

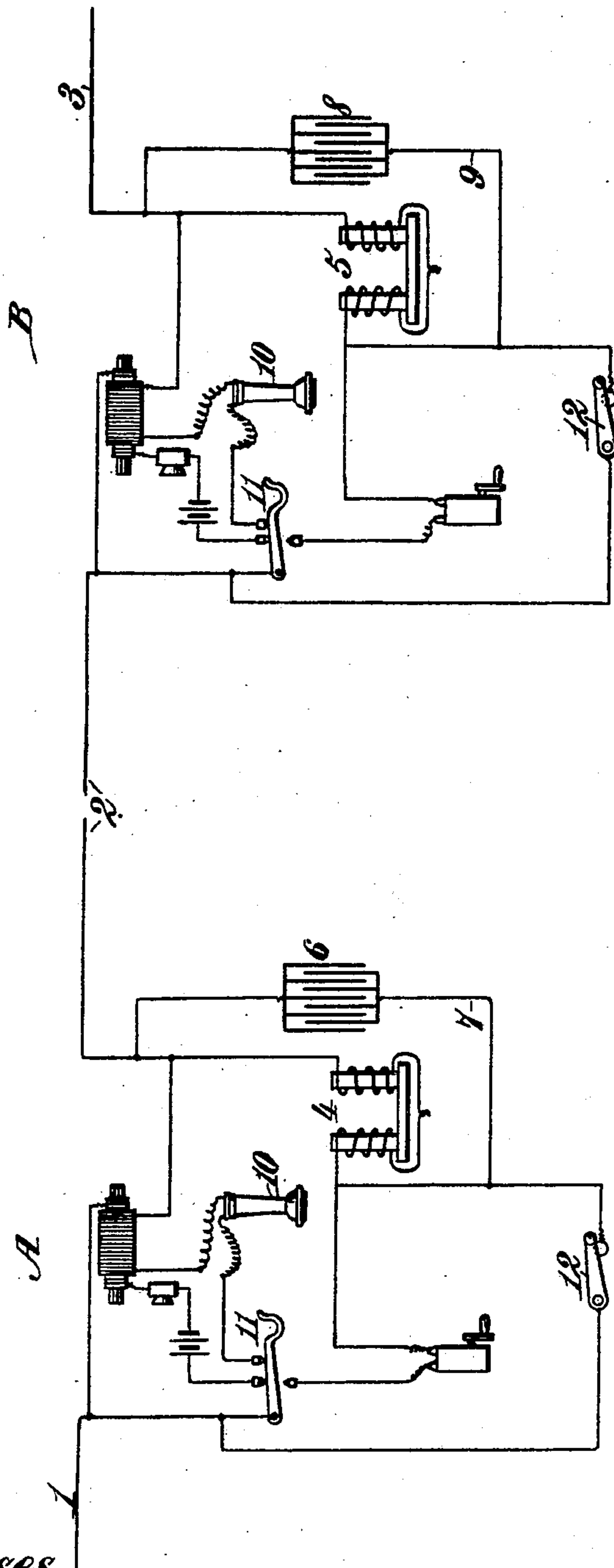
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Patented Sept. 3, 1901.

C. A. CASPERKE.  
SERIES TELEPHONE SYSTEM.

(Application filed Apr. 17, 1901.)

(No. Model.)



Witnesses.  
*Alfred G. Smith*  
*J. B. Keefe*

Inventor.  
*Charles A. Casperke.*  
By *James L. Norris.*  
*Atty.*

# UNITED STATES PATENT OFFICE.

CHARLES A. CASPERKE, OF BRANDENBURG, KENTUCKY.

## SERIES TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 682,030, dated September 3, 1901.

Application filed April 17, 1901. Serial No. 56,258. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. CASPERKE, a citizen of the United States, residing at Brandenburg, in the county of Meade and State of Kentucky, have invented new and useful Improvements in Series Telephone Systems, of which the following is a specification.

My invention is concerned with series telephone systems, and has for its object to provide means for overcoming the impedance to the voice-currents on series telephone-lines and for rendering the ringer more efficient without materially changing the apparatus used. The impedance of the ringer-coils on a series telephone-circuit not only decreases the intensity of the vibrations of the undulatory voice-currents, but also changes somewhat the form of the vibrations of these currents. It is therefore impossible to transmit the voice-currents over long series lines crowded with stations. By my invention I provide means at each station for overcoming the local impedance thereof and for correcting the distorted vibrations in the voice-currents passing therethrough, the same consisting of a shunt-circuit bridged across the ringer-coils and including a condenser of proper capacity. This decreases the resistance to the alternating signaling-current, increases the efficiency of the ringer, and also provides another path for the voice-currents other than through the ringer-coils alone. The result is that the impedance of each station is decreased, and as the induced current of the condenser has an opposite effect in phase to the effect of the self-induction of the ringer-coils the distortion of either ringer or condenser is counterbalanced. A double effect is thereby produced, which overcomes the disadvantages under which series telephone-lines are at present operated.

In the accompanying drawing my invention is illustrated by a diagrammatic view showing two substations of a series telephone-line.

The substations A and B have the line-wires 1, 2, and 3 leading into and from the same, the line including in series the ringer-coils 4 and 5 of the respective stations. Bridged across the ringer-coils 4 is a condenser 6 in a shunt-circuit 7, and bridged

across the ringer-coils 5 is a condenser 8 in a shunt-circuit 9. The coils 4 and 5 and the condensers 6 and 8 may be of any suitable or preferred form or construction, the details of the same forming no part of my invention. By this arrangement the voice-current is delivered from each substation A B on the line 1 2 3 with practically the same potential as it is received at such station by repeating it at every such station, thus practically dividing the entire talking-circuit into short sections, each repeating to the next adjacent one and in effect leaving the ringer-coils 4 5 out of the way when the condenser used is of proper capacity to receive the vibrations produced by the voice. Being so rapid and intense these vibrations are absorbed by one set of plates of a very small capacity condenser and repeated by induction to the opposite plates. The voice at the receiving-station is made more natural, and the change in the form of the voice-currents ordinarily produced by the substations is prevented by locating the condenser at the point of the trouble on a series circuit. Furthermore, the efficiency of the line in both talking and ringing is increased, as the charging of the condensers along the line practically reduces the resistance of the line, and therefore increases the output of the generator. The condenser at each station acts as a local storage-cell, and being of small capacity it robs the current of sufficient supply to charge itself; but this is done with the effect of decreasing the resistance from the generator until the condenser is charged to a capacity somewhat in excess of the capacity in normal intensity of the generator impulse, as it meets with its highest charge at first while the current is overcoming the self-induction in the ringer-coils. As soon as this self-induction is overcome the excess of charge is added to the flow from the generator as the intensity decreases, and a similar effect is produced when the current becomes of opposite polarity. This takes place from the side receiving current from the generator, and a similar assistance to the efficiency of the ringer acts on the opposite plates in complement with that already mentioned, and so on at each station on the line. The result of the foregoing is that the ringing pulsations are



slightly prolonged during the time of greatest potential and at the same time are made practically sinusoidal in phase. Furthermore, practically the total amount of the increased current output of the generator is utilized. It will thus be seen that by my invention the inductive resistance and in effect ohmic resistance to vibrating currents at each intermediate station is reduced, making the ringing as well as the talking more efficient.

At substations where the receiver 10 is apt to be removed often for any cause when said station is neither calling nor being called it is important to connect the shunt-circuit containing the condenser with the line at a point above the hook-switch 11, on which the receiver is suspended, and to locate in said shunt-circuit adjacent to the hook-switch 11 a switch 12, by means of which the shunt-circuit may be opened when the station is actually engaged in conversation; otherwise the local impedance of the station would not be prevented on account of the shunt being connected to one line only, since in the usual wiring of series telephones the shunt-circuit containing the condenser would not extend to the line entering station A, the receiver and secondary winding of the induction coil would add great impedance to the circuit at said station while the hook-switch 11 is in its upper position—that is to say, the shunt-circuit should be closed only when the station is not actually engaged in conversation. However, at such stations where the hook-switch is never left in its upper position except during conversation it is sufficient to connect the shunt-circuit to the line below the

hook-switch, thereby avoiding the necessity of the switch 12.

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

1. In a series telephone system, a ringer-coil at each station and a condenser in multiple therewith the said condenser being included in a shunt-circuit having no source of impedance therein, as and for the purpose set forth.

2. In a series telephone system, a ringer-coil at each station and a condenser connected with the line and bridged across said coil the said condenser being included in a shunt-circuit having no source of impedance therein, as and for the purpose set forth.

3. In a series telephone system, serially-arranged ringer-coils located respectively at each station, a non-impeding shunt-circuit around each of said coils, and a condenser in said shunt-circuit, as and for the purpose set forth.

4. In a series telephone system, a ringer-coil at each station, a normally-closed non-impeding shunt around said coil, connected with the line above the hook-switch for the receiver, a condenser in said shunt, and a switch for opening said shunt, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES A. CASPERKE.

Witnesses:

JOHN BIRCHER,

J. MORGAN RICHARDSON.