phone switch at each substation controlling the continuity or resist-ance of its own circuit, with two Wheatstone balance or bridge systems, one for each substation circuit, interposed in the said switch conductors, glow lamp disconnecting signals one for each circuit, included each in the bridge or cross wire of the bridge system of its own circuit, a main battery in a third bridge or cross wire common to both bridge systems, each substation circuit, its instruments, and its automatic switch being connected in one of the branches of its own bridge system, to serve as a variable resistance therefor, whereby each disconnecting signal lamp is made responsive solely to the operation of its own substation switch, substantially as specified herein.





The Bell Telephone Company of Canada, Montreal, Quebec, Canada, assignee of Charles Ezra Scribner, Chicago, Illinois, U.S.A., 28th October, 1896; 6 years. (Filed 21st August, 1896.)

Claim.-1st. The combination with a signalling circuit divided at one point into two parallel branches of fixed resistance, of means for varying the resistance of the signalling circuit, a source of signalling current in the undivided portion of the signalling circuit, a signal-indicating instrument requiring for its operation a definite predetermined current in one of the branches, a separate source of carrent in one of the parallel branches, the polarities of the source of signalling current and of the said other source being oppositely directed in the portion of the circuit including the signalling instrument, the electromotive force of said last-mentioned source being sufficient to prevent current from actuating the signal when the signalling circuit is closed, whereby the closing of the signalling circuit renders the signal inert, and the opening of the signalling circuit causes its display, substantially as described. 2nd. The combination with a telephone line provided with a switch adapted to interrupt the circuit and a source of current in the line, a portion of the line being divided into two parallel branches, of a signal lamp in one of the branches, a resistance coil in the other branch, and a source of current in one of the branches, the polarity of said last mentioned source of current being adapted to oppose the passage of the signalling current through the lamp, and its electromotive force being sufficient to prevent the illumination of the lamp by current in the signalling circuit, substantially as described. 3rd. The combination with a telephone line, of a branch thereof including a signal lamp and a source of current, a spring cribed. jack connected with the line, a plug circuit for making connection with the spring jack and a conductor of low resistance connected with the spring jack and a conductor of low resistance connected with the plug adapted to form a bridge of the line circuit including the said source of signalling current, when cennection is made with the line, whereby the signal lamp is shunted. 4th. The combination with a telephone line, of a spring jack constituting a terminal there-of, a signal lamp together with a source of signalling current in a permanently-closed bridge of the line circuit, a connecting plug and the plug circuit, a connecting plug and its plug circuit, and a conductor of low resistance including a signal lamp connected with the plug adapted to be brought into a bridge of the line circuit when the plug is inserted into the spring jack, sub-stantially as described. 5th. The combination with a telephone line, a switch for interrupting the line at the substation, a spring jack constituting a terminal of the line in a switch-board, a signal lamp, a low-resistance branch of the line circuit including a source of signalling current temporarily associated with the circuit, a supervisory signal lamp in said low-resistance branch, a shunt circuit including a resistance coil about the lamp, and a source of current in the closed circuit formed by the shunt and the conductor includ-In the closed circuit formed by the shunt and the conductor includ-ing the lamp, the source of current being so adjusted with relation to the source of signalling current as to produce a condition of no difference of potential between the terminals of the supervisory signal when the line circuit is closed, substantially as described. 6th. The combination with a telephone line, of a switch at the sub-station for interrupting the line, a spring jack for the line in a switch-board, an impedance coil, a signal lamp, and a source of signalling current in a permanently-closed bridge of the line circuit, a pair of loop-connecting plugs for uniting lines, the different contact pieces of each plug being united through a helix or helices of the same nduction coil and through a source of signalling current a super

visory lamp signal in the conductor uniting the contact pieces of each plug, a shunt including a resistance coil about each supervisory signal lamp, and a source of current in each shunt adapted to divert the current of said source of signalling current from the corresponding supervisory signal when the line circuit is closed, substantially as described. 7th. The combination with a telephone line having a switch for interrupting the line circuit, a spring jack for making connection with the line, of a plug in the spring jack in continuation of the line, a source of signalling current in circuit with the plug, the circuit of the plug being divided at one point into two parallel branches, a signal lamp in one of the branches, and a source of current in one of the branches, the said last-mentioned source of current being of such strength and polarity as to prevent the illumination of the signal lamp by current from the signalling battery, substan-tially as described.

No. 53,904. Telephone Circuit. (Circuit de téléphone.)



The Bell Telephone Company of Canada, Montreal, Quebec, Canada, assignee of Charles Ezra Scribner, Chicago, Illinois, U.S.A., 28th October, 1896; 6 years. (Filed 21st August, 1896.)

Claim .-- 1st. The combination with a line-circuit, of a receiving instrument and a source of current connected with the line at one station, and at another station a receiving instrument and a source of current in different parallel branches of the circuit, and a source of electromotive force in the branch with the receiving instrument adapted to oppose the passage through the receiving instrument of current from the said source in the other branch, substantially as described. 2nd. The combination in a telephone-circuit, of a source of telephonic undulatory current and a telephone receiver in separate parallel branches of the circuit, and included in the branch with the receiving instrument, a source of undulatory or alternating electro-motive force corresponding in phase and direction to that of the said source of current and nearly equal in amount to the difference of potential set up between the terminals of the branch including the receiver by the said source of current, whereby the shunting of the telephonic currents from the said source of current, whereby the stuffing of the telephonic currents from the said source of current through the receiving instrument is prevented, substantially as described. 3rd. The combination in a telephone-circuit divided into two parallel branches at a station, of a telephone-receiver in one of the branches, and an induction coil having its secondary helix included in the other branch and its primary helix in circuit with the local micro-phone, and, included in the branch with the telephone-receiver, **a** source of undulatory or alternating electromotive force corresponding in phase and direction with that produced by the said secondary helix while the microphone is in operation, the electromotive force of said source being almost or quite equal in amount to the differ-ence of potential produced by the said secondary helix between the terminals of the branch containing the receiver, whereby the side tone is prevented. 4th. In combination in a telephone-circuit divided into two parallel branches at a station, a telephone-circuit divided into two parallel branches at a station, a telephone-receiver in one of the branches, a secondary helix of an induction-coil included in each of the branches, each of said secondary helices being placed in inductive relation with a primary helix constant the primary helix inductive relation with a primary helix connected with means for producing undulatory currents corresponding to sound-vibrations. the secondary helix in the branch with the telephone being adapted to have an electromotive force corresponding in phase and direction to that in the other secondary helix and slightly less in amount than the difference of potential set up between the terminals of the branch including the telephone by the other helix, whereby the side tone in the telephone is avoided. 5th. The combination in a telephonecircuit divided into two parallel branches at a station, of two induction coils having their secondary helices in the different branches, respectively, and their primary helices connected in separate parallel branches of a local microphone-circuit, the secondary helix in the branch with the telephone being adapted to have an electromotive force sufficient to practically prevent the shunting of current from the other branch through the branch containing the telephone, substantially as described. 6th. The combination with a telephonecircuit divided into two parallel branches at a station, of a source of telephonic undulatory current in one of the branches, a telephone-receiver in the other branch, and, in the branch with the telephone, a source of undulatory electromotive force corresponding in phase and direction with that of the source of current in the other branch and sufficient in amount to create a difference of potential between the terminals of its branch slightly less than the electromotive force of the source of current in the other branch, the latter branch being of each plug being united through a helix or helices of the same constructed to have a high impedance, whereby the shunting through nduction coil and through a source of signalling current, a super-