

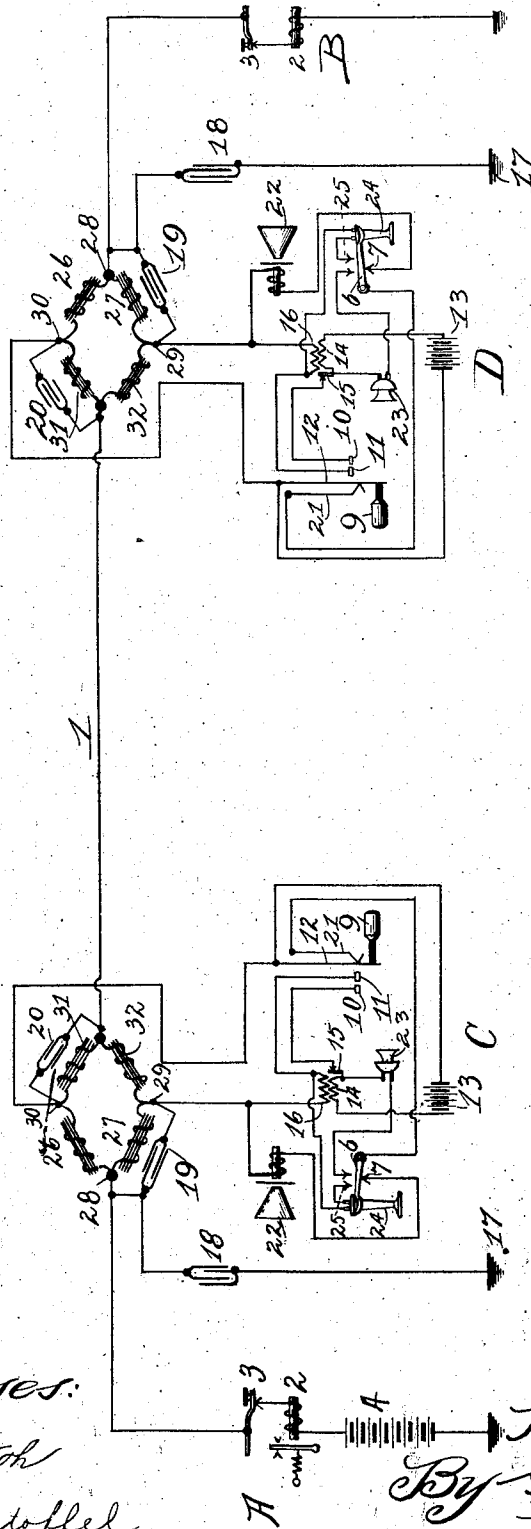
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H. O. RUGH.

COMPOSITE SYSTEM OF TELEGRAPHY AND TELEPHONY.

APPLICATION FILED OCT. 20, 1906.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## COMPOSITE SYSTEM OF TELEGRAPHY AND TELEPHONY.

No. 839,210.

Specification of Letters Patent.

Patented Dec. 25, 1906.

Application filed October 20, 1906. Serial No. 339,832.

*To all whom it may concern:*

Be it known that I, HARRY O. RUGH, a citizen of the United States, residing at Sandwich, in the county of Dekalb and State of Illinois, have invented a certain new and useful Improvement in Composite Systems of Telegraphy and Telephony, 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 to composite systems of telephony and telegraphy, the subject-matter of the claims in this application being disclosed and broadly claimed, though not specifically claimed, in my application, Serial No. 321,769, filed June 14, 1906.

The subject-matter of my present application is the precise form thereof which is now being installed in practice, and I herein specifically claim the organization herein set forth.

This specification has in its concluding portion a specific description of the advantages of the subject-matter of this application, which are therefore not repeated at this point.

My invention will more fully appear by reference to the accompanying drawing and will be pointed out in the claims.

The drawing illustrates two telegraph-stations united by a transmission-line and two telephone-stations also united by the same transmission-line; but I do not wish to be limited to the number of stations which are thus connected by the same transmission-line.

The transmission-line 1 is shown as forming telegraphic connection between two telegraph-stations A B and telephonic connection between telephone-stations C D. At each telegraph-station there is shown a part of the usual telegraphic apparatus, the part illustrated including a line-relay 2, a telegraph-key 3, together with connections that ground the conductor 1 at the telegraph-stations. There is shown included in series with the line at station A a closed-circuit battery 4. At each telephone-station there is indicated a telephone switch-hook 6, that has a normal contact 7 normally establishing with the switch-hook a signal-receiving circuit at the corresponding telephone-station.

The signal-sending appliance at each telephone-station includes a signaling-key 9; the contacts 10 and 11, that are electrically connected with the switch element 12 when the

push-button 9 is actuated; the battery 13; the primary 14 of the induction-coil, which primary constitutes a winding of a circuit breaker or interrupter; the armature 15, and the back contact for said armature. When the push-button 9 is depressed, local circuit including the primary 14 is established, whereby owing to the interruption of this circuit at 15 signaling-current is induced into the secondary 16, through the agency of which secondary signaling-currents are impressed upon the transmission-line. The signaling-currents received at each telephone-station may be traced as follows: Assuming that the push-button 9 is depressed at station C, current induced in the winding 16 is impressed upon the line and finds circuit from the ground 17 at said station C, through the condenser 18, the condenser 19, the coil 16, the contact elements 11 12, the condenser 20, the transmission-line 1, the condenser 20 at the receiving-station D, the switch element 12, the normal back contact 21 of said switch element 12, the switch-hook 6, the contact 7 of said switch-hook, the signal-receiver, preferably a howler 22, the condensers 19 18 at station D, to the ground 17. When the switch-hook is raised at a telephone-station, the primary 14 is included in a local circuit with the battery 13 and the transmitter 23 thereat, and voice-currents are impressed upon the telephone-line through the agency of the secondary 16, which voice-currents follow a circuit that may be traced from the ground 17, through the condensers 18 and 19, the coil 16 at the speaking-station, the receiver 24, the switch-hook 6 and its upper contact 25; the contact 21, the spring 12, the condenser 20, the line 1 to the receiving-station, where this telephonic current continues its passage through the condenser 20, a spring 12 at the receiving-station, the contact 21, the switch-hook 6, the contact 25, the receiver 24, coil 16, the condensers 19 and 18, to the ground 17.

In order to prevent the abrupt telegraphic impulses from finding passage through the telephonic apparatus, I provide quadrilateral connections at each of the telephone-stations, as indicated. Two adjacent sides 26 27 of each quadrilateral have their terminal 28 connected with that portion of the transmission-conductor 1 extending to the corresponding telegraph-station. These sides 26 and 27 are of the same high impedance and ohmic resistance. The terminals

29 30 of the sides 26 27 also constitute terminals of the impedance devices 31 32, which latter devices are of substantially the same high impedance and of the same ohmic resistance. The ohmic resistance of each of the devices 26 27 31 32 is preferably low. The devices 31 32 have a common terminal 33. The telephonic-circuit connections are effected at the telephone-stations by connecting the telephonic conductors with the terminals 29 and 30, whereby through the agency of the impedance devices 26 27 31 32 the telephone instruments are not subject to the telegraphic currents impressed upon the transmission-line at the telegraph-stations. While the impedance devices 26 27 31 32 guard the telephonic apparatus perfectly from the action of the telegraphic currents impressed at the points 28, said impedance devices would prevent the transmission of telephonic currents between the telephone-stations, and I therefore supplement certain of these impedance devices with instrumentalities that will permit of telephonic communication between the telephone-stations, which at the same time will not deprive said impedance devices of their true function in guarding the telephonic apparatus from the telegraphic currents. To this end the impedance devices in opposite sides of each quadrilateral are shunted by devices that will permit of the passage of telephonic currents. The devices that I prefer to employ are the condensers 19 and 20, which are shunted about the associate impedance devices 27 and 31 and which by their very nature cause the shunts about said impedance devices to be of extremely high ohmic resistance, whereby the objectionable passage of telegraphic current is not permitted by said condensers, but the required passage of telephonic current is afforded.

It will be seen that I have provided a composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device permitting the passage of current between the telegraph-stations, the impedance devices in two opposite sides of each quadrilateral being shunted by devices (preferably condensers) that permit the passage of telephonic current and substantially preventing the passage of telegraphic current, the telephone-receiver at each telephone-station having one of its terminals connected between two of a pair of the sides of said quadrilateral and its other terminal connected between the two

sides of the remaining pair of sides of said quadrilateral in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral, and a conductor at each telephone-station including a condenser and having connection with that portion of the transmission-line from which the telephonic currents are directed.

Further analysis of the system of my invention will not be required, as the advantages thereof will be at once pertinent to those skilled in the art.

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

1. A composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device permitting the passage of current between the telegraph-stations, the impedance devices in two opposite sides of each quadrilateral being shunted by condensers, the telephone-receiver at each telephone-station having one of its terminals connected between two of a pair of the sides of said quadrilateral and its other terminal connected between the two sides of the remaining pair of sides of said quadrilateral, in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral, and a conductor at each telephone-station including a condenser and having connection with that portion of the transmission-line from which the telephonic currents are directed.

2. A composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device per-

mitting the passage of current between the telegraph-stations, the impedance devices in two opposite sides of each quadrilateral being shunted by devices that permit the passage of telephonic current and substantially preventing the passage of telegraphic current, the telephone-receiver at each telephone-station having one of its terminals connected between two of a pair of the sides of said quadrilateral and its other terminal connected between the two sides of the remaining pair of sides of said quadrilateral, in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral.

2. A composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device permitting the terminal connected between two sides of the remaining pair of sides of said quadrilateral, in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral.

3. A composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device permitting the passage of current between the telegraph-stations, the impedance devices in two opposite sides of each quadrilateral being shunted by condensers, the telephone-receiver at each telephone-station having one of its terminals connected between two of a

pair of the sides of said quadrilateral and its other terminal connected between the two sides of the remaining pair of sides of said quadrilateral, in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral.

4. A composite system of telegraphy and telephony including a transmission-conductor, a plurality of telegraph-stations connected thereby, a plurality of telephone-stations also connected thereby, said transmission-conductor normally permanently extending to all of said telegraphic and telephone stations, a quadrilateral of connections at each telephone-station, each side of which quadrilateral includes an impedance device permitting the terminal connected between two sides of the remaining pair of sides of said quadrilateral, in a manner to have the telephone-receiver terminals telephonically connected with the transmission-line by the shunts established about two of the impedance devices in said quadrilateral, the said pairs of sides of said quadrilateral each being connected in series with the transmission-conductor, the telegraphic stations also being in serial relation with said quadrilateral.

In witness whereof I hereunto subscribe my name this 16th day of October, A. D. 1906.

HARRY O. RUGH.

Witnesses:

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