

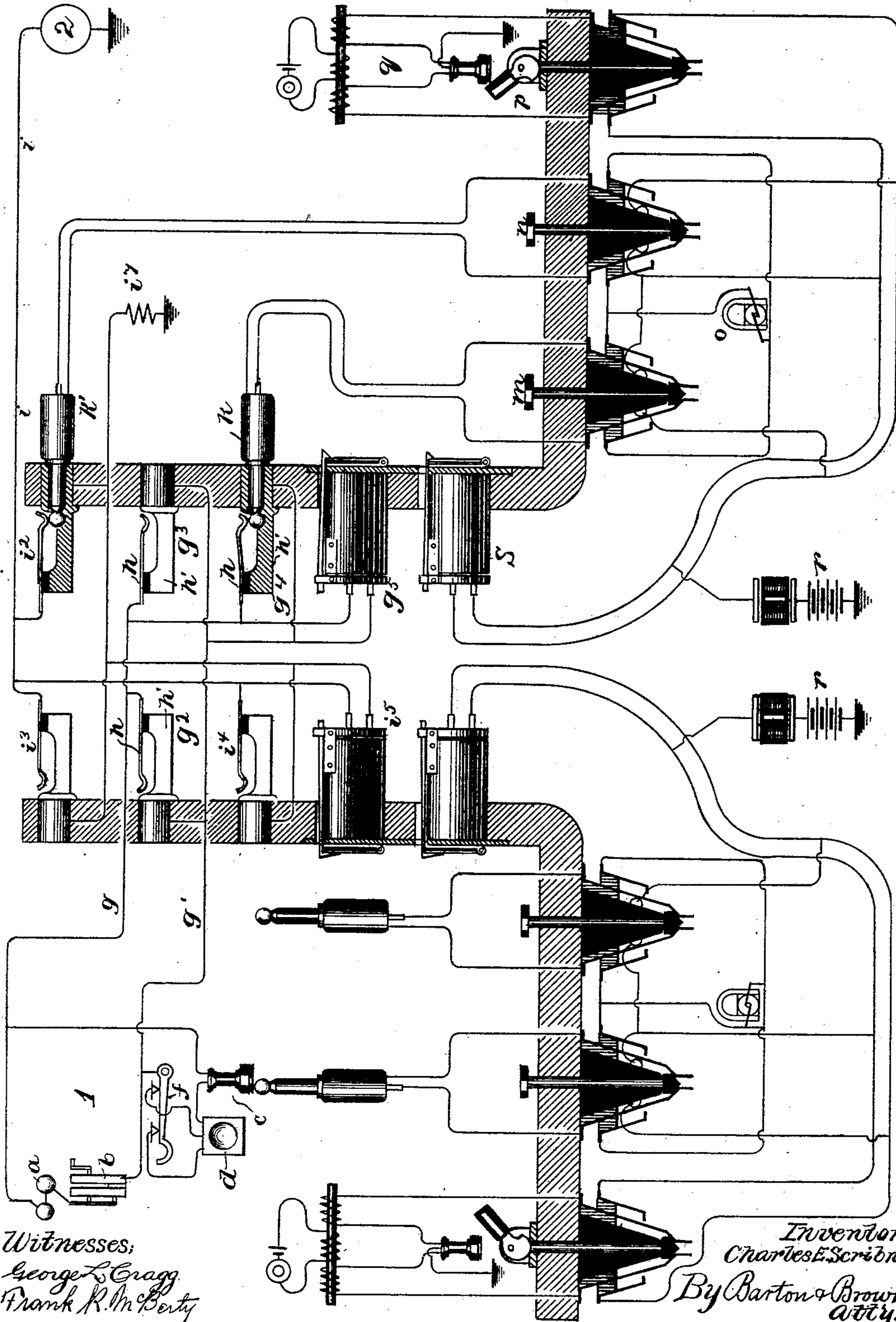
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C. E. SCRIBNER.
MULTIPLE SWITCHBOARD SYSTEM.

(Application filed Oct. 19, 1891.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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MULTIPLE-SWITCHBOARD SYSTEM.

SPECIFICATION forming part of Letters Patent No. 684,315, dated October 8, 1901.

Application filed October 19, 1891. Serial No. 409,197. (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. 276,) of which the following is a full, clear, concise, and exact description.

My invention relates to multiple-switchboard systems for telephone-exchanges.

Its object is to provide circuits and apparatus whereby the subscriber's annunciator of a connected line may be prevented from operating when a call-signal is sent without including in the circuit of the telephone-lines any contact-points.

My invention comprises signal apparatus at a substation, telephone-lines extending from the substation, spring-jacks, one for each line upon each switchboard, one contact-piece of each jack being connected to one of the lines and the other contact-piece to the other line, a high-resistance annunciator in a bridge connection between the lines, connecting-plugs having each two contact-pieces, corresponding contact-pieces of two plugs being electrically connected together, and a clearing-out annunciator or its equivalent of low resistance and high retardation in a "bridge" connection between the different contact-pieces of a pair of connecting-plugs. When no connection exists to a line, a calling-current sent from the substation will traverse the high-resistance annunciator connected to the line, causing its shutter to be thrown down; but after a connection has been established to a line by means of a connecting-plug and cord a calling-current again sent from the substation will be so largely shunted through the low-resistance clearing-out annunciator that the individual annunciator will fail to operate, while the clearing-out annunciator will respond. Thus a call from a substation will be evidenced at the exchange by the operation of the annunciator connected to the lines from the substation; but any signal, as the "ring-off" signal from either of two substations between which a connection is made, results in the operation of the clearing-out annunciator, but not of the individual annunciators of the lines connected. Fur-

ther, my invention provides that when a call is sent from the exchange to a substation the individual annunciator of the lines to that substation shall be shunted by the low-resistance call-bell at the substation, the effect being that while that portion of the calling-current which traverses the call-bell at the substation is sufficient to operate that bell sufficient current does not traverse the individual annunciator to cause its shutter to fall.

With this system I am enabled to dispense with the ordinary form of spring-jack having a line-spring and a back contact and to substitute therefor a jack having only a line-spring and a frame or a socket consisting of two insulated halves adapted to make connection with two corresponding contact-pieces of a connecting-plug. Hence when a connection is made between two lines no contacts are included in the lines except those of the plugs with the jacks and those of the ringing-keys.

The operator's apparatus for calling subscribers, listening, and testing may be of the usual construction.

My invention is illustrated in the accompanying drawing.

In the drawing I have shown two substations connected by lines to their respective spring-jacks and annunciators upon two sections of multiple switchboards. The switchboards are shown equipped with the usual apparatus for calling, listening, and testing, together with clearing-out annunciators and circuits in conformity with my invention.

In the drawing the substation 1 at the left of the drawing is shown equipped with the signaling apparatus, switches, and telephone complete. This apparatus consists of a call-bell *a*, preferably of comparatively low resistance, a generator *b*, having the well-known automatic device whereby a short-circuit is closed around it when it is not in use, a telephone *c*, microphone *d*, included with battery in a local circuit, and the gravity-switch *f*, adapted to connect the call-bell *a* to the lines and to disconnect the telephone and open the local circuit when the telephone rests upon the hook, and vice versa. The substation is connected to the switchboards at the exchange by lines *g g'*, forming a me-

tallic circuit. At each of the switchboards is a spring-jack g^2 g^3 and at one of them an answering-jack g^4 and an annunciator g^5 . One contact-piece, the line-spring h of each jack, is connected to one line g and the other contact-piece, the frame of the jack h' , to the other line g' . The annunciator is of high resistance—say two thousand five hundred ohms—and high retardation and self-induction and is permanently connected in a branch connection joining the two lines. The apparatus at station 2 is not shown in detail, but is the same as that at station 1. The station is connected to the exchange by a grounded line. The circuit is over line i to the spring-jacks i^2 i^3 i^4 and annunciator i^5 , returning through wire, resistance i^7 , and earth to station 2.

The keyboard apparatus comprises the following connecting-plugs k k' , each having two contact-pieces, one the sleeve adapted to make contact with the frame of a jack into which it is thrust and the other the tip to make contact with the line-spring. Like contact-pieces are electrically connected. Included in the conductors joining the two plugs are two keys m n , each provided with contacts whereby it is adapted when depressed to disconnect both contact-pieces of one of the plugs from those of the other and to connect them to the two poles of a calling-generator o . Branch connections are extended from the conductors joining the plugs to the contact-anvils of a listening-key p , which is adapted to connect the terminals of a telephone set q to the branch connections when its lever is thrown into its horizontal position. Thus the telephone set may be looped into a subscriber's circuit or bridged in between the lines joining two subscribers in communication.

The test system consists of a battery connected through a retardation-coil to the conductor joining the sleeves of two plugs and a branch extending from the middle of the operator's telephone-coil to earth. Other branch connections are extended from the conductors joining the plugs to a clearing-out annunciator s of low resistance—say five hundred ohms or less—and high self-induction.

The operation of the system shown is as follows: Suppose that subscriber at station 1 wishes to communicate with subscriber at station 2. Upon rotating his generator b , which constitutes a source of current, the shutter of annunciator g^5 is allowed to fall, notifying the operator in attendance that a connection is desired. She thrusts one of her connecting-plugs k into answering-jack g^4 of lines to station 1 and throws the lever of her listening-key p into its horizontal position, connecting her telephone set q to the line. Having received the order for a connection to station 2, she proceeds to test that line to determine whether it is already in use or not in the well-known way. She applies the tip

of her remaining plug to the testing-frame of the jack i^2 of that line at her board. If the line be in use, a current will flow from the test-battery r , connected to the sleeve of the plug, by means of which the connection already established is made, thence to the frame of the jack at which the connection is made, thence to frame of jack i^2 , thence through the tip of plug k' , one-half of the telephone-coil to earth, and a click is produced in her telephone. If the line were not in use, no sound would be produced, since there would be no source of current in connection with either the line or the telephone. Having found the line to be idle, she inserts plug k' into jack i^2 , thus extending the circuit from station 1 to station 2. She now depresses key n , allowing a calling-current to flow from generator o over lines to station 2. The resistance of the path through the substation apparatus is so low in comparison to the resistance through the annunciator i^5 that the current received by the latter is insufficient to operate it, but the bell at substation 2 is operated. When the subscriber at this station has removed his telephone from his hook, the two subscribers are in telephonic communication. When conversation is completed, either subscriber may by rotating the armature of his calling-generator send a clearing-out signal. Nearly the whole of this current will be sent through the low-resistance clearing-out annunciator and the bell at the other substation, and little, if any, current will be sent through either of the individual or line annunciators, and neither of such individual annunciators will be operated, since they are of such high resistance as compared with the resistance of the clearing-out annunciator.

It will be observed that the individual annunciators and the clearing-out annunciators remain permanently bridged in between the two sides of the circuit joining the two subscribers, but no appreciable portion of the telephonic current is shunted thereby on account of the high self-induction of the annunciator.

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

1. The combination with telephone-lines extending from a substation, of jacks each having one contact-piece connected to one line and the other contact-piece connected to the other line, a high-resistance annunciator included in a connection between the two lines, a pair of connecting-plugs, each having two contact-pieces adapted to make contact with the two contact-pieces respectively, of a jack and a clearing-out annunciator of comparatively low resistance connected in a branch between the different contact-pieces of the two plugs, a source of current at the substation adapted for the operation of either the line-annunciator or the clearing-out annunciator, and means for connecting said

clearing-out annunciator with the line-circuit, whereby the low-resistance clearing-out annunciator diverts the current from the line-annunciator, to prevent the operation of the same, substantially in the manner described.

2. The combination with two substations connected by lines with switchboards of an exchange, of spring-jacks, one for each line upon each switchboard, each of said spring-jacks having two contact-pieces, which are connected to the two lines of one of the substations, individual annunciators of high resistance, one connected in a branch between the two lines of each substation, a connecting-plug having two contact-pieces making contact with the corresponding contact-pieces of one of the jacks, one plug in a jack of each substation, corresponding contact-pieces of said plugs being electrically connected, keys included in the conductor joining the contact-pieces, adapted to disconnect both contact-pieces of either plug from those of the other and to connect them to the poles of a source of electricity.

3. A multiple telephone-switchboard comprising main circuits having normally-discontinuous branches leading to connection-terminals at its several sections, a relatively-high-resistance electromagnetic call device permanently included in each main circuit at some one of the said sections, means at each switchboard-section for electrically uniting any two circuits by connecting their respective branch terminals, and a disconnecting-annunciator of relative low resistance bridged between the direct and return conductors of any two circuits when so united in a branch circuit shunting the high-resistance call devices of the said circuits, a source of current adapted for the operation of either the line-annunciator or the clearing-out annunciator, and means for including such source of current in the main circuits, whereby during connection with the line at any of the branch terminals thereof, the low-resistance disconnecting-annunciator diverts the current from the high-resistance electromagnetic call device and prevents the operation of the said call device, as described.

4. In a metallic-circuit multiple switchboard comprising several operative sections, a series of metallic circuits, each branching to paired connection terminal sockets located at every section and each looping through a call-annunciator helix of relatively high resistance and self-induction at some one of the said sections, a double-conductor link connection at each section terminating at both ends thereof by plug-connectors having two conducting surfaces or members and adapted to be inserted, respectively, in the said terminal sockets of any two lines and thereupon to unite the said two lines without breaking their normal circuits through their respective call-annunciators, and a disconnecting or clearing-out annunciator hav-

ing a helix of relatively low resistance connected by a cross-conductor from one of the conductors of said link connection to the other and constituting, when the said link connection is connected with any circuit, a shunt-circuit around the high-resistance call-annunciator of such circuit, a source of current adapted for the operation of either the line or the clearing-out annunciator at each substation, and means for including such source of current in the line, whereby the clearing-out annunciator diverts the current from the line-annunciators and is operated by the diverted current, as described.

5. In a telephone-exchange system, two metallic circuits, each extending from a different substation to the same central station and there having their respective direct and return conductors united to constitute a single compound metallic circuit from one of the said substations to the other, in combination with two bridge conductors, each uniting the direct and return conductors of said compound metallic circuit through an annunciator-helix of relatively high resistance, and a third bridge uniting the said direct and return conductors through an annunciator-helix of relatively low resistance and shunting the said high-resistance helices, and a source of current adapted for the operation of the different annunciators with means for connecting the same in the line-circuit, whereby when current is sent in the line from said source, the current is diverted through said annunciator-helix of low resistance and the operation of the annunciators of high resistance is prevented, substantially as described.

6. In combination with two telephone-lines, each extending from a substation to a central station, and having their respective line conductors united thereat to constitute a single compound circuit from one of the said substations to the other, two branch circuits from the lines, said branch circuits being of high resistance and retardation, and each including an annunciator, a third branch including a clearing-out annunciator of relatively low resistance, and a source of signaling-current included in the united circuit of the said telephone-lines, whereby the current is directed through the clearing-out annunciator to operate the same, thereby being prevented from operating either of the annunciators included in the branch circuits of high resistance and retardation, substantially as described.

7. The combination, with a telephone-circuit extending between a substation and a central station and permanently closed at the central station through a call-annunciator circuit of high resistance, of a clearing-out annunciator of low resistance connected in a shunt of said high-resistance annunciator-circuit, a source of signaling-current and means for connecting the same into circuit with said annunciators, whereby the call-annunciator is temporarily shunted as to sig-

naling-currents by the low-resistance clearing-out annunciator, substantially as described.

5 8. The combination, with a telephone-circuit extending between a substation and a central station and permanently closed thereat through a call-annunciator circuit of high resistance and retardation, a source of signaling-current and means for connecting the
10 said source in the telephone-circuit to operate the line-annunciator before connection with the line, of a terminal socket connected with the telephone-line, and a clearing-out annunciator of relatively low resistance connected with the said terminal socket in shunt
15 of the high-resistance call-annunciator, the said clearing-out annunciator being operated by said source of current when connected with the telephone-circuit by said means, substantially as described.
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9. The combination of two telephone-circuits extending from independent substations to a central station, and each provided at the central station with a permanent ter-

minal connection extending to a return-conductor and of high resistance and retardation, a signal-indicating device in each such terminal connection, a link conductor adapted to unite said circuits at the central station
25 at a point external to said terminal connection, a branch conductor of relatively low resistance but of high impedance, extending from the said link conductor to the said return-conductor, a source of current at each substation, and means for connecting the
30 same in circuit with said terminal connections and branch conductor; whereby during the linking together of the lines the branch conductor shunts the current of said source from the high-resistance terminal connections, as described.
35 40

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

CHARLES E. SCRIBNER.

Witnesses:

FRANK R. MCBERTY,
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