T. A. HAMMOND.

SWITCHBOARD.

APPLICATION FILED MAR. 8, 1905.

987,874.

Patented Mar. 28, 1911.

2 SHEETS—SHEET 1.

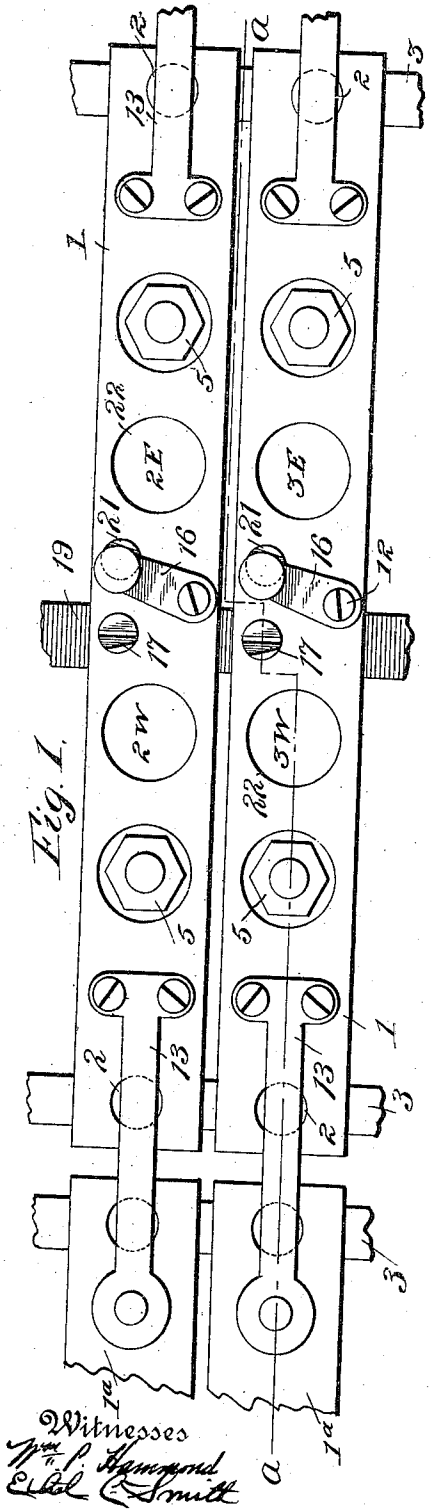

Fig. 1.

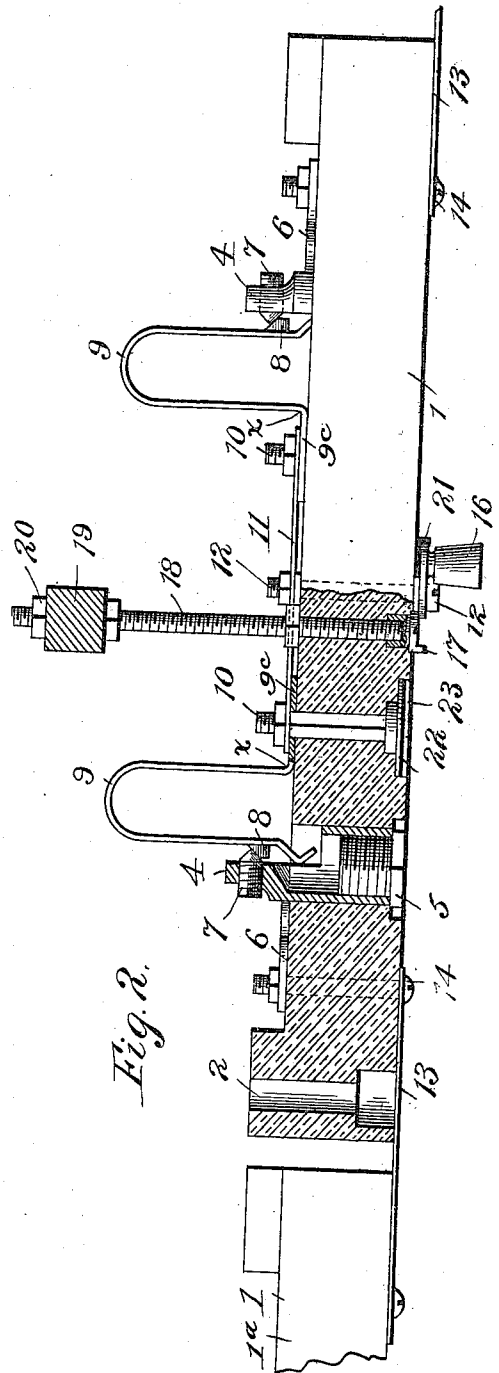

Fig. 2.

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Fig. 3.

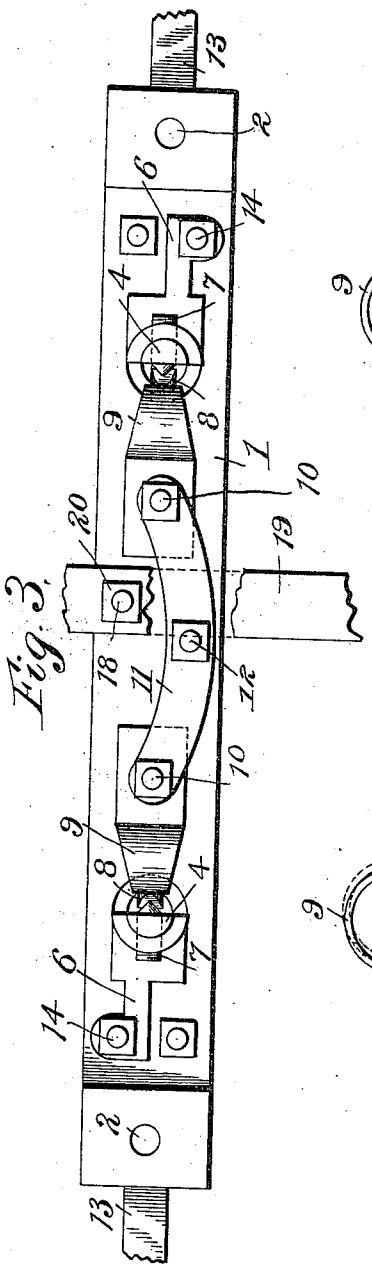


Fig. 5.

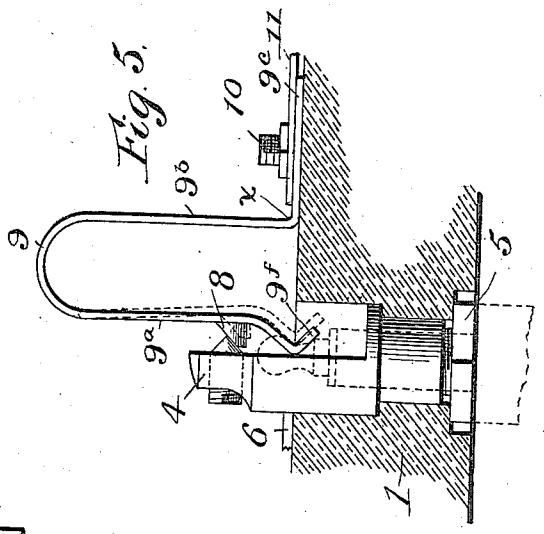
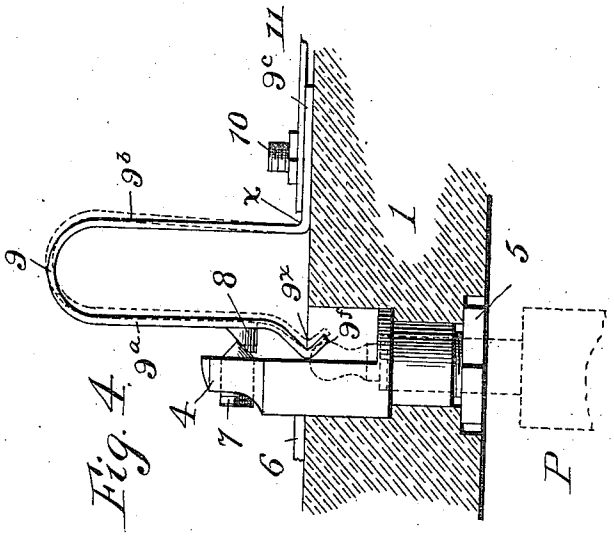


Fig. 4.



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SWITCHBOARD.

987,874. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed March 8, 1905. Serial No. 249,075.

To all whom it may concern:

Be it known that I, THEODORE A. HAMMOND, a citizen of the United States, residing at Passaic, county of Passaic, State of New Jersey, have invented new and useful Improvements in Switchboards; and in order that those skilled in the art to which my invention pertains may understand, make, and use the same I give the following description and specification thereof.

My invention relates to switchboards and primarily to switchboards for telegraph systems of the type set forth in the application of Hammond and Hammond, Serial No. 181,665, filed November 18th, 1903. Its use is not confined to telegraph service, however, but it may be used wherever a switching apparatus is required where connections are to be made from one circuit to another, as for instance, in telephone or other systems of communication or signaling.

The objects of my invention are to provide a switchboard of novel and improved construction, of unlimited capacity and adaptable for large or small systems comprising one or any number of lines or circuits, to provide a switchboard, all parts of which, including its connections are readily accessible from the front of the board; to eliminate complicated wiring and to provide jacks of novel and improved construction. These and other objects are fully set forth and explained in the following specification and more particularly pointed out in the claims.

The accompanying drawings illustrate an embodiment of my invention.

Figure 1 shows an elevation of a portion of a switchboard made in accordance with the invention. The portion illustrated comprises two units or sections affording connections for two lines or circuits. Fig. 2 is a horizontal sectional view taken on line *a*—*a*, Fig. 1. Fig. 3 is a rear elevation of one of the units or sections shown in Fig. 1. Figs. 4 and 5 are enlarged detail views showing a jack and its mode of action.

The switchboard is constructed on the unit principle, each unit being complete and independent in itself. All the units are alike in construction and each unit accommodates one line or circuit. Fig. 1 shows a switchboard or a portion of a switchboard comprising two units accommodating two lines and providing means for making all the different kinds of switching connections required. It will be understood that the board may consist of as many or as few units as are necessary to accommodate the number of lines entering or leaving an office. Units may be added or taken away at any time as circumstances require; and, as each unit is independent of the others, this may be done without interfering with or interruption of the other units or lines. Each unit comprises a block 1 of insulating material, preferably of porcelain or other fireproof material, made in the required shape. The blocks are provided with countersunk holes 2, 2 to receive bolts or screws (not shown), by which they are secured to a supporting frame 3. Apertures are provided to receive the socket members 4 of the jacks. The socket members are shown as inserted from the back of the block and secured in place by a headed tubular male screw 5 which screws from the front of the block into the interiorly threaded portion of the part 4 and engaging the shoulder formed by countersinking the outer end of the jack receiving aperture. A shoulder or metallic strip 6 is soldered to or otherwise united with the socket member 4; so that upon screwing up the part 5 the socket member 4 is securely held in place in the block.

In socket member 4 is an adjustable contact 7 arranged to contact with a contact piece 8 on the spring member 9 of the jack. The contace pieces 7 and 8 are formed with sloping meeting faces for a purpose which will hereinafter appear. The spring member 9 of the jack is U-shaped having the two limbs 9^a, 9^b, the latter having a lateral extension 9^c, by which the spring member is secured to the block 1 independently of socket member 4. Limb 9^a is formed at its free end with an angle 9^x and with a cam face 9^f. The free end of limb 9^a extends into the socket member approximately axial to the socket so as to be in the path of a plug inserted in the socket. (See Figs. 4 and 5). Normally the socket member and the spring member are in electrical contact at their contact pieces 7 and 8. Each block is shown provided with two jacks; but as each is of the same construction the above description of one of them is sufficient. Two jacks are provided in each block or unit in order that the incoming and outgoing branches of a line may each be connected independently to any other line or branch. Thus, where the board is used for an intermediate station the two branches of a line may be "east" and

"west" (or "north" and "south"), and connections made in either or both the eastward and westward lines independently. The board may be also used for terminal stations as will be readily understood by those skilled in this art.

The spring members 9 of the jacks are secured to the blocks 1 by screws or bolts 10 which pass through the blocks and the lateral extensions 9^e. The two jacks of each block are electrically connected by a strip 11, through which the bolts 10 also pass. The block 1 is provided at each end in front with a connecting strip 13, having electrical connection with one of the socket members 4 through a bolt 14, which passes through block 1, said strip 13 and the shoulder or strip 6 connected to the socket members. The outer ends of the strips 13 are for connection with blocks 1^a which carry the usual fuses and lightning arresters (not shown). The line circuits, therefore, normally pass through the units from the fuses and arresters on one side, *e. g.* the left, through strip 13, bolt 14 shoulder or strip 6, socket member 4, contacts 7 and 8, spring member 9, and strip 11, to the other or right hand jack and thence to the right hand strip 13 and right hand fuses and arresters to the line.

In order that any line or either branch thereof may be grounded, or either branch left open, a grounding switch 16 is provided, which may be of any suitable form, such for instance as shown. This is pivotally mounted at the front of the block on the screw bolt 12 which passes through the block from front to rear and through an opening in strip 11 with which it has electrical connection. The ground contact for said switch is at 17 and consists of a nut 17 which has screw-threaded engagement with a threaded rod 18 extending rearwardly and passing through a grounding bar 19 having ground connection. Nuts 20 are provided on rod 18 to secure support and electrical connection upon said grounding bar. This grounding bar 19 is common to all the units and runs vertically in the rear from top to bottom of the board. It will be seen that when switch 16 is thrown on contact 17 both branches of the lines are grounded, since switch 16 has connection with bolt 12, which, in turn, is connected with the line through strip 11. When it is desired to ground but one branch of the line a plug is inserted in the jack of the other branch of the line to open the circuit in that branch and thereby disconnect it from the ground. A dead stop 21 is provided for the open position of the switch.

In order to mark and identify the various lines or circuits markers 22 are provided. These fit into sunk recesses 23 in the face of the block. In Fig. 1 these markers are shown as 3 E, 3 W, 2 E, 2 W, to indicate lines 2 and 3 entering the board from the east and continuing out from the board to the west.

The operation of the board is as follows, reference being had to the enlarged views, Figs. 4 and 5: When a connection is to be made a plug P having a conducting cord attached is pushed into the socket 4, as indicated in Fig. 4. The rounded end of the plug engages the cam face 9^f of the spring member 9 and the inward thrust of the plug pushed longitudinally on the limb 9^a causes the spring member 9 as a whole to flex at the line x and deflect to the right as indicated by the dotted lines in Fig. 4. During this movement the limb 9^a maintains the contact between 7 and 8 owing to its "spring". This rear endwise movement of the limb 9^a causes contact 8 to wipe against contact 7 for a short distance. This movement occurs during the first part of the thrust of the plug. Upon the continued inward movement of the plug, the increasing resistance of the spring member 9 and the camming action of the face 9^f and contacts 7 and 8, the end of the plug P rides over the angle 9^x, (see Fig. 5), and the limb 9^a is deflected laterally. This opens the circuit at contacts 7 and 8, the current being switched through the plug and its connections. The angle 9^x engages the narrowed neck portion of the plug P and securely holds the plug against accidental displacement. Upon withdrawing the plug the circuit is closed by the limb 9^a springing back to original position as indicated in Fig. 5.

The wiping action between contacts 7 and 8 is an important feature of the invention since the contacts are thereby automatically kept clean and bright. In switchboards which are in general use and all with which I am acquainted, it is necessary to resort to a cleaning operation from time to time in order to insure the working of the lines. This is unnecessary with my new form of jack herein described.

It will be noted that no insulation is employed in the jacks nor in any part of the switchboard, except of course the blocks or units themselves upon which the several parts are mounted. This also is a feature of great importance. By accidental crossing of the external lines or circuits with high tension circuits such as trolley, light or power circuits, high tension circuits frequently enter a switchboard burning out insulation and often causing serious fires. In my board no damage is done when such currents pass through the board. There is no insulation to be burned out and no complicated network of wires at the back of the board to be deranged by accidental and high tension currents. All the parts of my switchboard are of substantial size, being metal

stampings or strips and rods instead of wires, thus affording ample capacity for carrying not only the normal currents but accidental high tension currents without injury to the board.

The board is readily installed and when installed all parts are readily accessible from the front of the board. A block or unit may be removed or a new block added at any time. By removing the screws (not shown) from holes 2 and disconnecting strips 13 at each end, and by removing screw nut 17 from the front end of bolt or rod 18, the entire block may be withdrawn without in any way disturbing or affecting any other block or any other circuit. Only one jack is shown in each branch. Any connection may be made at this one jack, whether a patch, a loop, a patch and a loop, a patch and a plurality of loops, or a plurality of loops.

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

1. The combination, in a switchboard, of a plurality of electrically independent units, each comprising a block or support carrying a line circuit and a jack included in said circuit and a grounding switch upon the block or support independent of the jack in operative relation to said circuit, and a common ground for said switchboard units with which all of the switches coöperate.

2. The combination, in a switchboard, of a plurality of electrically independent units, each unit comprising a block or support carrying a line circuit, two jacks included in said line circuit, and a common grounding switch independent of said jacks, said switch being supported upon the block or support in operative relation to said circuit, and a common ground for all of said units with which said switches coöperate.

3. The combination, in a switchboard, of a suitable supporting frame, a plurality of electrically independent units of uniform construction, each unit carrying a line circuit and jacks included in said circuit, a common ground for all of said units, an independent detachable connection between each unit and the common ground, and an independent grounding switch interposed between the common ground and the line circuit of each unit.

4. A jack for switchboards comprising a socket member and a spring member separately and independently mounted on the board, and normally in electrical contact, said spring member being constructed and arranged to yield both longitudinally and transversely of the socket member, under the action of inserting a plug in the socket member.

5. A jack for switchboards comprising a socket member and a spring member separately and independently mounted on the board, and normally in electrical contact with each other, the spring member being constructed and arranged to yield longitudinally of the socket member and maintain the contact therewith, and transversely of the socket member to break the contact, under the action of inserting a plug in the socket member.

6. A switchboard jack comprising two separately and independently mounted members, one of said members formed with a socket to receive a switchboard plug, the other of said members consisting of a spring of substantially U-shape, one of the limbs of the spring being secured to the board and the other limb free and normally in electrical contact with the other jack member, and arranged in the path of a plug inserted in the jack for the purpose explained.

7. A switchboard jack comprising a socket member and a spring member mounted in operative relation upon a suitable support, said members having coöperating beveled contacts which are normally in electrical contact, and the beveled contact of the spring member being supported to yield under the action of inserting a plug in the socket member, both longitudinally and transversely of the socket member.

8. A switchboard jack comprising a socket member and a substantially U-shaped spring member mounted in operative relation upon a suitable support and normally in electrical contact, one limb of the U-shaped spring member being rigidly secured to the support thereof so as to present the other or free limb member in the path of the plug inserted in the jack, the whole U-shaped spring member being capable of yielding laterally, and the free limb member of the spring being capable of yielding both in the direction of the thrust of the plug and laterally thereto.

9. A switchboard jack comprising a socket member and a substantially U-shaped spring member both mounted upon a suitable support in operative relation and each carrying a beveled contact, one limb of the spring member being secured to the support, and the other limb of the spring being extended into the socket member of the jack and formed with an angular plug-engaging end, the contact of the socket member and spring member being in rear and approximately in line with the path of the plug.

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