

(No Model.)

G. TAINTOR.
MULTIPLE SWITCHBOARD SIGNAL.

No. 487,795.

Patented Dec. 13, 1892.

Fig. 1.

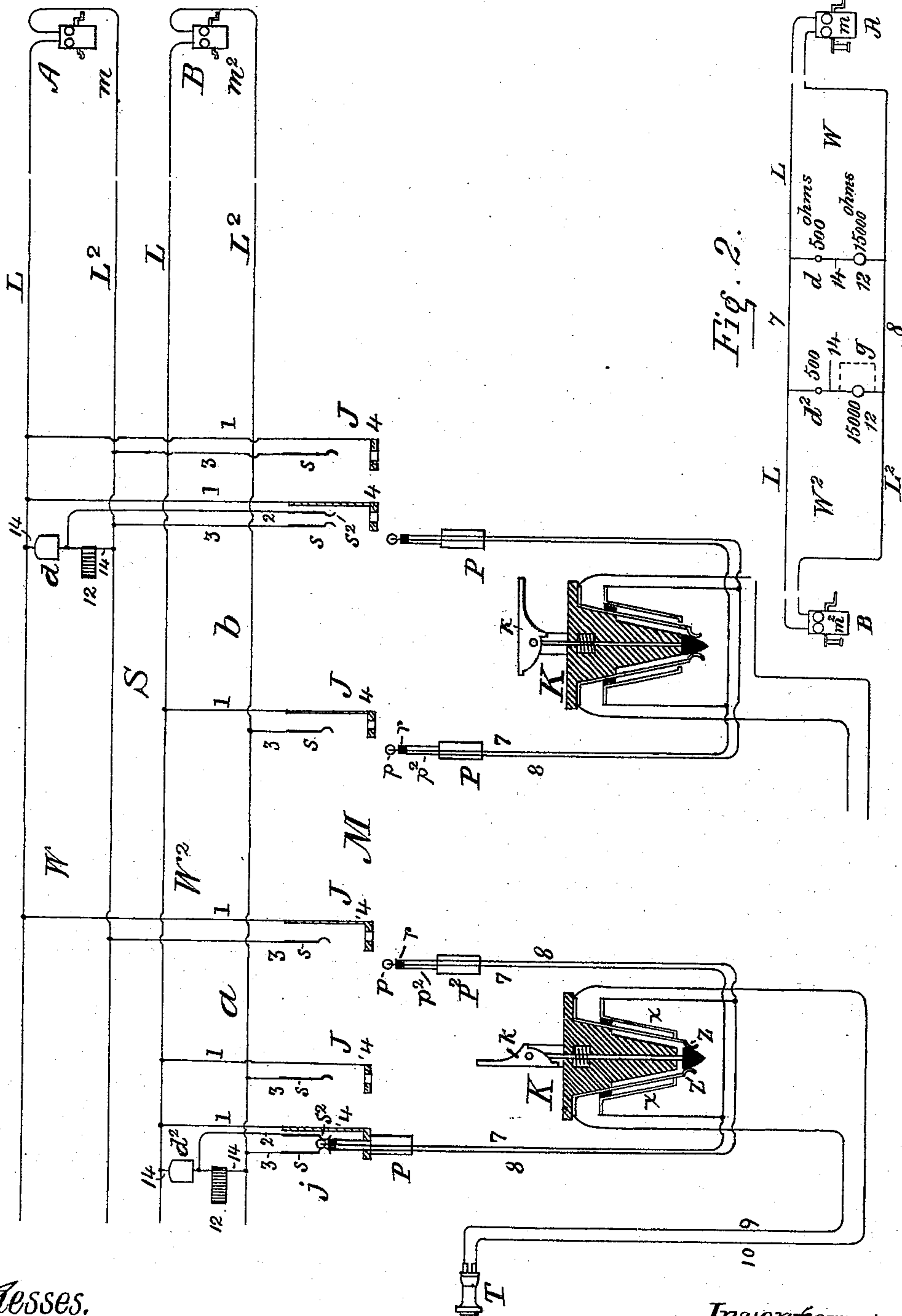
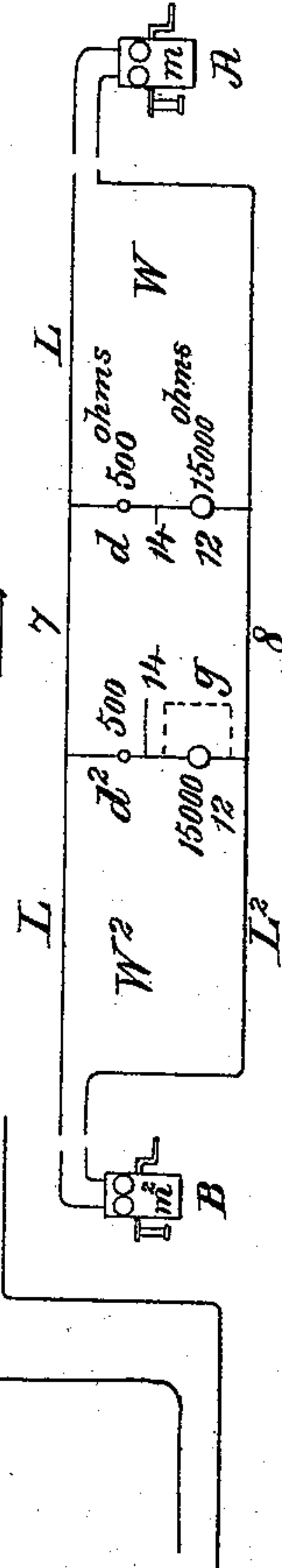


Fig. 2.



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GILES TAINTOR, OF KEENE, NEW HAMPSHIRE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WESTERN ELECTRIC COMPANY, OF ILLINOIS.

MULTIPLE-SWITCHBOARD SIGNAL.

SPECIFICATION forming part of Letters Patent No. 487,795, dated December 13, 1892.

Application filed April 7, 1892. Serial No. 428,199. (No model.)

To all whom it may concern:

Be it known that I, GILES TAINTOR, residing at Keene, in the county of Cheshire and State of New Hampshire, have invented certain Improvements in Multiple-Switchboard Signals, of which the following is a specification.

In constructing multiple switchboards for large central telephone-stations it has been customary, as is well known, to loop or branch each of the several lines to a spring-jack or plug-socket at each section of the switchboard, so that upon a call being received at any section for a given line a connection can be made at said section between the calling and called lines by means of connecting-plugs joined by a flexible conductor, which are inserted in the sockets of the two concerned lines, respectively. Each line is usually provided, also, with a call-annunciator and these in practice are divided between the sections of the switchboard, a certain number being assigned to each, so that the calls originating on any line are always answered at some one special section, while a connection can be made with all lines at all sections. The several lines are for convenience provided at the switchboard-sections where their call-annunciators are located and their calls answered with two plug-sockets or spring-jackets, one of which is always used in connection with the first or answering plug of a pair, and is therefore termed the "answering-jack," this feature and its use being fully described in Letters Patent of the United States granted to John A. Seely, No. 330,067, November 10, 1885. In addition to the calling-annunciator, a second annunciator for the reception of "clearing-out" or disconnecting signals has been associated with the connecting-cord conductor. When the metallic line-circuits are employed, spring-jacks are so made that an internal spring represents one side of such circuit, while the metallic frame of the jack connects with and represents the other side. Under the same conditions the plugs also require to be loop-plugs, which have two conducting-surfaces, one at the tip to register with the jack-spring and one on the shank to make contact with the jack-frame, these being insulated from one another, and the flexible

conductor uniting these plug-contacts must of necessity also be doubled, so that one such conductor unites the two tips and another the two sleeves. The disconnecting-annunciator has been bridged between these two cord conductors, and telephone and ringing keys have also been placed in circuit therewith, whereby calls may be sent over lines united with the cord-conductors and whereby the telephones for supervisory purposes may also be bridged between them.

My present invention is in the direction of simple and economical construction and economy of space; and its object is to dispense with a special clearing-out annunciator and to make it possible and practicable to employ the regular call-receiving annunciator conveniently for the reception and indication also of disconnecting-signals.

To this end it consists in associating a high auxiliary resistance with the call-annunciator and in circuit therewith and in providing means whereby the insertion of the plug in the answering-jack shall cut out or short-circuit the said resistance, thus enabling the disconnecting-signal to be received on and indicated by the calling-drop of that one of two connected lines which initiated the call, that line only having a plug in its answering-jack.

It also consists in associating with the call-annunciator and its auxiliary resistance a normally-open shunt-circuit round the latter and means for closing the same by the act of inserting the connecting-plug in the answering-jack.

In the drawings which accompany and constitute a part of this specification, Figure 1 is a drawing of so much of the connections of a multiple switchboard as is necessary to illustrate the invention; and Fig. 2 is a theoretical diagram of two metallic circuits united for conversation with their two call-annunciators in bridge-circuit between their two conductors, that of the call-initiating line being shunted in accordance with my invention.

w and w^2 are two metallic line-circuits extending from sub-stations A and B, respectively, to a central station S, where they connect with sections a and b , and as many others as may be required of a multiple switchboard M. At the sub-stations A and B are placed

the usual telephones and appliances of which, so far as this invention is concerned, it is only necessary to show the magneto call-generators m and m^2 . Circuit W has its call-annunciator d located at section b , which is therefore the answering-section for that line, and in like manner circuit W^2 has its annunciator d^2 placed at section a , where its calls are therefore answered. At section a , therefore, such circuits as W^2 , which have their calls there answered, are provided not only with the regular connecting spring-jack or plug-socket J , but also with an answering socket or jack j , and the same is true at section b with respect to circuit W and such other circuits as have their calls there answered. The circuits W and W^2 extend from sub-stations A and B by two conducting-lines L and L^2 to the central station. Line L of both circuits branches by wires 1 to the metallic frame 4 of plug-sockets J at each section of the switchboard and at the answering-section branches, also, by a similar connection to the metallic frame of the answering-jack j . The line L^2 of both circuits branches by wires 3 in like manner to the spring connections s of the plug-sockets J at each section of the switchboard and at the respective answering-sections branches by similar wires 3 to a like connection in the answering-jack j also. The call-annunciator d of each circuit is included in a permanently-closed bridge 14, between the conductors L and L^2 of such circuit, which bridge is, in fact, the only normally-closed central-office connection between the said two conductors. The said annunciator may have a resistance of about five hundred ohms, and its inductance should, also, be high, as its bridge-circuit being, as stated above, permanently closed it is necessary to have a high resistance and inductance, so that the voice-currents circulating between the sub-stations of two connected lines shall not be short-circuited through the bridge.

Included in each bridge-circuit 14 I place an auxiliary resistance 12, which may be of any standard form and which is preferably much higher than the resistance of the annunciator—a resistance, for example, of from ten to fifteen thousand ohms will answer. The relation of this resistance to the answering-jack is shown more clearly in section b , where no plug is inserted, while in section a , where the plug is in the answering-jack, the resistance is shown as being shunted. From a point on the bridge-conductor 14, between the annunciator d and the auxiliary resistance 12, a branch conductor extends to a supplementary contact-spring s^2 , provided in each answering-jack j . The free end of the spring s^2 is in close proximity to that of the principal contact-spring s and is immediately opposite thereto. Thus a normally-open shunt-circuit is arranged round the resistance 12, consisting of the contact-springs s and s^2 and their connecting branch wires 3 and 2, and it is obvious that the said shunt-circuit can be

closed simply by uniting the ends of the said springs, and that when this is done the resistance 12 is shunted or short-circuited and the resistance of the bridge 14 is reduced practically to that of the annunciator.

The plug-connectors P , their uniting-conductors, their key apparatus K , and telephone connections may be of any usual construction. Each loop-plug P has a tip-conducting surface p , adapted to make contact with the ordinary jack-spring s , and thereby with the main wire L^2 , with which it unites, and the two tips of any pair of plugs are united by the flexible conductor 7. Each also has a sleeve-conducting surface p^2 , adapted, when the plug is inserted, to make contact with the jack or socket frame 4, and thus with the main wire L of the circuit it represents, and the two sleeve-conductors of a pair are united by the flexible conductor 8. The handle of the plug P , as also a bushing r interposed between the tip and sleeve conductors, are of non-conducting material. The telephone-loop conductors 9 and 10 terminate in springs z , controlled by the cam-key k , and when the said key is turned down are discontinuous. When, however, the key is turned up, the said terminal springs are pressed into contact with other springs z , which are connected with the cord conductors 7 and 8, respectively, and by this means the act of turning up the key bridges the telephone T between the two cord conductors. The plug-tip is bulbous in form and is joined to the stem of the plug by a comparatively-small neck. The free ends of the two opposing springs in the answering-jacks are bent round, facing each other, to fit and closely grasp the said neck. At section a the answering-plug is shown as being inserted in the answering-jack j of circuit W^2 . The two lines L and L^2 are thus extended through the cord-conductors 7 and 8, and by means of the complementary plug P^2 can be connected with the two lines L and L^2 of circuit W or any other unoccupied circuit. At the same time the auxiliary resistance 12 is shunted from the bridge 14, because the two springs s and s^2 which form the terminals of its shunt-circuit, are electrically united by the interposition between them, in contact with both, of the bulbous tip p of plug P . The bridge-circuit itself remains, however, unbroken, and the annunciator d^2 is bridged between the two conductors of the compound circuit. Supposing that plug P^2 , to complete the connection with circuit W , is inserted in the jack J of that circuit, of course at the same section a it will be found that the annunciator d of that circuit is also bridged between the main conductors of the compound circuit so formed; but since the connection with W is not made by the answering-jack j , but by an ordinary jack J , the auxiliary resistance 12 of circuit W is not shunted. The resistance of this second bridge-circuit is therefore very much greater than is that of the first bridge-

circuit whose resistance is shunted out, and when either sub-station rings off, the current dividing between the several paths open to it inversely as their resistances, such a small proportion passes through the annunciator d that it cannot respond, while a sufficient proportion thereof passes through annunciator d^2 to render it fully responsive. Consequently no matter which sub-station sends the disconnecting-signal that one only of the call-annunciators which gave the original call will respond, and no false calls are received at other sections. Of course two or more sub-stations may be connected with any main circuit.

Fig. 2 is a simple diagram indicating a system of telephonic communication and showing the electrical connections of two united circuits, the switchboard being understood.

A and B are sub-stations united by metallic circuits W and W^2 through central-station connections 7 and 8, which link the two lines L and L^2 of W with those of W^2 . The two bridges 14 are indicated as uniting the two main lines at the central station S , one (located at a switchboard-section where the call was not received) including the call-annunciator d and the auxiliary resistance 12, and therefore irresponsive to disconnecting-currents sent by either of the sub-station generators m , and the other (located at the switchboard-section where the call was received and the connection made) including the call-annunciator d^2 and its auxiliary or supplementary resistance shunted, the margin between this bridge and the other being so wide that its annunciator alone is responsive. The shunt-circuit is indicated by the dotted line g .

The working resistances are indicated in figures on the diagram. I do not, however, restrict myself to the use of resistances of such magnitudes, since they may be widely varied without departing from the spirit of my invention.

I claim—

1. In a central-station-connecting apparatus, the combination, with the call-annunciator, of an auxiliary resistance normally in circuit therewith, a normally-discontinuous shunt-circuit round said auxiliary resistance, and a circuit-closer therefor, mounted in a

spring-jack or plug-socket connected with the main-line circuit of said annunciator and adapted to be operated and to shunt said resistance by the act of inserting the plug in said socket to make a main-line connection.

2. The combination, in a multiple switchboard, of a metallic circuit, a call-annunciator therefor bridged between the conductors thereof at some one of the switchboard-sections, a spring-jack or plug-socket connected by branch conductors with said circuit at each switchboard-section, a similarly-connected additional or answering jack or plug-socket at the said annunciator-section, a high auxiliary resistance included in the annunciator-bridge, plug-connectors united in pairs by flexible conductors and adapted to fit the said plug-sockets for the purpose of connecting any two circuits together, and a normally-open shunt-circuit round the said auxiliary resistance, having separated terminals in the answering-jack, which terminals are adapted to be electrically united by the insertion of the plug-connector in said answering-jack, substantially as and for the purposes described.

3. In a system of telephonic intercommunication, two telephone-circuits, each extending from terminal sub-stations to two or more switchboard-sections at a central station and united at one of such sections to form a compound through-circuit, call-sending generators at each substation, and two bridge-conductors uniting the direct and return main conductors of said compound circuit at said central station, one containing a call-annunciator located at the switchboard-section where the said two circuits are united and the other located at some other section and containing a call-annunciator and a high supplementary resistance, substantially as described, and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 4th day of April, 1892.

GILES TAINTOR.

Witnesses:

GEO. WILLIS PIERCE,
FRANK C. LOCKWOOD.