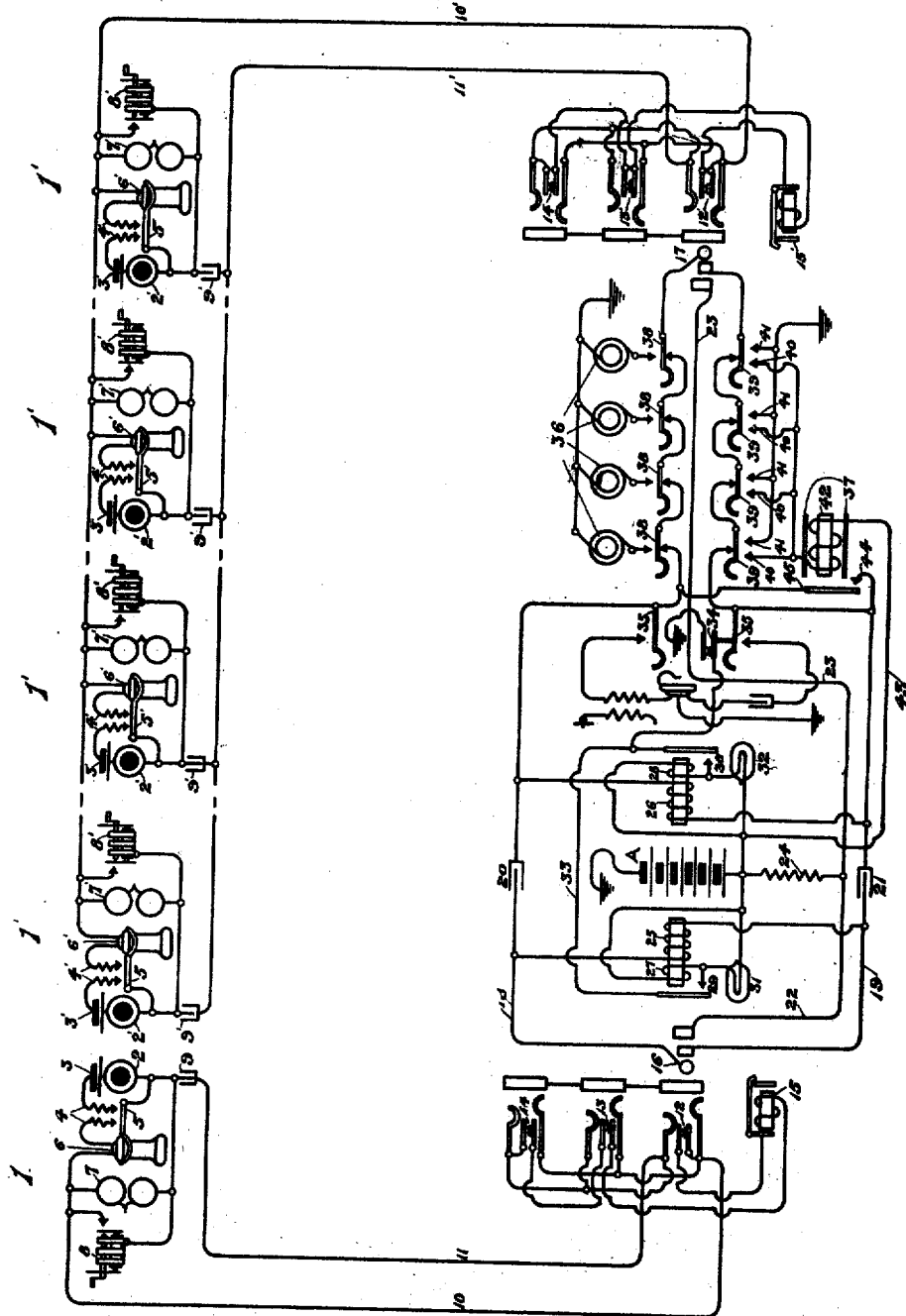


C. A. SIMPSON.
 TELEPHONE RINGING SYSTEM FOR PARTY LINES.
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Witnesses
 W. H. Badley
 C. A. Bradbury

Charles A. Simpson
 Inventor
 By Curtis B. Camp
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES A. SIMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE RINGING SYSTEM FOR PARTY-LINES.

No. 910,873.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES A. SIMPSON, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone Ringing Systems for Party-Lines, of which the following is a specification.

My invention relates to party line telephone systems, and more particularly to that class of systems having a bridged clearing-out signal at the central office adapted to be actuated at the end of a conversation by current sent from a hand generator at the subscriber's station. In systems of this class it has become the practice to connect a number of subscribers' instruments in parallel across the same telephone line. These instruments are each provided with a signaling bell, and in the system to which my invention particularly relates each bell is connected in series with a condenser of sufficient capacity to pass the ringing current for the bell. With former systems of this character, when the operator at the central office rung one of the bells on a party line, she simultaneously charged and discharged all of the condensers which were bridged across the line at the different substations. If in these systems, the operator released her ringing key at a time when the condensers of the various substations were highly charged, the discharge of these condensers would take place after the ringing key had returned to its normal position and would therefore pass through the clearing-out signal and momentarily energize that signal, causing it to be displayed.

It is the object of my present invention to overcome the difficulty experienced from the discharge current from these condensers, and thereby to provide a circuit which is more perfect in operation and less liable to give false signals than systems used in the past.

Other objects of my invention will be brought out in the following description and claims.

My invention is illustrated in the accompanying drawing in which a line having but one subscriber thereon is illustrated at the left hand side of the drawing, and a party line having four subscribers thereon is illustrated at the right hand side of the drawing, the two being adapted to be connected for conversation by the central office apparatus.

The calling subscriber's station No. 1 is

equipped with the usual apparatus consisting of the transmitter 2, battery 3, induction coil 4, switch hook 5, receiver 6, annunciator 7, and generator 8, and in addition thereto, the condenser 9 which is connected permanently in series with the apparatus of the set. The line wires 10 and 11 extend from the subscriber's station 1 to the central office where they pass through the series contacts 12, 13 and 14 of the answering and multiple jacks and terminate in the coil of the line drop 15. The called subscriber's line is similarly equipped, corresponding apparatus of this line being designated by like figures with the suffix "F".

The cord circuit for connecting the lines for conversation has the tip and ring conductors 18 and 19, each being respectively interrupted by condensers 20 and 21. The sleeve conductors 22 and 23 of the answering and calling cords are connected with the live pole of battery A through the non-inductive resistance 24. The clearing out signals in the system here shown consist of the relays having the high resistance windings 25 and 26, one bridged across each end of the cord circuit, these relays being provided with the lock-windings 27 and 28 and with the contacts 29 and 30 in the circuits of the clearing out lamps 31 and 32. The spring contacts of the two clearing out relays are connected together by conductor 33, this conductor being connected through the auxiliary contact 34 of the operator's listening key 35 to earth. It is customary in a four-party ringing system of the type here shown to use four separate sources of current 36, each adapted to be connected with the desired line through the contacts of the ringing key. These four ringing keys are connected in series, such that the actuation of one of the keys disconnects the plug of the calling cord from the other apparatus of the cord circuit, and prevents current from being sent through the condensers 20 and 21 back to the calling subscriber's station.

The four party ringing key used in this system is provided with the tip springs 38 and with the ring springs 39, the springs 39 being adapted to connect with contacts 40 and 41 when the key is actuated. Contact 41 is connected with earth, while contact 40 is connected with the coil of relay 42, the other terminal of the coil of this relay being connected through conductor 43 with the

live pole of battery A. Relay 42 controls the normally open contacts 44 and 45, contact 44 being permanently connected with the sleeve strand of the cord circuit and contact 45 being permanently connected with the tip strand of the cord circuit at a point back of the series contacts of the ringing key.

In the operation of my system the calling subscriber turns her hand generator 8 and sends a current over conductors 10 and 11 through the series contacts 14, 13 and 12 of the jacks and through the coil of the line drop 15, throwing the drop and indicating to the operator that a connection is desired. The operator therefore inserts her calling plug 16 into the jack indicated, throws her listening key 35 and inquires the desired number. The number being obtained, the operator tests the desired line in the usual manner. If the line is busy its sleeve contact will be at a potential higher than that of earth and a current will flow over the tip of the cord and through the operator's head receiver and the third conductor connected therewith to earth giving a click and indicating the busy condition. Considering, however, that the line is idle, the operator inserts her calling plug 17 and actuates the ringing key which is adapted to ring the bell at the desired subscriber's station. The actuation of this key closes the circuit from the generator over the tip contacts of the plug and jack, line conductor 11', condensers 9', annunciators 7', line conductor 10', the ring contacts of the jack and plug, the spring 39 of the operator's ringing key and contact 41 to earth. At the same time current will flow from the battery A through conductor 43, the coil of relay 42, contact 40, spring 39 and contact 41 to earth, thereby actuating relay 42 and closing its contacts 44 and 45, thus completing a shunt between the tip and ring conductors of the cord circuit. Upon the release of the operator's ringing key the stored up energy from the condensers 9' is allowed to discharge over the line conductors 10' and 11', the tip and ring contacts of the jack and plug, the series contacts of the operator's ringing key and the shunting contacts 45 and 44 of relay 42. This prevents current from these condensers from passing through the actuating coil 26 of disconnect relay. The relay 42 is preferably made slow acting by any of the well known methods such as inclosing its core in the copper shell 37.

When the conversation has been terminated the subscribers rotate their hand generators and thereby send current over the line conductors and through the coils 25 and 26 of the disconnect relays associated respectively with the answering and calling ends of the cord circuit. When these relays are actuated the circuit is completed from the live pole of battery A through the lamps 32 and 31 and through the contacts 29 and

30 and the contact 34 of the operator's listening key to ground, thus displaying the lamps 32 and 31. A circuit is simultaneously completed from the live pole of battery A through the locking coils 27 and 28 of the disconnect relays and through the contacts 34 of the operator's listening key to earth. The operator seeing the signals 31 and 32 displayed removes her answering and calling plugs from the jacks of the line and then presses her listening key opening the contacts 34 and releasing the disconnect signals 31 and 32. The lines are now again in their normal condition and ready for a second call.

It is to be understood that the clearing out signals here shown and described are of typical form and may be simply ordinary clearing out drops or may be of any other desired form, and that many other variations from the system shown and described may be made without departing from the spirit or scope of my invention.

I claim:

1. In a telephone system, the combination with a telephone line having a bridged condenser thereon, of a cord circuit to connect therewith having a bridged clearing out signal, a source of ringing current at the central office, means to connect said source with the telephone line for signaling, and means to divert the discharge current from said condenser from the coil of said clearing out signal after ringing, substantially as described.

2. In a telephone system, the combination with a telephone line having a bridged condenser and annunciator, of a cord circuit to connect therewith having a clearing out signal, a source of ringing current, and means to connect said source with the line for signaling purposes, and means to prevent the discharge current from said condenser from passing through said clearing out signal after ringing, substantially as described.

3. In a telephone system, the combination with a telephone line having a bridged condenser, of a cord circuit to connect therewith having a bridged clearing out signal, a source of ringing current, a ringing key and means to complete a shunt about the coil of said clearing out signal to receive the discharge current from said condensers after ringing, substantially as described.

4. In a telephone system, the combination with a telephone line having a bridged condenser, of a cord circuit having a bridged clearing out signal, a source of ringing current, a ringing key and means operated by the actuation of said ringing key for completing a circuit for the discharge current of said condensers after ringing, substantially as described.

5. In a telephone system, the combination with a telephone line having a bridged condenser, of a cord circuit having a bridged

clearing out signal, a source of ringing current, a ringing key, and a relay adapted to complete a shunt about the clearing out signal for a short time after ringing, substantially as described.

5 6. In a telephone system, the combination with a line having capacity, of a cord circuit having a signal which could be actuated by discharge current from capacity, and means to prevent the discharge current from said capacity from actuating said signal, substantially as described.

15 7. In a telephone system, the combination with a telephone line having capacity, of a cord circuit having a signal receiving device, a ringing key, a relay, said key having contacts in the circuit of the coil of said relay, and said relay having contacts in the circuit of the discharge current from said capacity, substantially as described.

20 8. In a telephone system, the combination with a telephone line having capacity, of a cord circuit having a bridged signal receiving device, means to charge the capacity of the line and means to divert the discharge current from the line from the bridged signal receiving device, substantially as described.

25 9. In a telephone system, the combination with a telephone line having reactance of a signal receiving device connected with said line which could be actuated by an impulse of reactance current, and means to prevent the reactance current from the line from passing through said signal receiving device, substantially as described.

30 10. In a telephone system, the combination with a telephone line having capacity, of a signal receiving device bridged between the limbs of the line at the central office adapted to be locked in actuated condition by an impulse of current, and means to prevent the discharge current from said capacity from actuating said signal, substantially as described.

40 11. In a telephone system, the combination with a telephone line having reactance, of a signal receiving device having its coil bridged between the limbs of said line at the central office, and means to prevent the reactance current from the line from passing through said signal receiving device, substantially as described.

50 12. In a telephone system, the combination with a cord circuit, of a signaling device associated therewith, and a slow-acting relay

adapted by its retarded action to maintain a shunt about the coil of said signaling device for a short duration of time, substantially as described.

13. In a telephone system, the combination with a telephone line having a reactance, of a cord circuit adapted to connect therewith, a signal receiving device associated with the cord circuit, and a slow-acting relay adapted by its retarded action to prevent the reactance current from the line from passing through said signal receiving device, substantially as described.

14. In a telephone system, the combination with a telephone line, of a cord circuit to connect therewith, a ringing key for the cord circuit, a bridged signal receiving device, and means to maintain a shunt about the coil of said signal receiving device for a short duration of time after the ringing key has been returned to its normal position, substantially as described.

15. In a telephone system, the combination with a cord circuit having a bridged signal receiving device, a ringing key for the cord circuit, a slow-acting relay adapted to be energized by the actuation of said ringing key and the actuation of said slow-acting relay being adapted to complete a shunt about the coil of said bridged signal receiving device, substantially as described.

16. In a telephone system, the combination with a telephone line having reactance, of a locking relay at the central office, a signal controlled by said relay, and means to prevent the reactance current from said line from actuating said relay, substantially as described.

17. In a telephone system, the combination with a cord circuit, of a locking relay having its initial operating coil bridged across the line, a second coil therefor adapted to be energized over a local circuit to maintain the actuation of said relay, and means to prevent discharge current from the line from initially actuating said relay, substantially as described.

Signed by me at Chicago, county of Cook, and State of Illinois, in the presence of two witnesses.

CHARLES A. SIMPSON.

Witnesses:

CLIFFORD C. BRADBURY
MARJORIE E. GRIER.