the switch hole and normally in contact with a contact-point, a second contact-spring or piece placed parallel to and insulated from the first spring, and another contact-point normally insulated from the rest, said switch being adapted to receive a switch plug, which on its insertion, moves the first contact-spring away from its contact-point with which it is normally in contact, and presses the second contact spring into connection with said other contact-point, substantially as set forth.

6. In a spring jack switch, a metal frame extending to the front of the switch board and through the front of which is a switch hole, a contact-spring or piece placed with its length parallel to the switch hole, a second contact-spring or piece insulated from and parallel with the first contact-spring and normally insulated from the metal frame, said switch being adapted to receive a switch plug which, on its insertion, moves the contact-spring, and said contact spring when thus moved presses the contact-piece into connection with the metal frame, substantially as set forth.

7. In a spring jack switch, a metal frame extending to the front of the switch board and through the front of which is a switch hole, a contact spring or piece placed parallel to the switch hole and insulated from the metal frame a contact point with which said spring is normally in contact, and a second contact spring or piece insulated from the first contact spring and also normally insulated from the metal frame, said switch being adapted to receive a switch-plug, which on its insertion moves the first contact spring away from its normal connection with said contact-point, and presses the second contact spring into connection with the metal frame, substantially as set forth.

8. In a spring-jack switch, a contact spring placed with its length parallel to the switch hole, a second contact spring insulated from and parallel with the first contact spring, a contact-point normally insulated from the second contact-piece and electrically connected with a metal test contact piece on the front of the switch board, said switch being adapted to receive a switch-plug which on its insertion, moves the first contact-spring and presses the second contact spring into connection with said contact-point, substantially as set forth.

9. In a spring jack switch, a contact spring placed with its length parallel to the switch hole, a contact point with which the spring is normally in contact a second contact spring or piece insulated from the first contact spring and placed parallel to it, and a contact point normally insulated from the second contact spring, and a test-piece placed on the front of the switch board with which the last named contact point is electrically connected, said switch being adapted to receive a switch-plug which on its insertion, moves the first spring away from its normal connection with its contact-point and presses the second contact-piece into connection with its contact point, substantially as set forth.

10. The combination of the frame-work having a hole therein, a metal switch-frame mounted on said frame-work with one end in the hole and having in said end a switch hole for the reception of a switch plug, two insulated contact-pieces or springs carried by said frame, an insulated contact point also carried by the metal frame and with which one of said springs is normally in contact, and another contact point also carried by said metal frame with which the other spring is normally out of contact, the arrangement being such that when a switch plug is inserted one contact spring moves out of contact with the point with which it is normally in contact, and the other spring moves into contact with the point with which it is normally out of contact.

11. The combination of the frame-work having a hole therein for the insertion of a switch plug, two contact-pieces or springs insulated from each other, arranged in the rear of the frame-work parallel, or substantially so, with the axis of the switch hole, a contact point with which one of the springs is normally in contact and another contact point with which the other spring is normally out of contact, the arrangement being such that when a switch plug is inserted one spring is pressed out of contact with its contact-point and the other into contact with its contact point.

12. The combination, of the frame-work having a hole therein for the insertion of a switch plug, two contact pieces or springs, insulated from each other, arranged in the rear of the frame-work, parallel, or substantially so, with the axis of the switch hole an insulated contact point upon which one of the springs bears, and another contact point also insulated from both springs and with which the second contact spring is normally out of contact the arrangement being such that when a plug is inserted into the switch hole, one spring is pressed out of contact with the point against which it normally bears, and the other spring is pressed into contact with the point with which it is normally out of contact.

13. The combination, of the frame-work having a hole therein for the insertion of a switch plug, two contact pieces or springs, insulated from each other, arranged in rear of the frame-work, parallel, or substantially so, with the axis of the switch hole, an insulated contact point upon which one of the springs normally bears, another contact-point with which the other spring is normally out of contact, and

a metal test piece or contact at the front of the switch board with which piece the last named contact is in electrical connection.

14. In a spring jack switch the combination, with the frame-work of the switch board, two insulated contact-pieces or springs arranged in rear of the frame-work parallel with each other, or substantially so, and at right angles to the plane of the face of the frame-work, a contact point against which one of the springs normally bears, and another contact point with which the other spring is normally out of contact, of a switch plug, adapted to be inserted into the switch, the arrangement being such that when the plug is inserted one spring is pressed out of contact with the contact point against which it normally bears, and the other spring is pressed into contact with the contact point with which it is normally out of contact.

In witness whereof I hereunto subscribe my name this 29th day of November, 1889.

MILO G. KELLOGG.

Witnesses:

EMIL ABENHEIM,

MARGARETHA PRIEHL.