

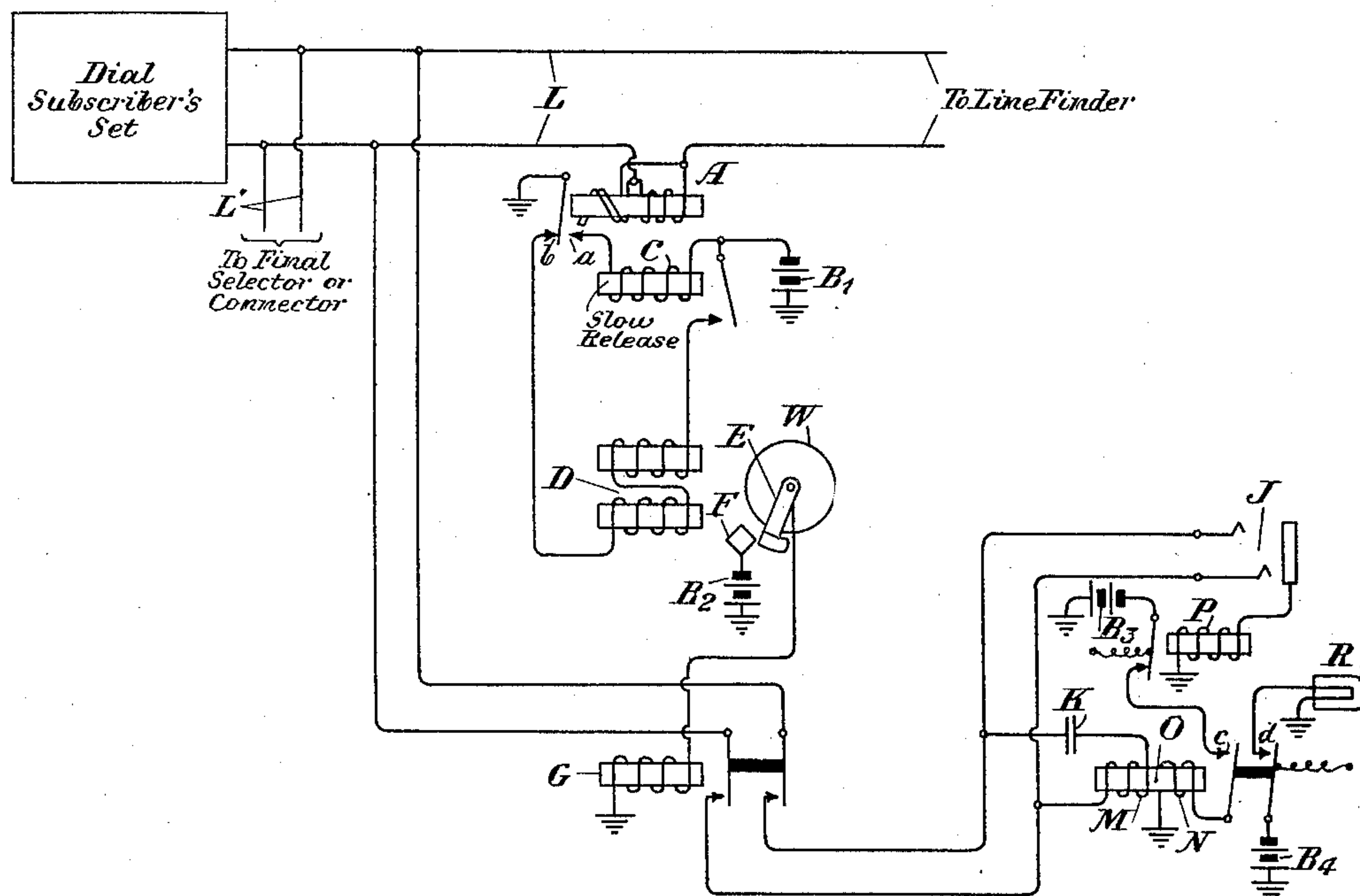
Nov. 17, 1931.

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1,831,901

TELEPHONE SYSTEM

Filed Feb. 21, 1930



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TELEPHONE SYSTEM

Application filed February 21, 1930. Serial No. 430,291.

This invention relates to signaling systems and more particularly to telephone systems. It provides an arrangement for automatically connecting a dial system subscriber to an operator's position and for disconnecting the subscriber from that position.

This invention consists essentially in the provision of a relay in the subscriber's line which may follow dialing pulses. A pulse-controlled circuit is incorporated in the arrangement for the purpose of operating a selector of a type which may be suitable in train dispatch signaling. This selector may be operated to close one or more contacts whenever pulses of a predetermined code are transmitted thereto and to avoid the closure of these contacts whenever any other code is transmitted.

While this invention will be pointed out with particularity in the appended claims, the invention, itself, both as to its objects and features, will be better understood from the following description when read in connection with the accompanying drawing showing one embodiment of the invention for illustrative purposes.

The reference character L designates a telephone line over which speech and ringing or other currents may be transmitted. At the left of line L, there is a dial subscriber's set, as indicated, which includes, among other things, a telephone transmitter, a receiver, a switchhook upon which the receiver may be mounted and a dial device for producing pulses of any desired code. At the right of line L, there may be connected a line finder of any well-known type, which may include, among other things, means for connecting a grounded battery to one side of the line and for grounding the other side of the line.

A relay designated A is connected in the line L. This relay includes two parallel windings, one of which is inductive and the other non-inductive. Relay A becomes operated whenever the receiver of the dial subscriber's set is removed from the switchhook. Only the inductive winding of the relay A controls the movement of its armature between the contacts *a* and *b* in accordance with dialing pulses produced at the subscriber's

set. Thus, when the telephone receiver of the set is removed from the hook, the inductive winding of relay A becomes energized and the armature of this relay closes contact *a*. Yet, throughout the period during which the telephone receiver of the subscriber's set depresses the switchhook, the inductive winding of relay A will not be energized and its armature in that case will close contact *b*. The non-inductive winding of relay A freely transmits direct and alternating currents and, in effect, simulates resistance in the transmission of speech currents.

When the contact *a* is closed by the armature of relay A, as is the case when the subscriber's receiver is removed from its switchhook, a relay C will be operated, in which event current will flow from a battery B₁, through the winding of relay C, contact *a* and the armature of relay A and ground. If a number 5 is dialed at the subscriber's set, then the armature of relay A will be released five successive times and the back contact *b* of relay A will be closed five times. The front contact *a* of relay A will be closed five times in succession.

The relay C is of the slow-release type and therefore a considerable period of time is required for its armature to open its associated contact. During the process of dialing, the armature of relay C will remain closed against its contact. Each time, however, that the contact *b* of relay A is closed, a relay D will be operated, the circuit controlled by contact *b* including battery B₁, the armature and contact of relay C, the windings of relay D, the contact *b* and the armature of relay A and ground.

The reference character W designates a wheel which may be of the ratchet type, as shown in a patent to J. P. C. Boswau, 1,101,679, dated June 30, 1914. This wheel may carry two arms, only one of which is shown and is designated E. These arms may be successively brought adjacent to a contact F in response to the transmission of coded pulses of a predetermined character, as is disclosed in the Boswau patent above mentioned. When predetermined pulses are transmitted to the relay D, the first of these

arms (the one not shown) and the other of the arms designated E are successively set adjacent to contact F. If the arrangement is designated to be responsive to a coded signal such, for example, as 5—8, the first arm (which is not shown and which is always insulated from contact F) will be brought adjacent to contact F after the number 5 is dialed, the effect of which is to lock the arm in this position awaiting the reception of pulses corresponding to the next digit. If any other digit had been dialed this locking would not occur and the arm would be restored to its normal position. The arm E will establish an electrical connection with contact F after the number 8 is dialed.

When the subscriber places his receiver back on the switchhook, relay A will become deenergized and its armature will again close its back contact *b*. Then current will again flow through the windings of relay D and the arm E will be advanced another step. It is to be noted that the arm E of this invention is made wide enough, as indicated in the drawing, in order to maintain the contact F closed after the subscriber returns the receiver back on the switchhook, provided the predetermined coded signal, which may be 5—8, assumed hereinabove for illustration, has been transmitted. The transmission of any other coded signal will not bring about the closure of contact F by the arm E after the subscriber has replaced his receiver on the switchhook.

When contact F is closed by arm E, current will flow through the winding of a relay G, the circuit including a battery B_2 , contact F, arm E, the winding of relay G and ground. Relay G will attract both of its armatures and these will close their associated contacts. The tip and ring sides of a jack J will be connected across the line L at the dial subscriber's set. Thus the operator, upon plugging into jack J, will be in a position to receive those messages intended for the subscriber.

When ringing current flows from line L' over line L as the result of an incoming call, that current will also flow over a circuit including the armatures of relay G, a condenser K and the winding M of a relay O. Relay O will then operate and its armatures will close their associated contacts *c* and *d*. The winding of relay P is connected in series with the sleeve side of the jack J and is normally unoperated. Hence, when relay O operates, its winding N will become energized and will lock that relay. The locking circuit includes a battery B_3 , the armature and contact of relay P, contact *c* and its associated armature at relay O, the winding N of relay O and ground. Relay O will remain locked until the armature of the relay P opens its associated contact. While relay O remains locked, a lamp R will become illuminated by the flow of current from a battery B_4 in a

circuit which includes contact *d* and its associated armature at relay O, the filament of lamp R and the grounded battery B_4 . The lamp will indicate to the operator that a ringing signal has been transmitted. When the operator plugs into jack J, relay P will become operated by virtue of the connection of battery to the sleeve side of jack J and the armature of relay P will become attracted and will open its associated contact. Relay O will then release. The operator's cord is arranged in the well known manner to trip ringing current and thus establish a talking connection to the calling person. Upon the release of relay O, moreover, lamp R will become extinguished by virtue of the opening of contact *d* of relay O.

It will thus be apparent that after the subscriber has placed the operator in a position to receive his calls, ringing current coming in over line L' will operate relay O and this relay will become locked up. Lamp R will become illuminated and will remain illuminated until the operator plugs into jack J. The message will be transmitted over the circuit including both armatures of relay G and the tip and ring sides of jack J. After the operator has received the message, her plug will be removed from jack J. Any subsequent ringing signal will again operate relay O, lock it up and illuminate the lamp R. So, it continues, the operator receiving all the messages intended for the subscriber.

When the apparatus of this invention has been put into the condition above described, then, if the subscriber desires to receive his own calls, all he needs to do is to dial any number at random. Any number subsequently dialed will disconnect arm E from contact F at the same time releasing the mechanical latch and permitting the wheel W to restore to its normal position.

One case in which this invention may find considerable application is that of the subscriber who may, for example, be a doctor. The doctor will receive his own messages while he is at his office but he may desire the service of the telephone operator to receive any messages intended for him during his absence. Thus, by his dialing the predetermined code, the telephone operator will be placed in a position to receive all calls intended for him. By telephoning the operator, the doctor may get the messages received during his absence.

It is to be understood that this invention may not only be employed for the purpose of placing a telephone operator in a position to receive the messages intended for a subscriber but the subscriber may, with a similar arrangement connect his line to that of a different subscriber. The latter subscriber may then receive those messages intended for the first subscriber during his absence.

While this invention has been described in

one particular embodiment merely for the purpose of illustration, it will be apparent that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The combination of a first circuit, a subscriber's set including dialing apparatus connected to said first circuit, a relay having parallel inductive and non-inductive windings connected in series in said first circuit the armature of which follows dialing pulses, a second circuit leading to an operator, means responsive to a predetermined coded signal impressed upon the winding of said relay for connecting said first circuit and said second circuit so that the operator at the second circuit may receive messages intended to reach the subscriber's set, and means for severing the connection between said first circuit and said second circuit in response to any signal different from said predetermined coded signal.

2. The combination of a first circuit including a telephone subscriber's set and means for producing any coded signal thereat, a relay connected in series with said first circuit having parallel inductive and non-inductive windings, a second circuit leading to an operator, means controlled by the armature of said relay and responsive to a predetermined coded signal transmitted through its winding for effectively connecting said first and second circuits, and means for apprising the operator of the transmission of a ringing signal to the subscriber's set over said first circuit.

3. The combination of a telephone line, a first relay having parallel inductive and non-inductive windings connected in series with said line, a subscriber's set terminating said line, said subscriber's set including means for dialing any desired coded signal, a jack, a second relay having two armatures which may connect the tip and ring sides of said jack to said telephone line, and means controlled by the armature of said first relay and responsive to a predetermined coded signal originating at said subscriber's set for operating said second relay.

4. The combination of a telephone line, a subscriber's set terminating said line, said subscriber's set including means for dialing any desired coded signal, a jack, a first relay having two armatures which may connect the tip and ring sides of said jack to said telephone line, means including a second relay the winding of which is connected in series with said telephone line and responsive to a dialed predetermined coded signal for operating said first relay, a third relay operated by ringing current transmitted over said tele-

phone line, and means for locking said third relay.

5. In combination, a telephone line, a dial subscriber's set terminating said telephone line, a direct current relay connected in series with said telephone line the armature of which follows dialing pulses, a slow release relay, means for maintaining said slow release relay operated during the impression of dialing pulses on the winding of said direct current relay, a ratchet wheel bearing an arm which may swing radially about its center, an element which may be engaged by the arm of said ratchet wheel, means interconnecting the contacts adjacent to the armatures of said direct current relay and said slow release relay to rotate the arm associated with said ratchet wheel so as to engage said element, an auxiliary line extending between the telephone line and some distant point, and means controlled by the arm of said ratchet wheel to effectively connect said auxiliary line to said telephone line.

In testimony whereof, I have signed my name to this specification this 20th day of February, 1930.

HENRY M. BASCOM.

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