July 7, 1931. C. V. RICHEY 1,812,984

LOCKOUT FOR OUTGOING CALLS FOR TELEPHONE SYSTEMS

Filed May 22, 1930

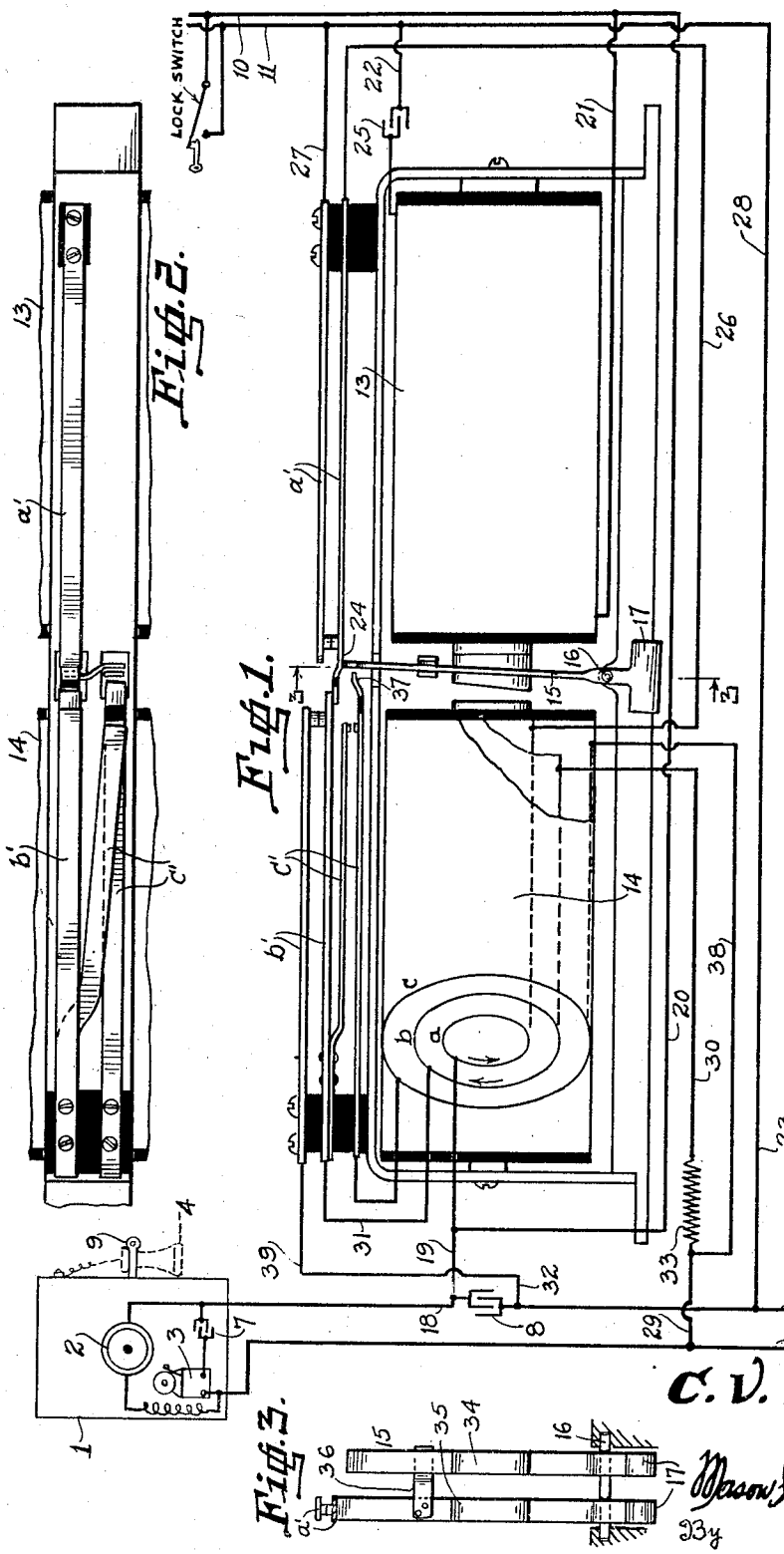


Fig. 2.

Fig. 1.

Fig. 3.

Inventor

C. V. Richey

By Mason Fennick & Lawrence

Attorneys

Patented July 7, 1931 1,812,984

UNITED STATES PATENT OFFICE

CHARLES V. RICHEY, OF JAMAICA, NEW YORK

LOCKOUT FOR OUTGOING CALLS FOR TELEPHONE SYSTEMS

Application filed May 22, 1930. Serial No. 454,763.

This invention relates to lock outs for telephone systems and has for its main object the provision of means adapted to be intercalated in a telephone line and normally having no effect whatever upon the line, but capable of being locked so as to inhibit the transmission of outgoing calls through the telephone which it controls, while at the same time selectively disposing its operating elements in such relation as to permit unimpeded passage to the telephone receiver at all times, of all incoming calls.

Another object of the invention is the provision of a lock out for outgoing calls which is not necessarily associated with the structure of the telephone instrument but which may be connected into the line at any point however remote from the telephone, if desired, for instance in another room or in the basement.

A further object of the invention is to provide a lock out which is not open to the objection that it may over-load the line, since during the talking period, that is to say, the period when the incoming calls are in transit, the operating circuits which are derived from the line energy, are led in choke relation so that they do not, during the talking period, take energy from the line.

Other objects of the invention will appear as the following description of a practical embodiment thereof proceeds.

In the drawings:

Figure 1 is a side elevation largely diagrammatic showing the instrumentalities and circuits involved in the construction and operation of the lock out;

Figure 2 is a fragmentary plan view showing the switch contacts; and

Figure 3 is a front elevation of the duplex armature.

Referring now in detail to the several figures and first adverting to Figure 1 in which the entire system is disclosed, the numeral 1 represents the telephone instrument, having the transmitter 2, the ringer 3 and the receiver 4. The line is represented by the numerals 5 and 6 and it will be understood that when the operator calls the subscriber, an alternating current passes through the line wire 5, ringer 3 and condenser 7 to the line wire 6 in which is interposed the condenser 8. This with the exception of the condenser 8, is usual construction.

It is also understood to be old that when the receiver 4 is lifted from the line a switch in the circuit of the transmitter 2 is closed and that when the operator switches on the talking circuit which is direct current, it cannot pass the condenser 7, and therefore, travels from the line wire 5 through the transmitter circuit and back to the line wire 6.

In view of the interposition of the condenser 8 in the line wire 6, the talking current takes a circuitous path from the transmitter through connections peculiar to the instrument of the present invention returning to the line wire 6 on the opposite side of said condenser.

The wires 10 and 11 represent branches from the line wire 6 at opposite sides of the condenser 8 and when said branches 10 and 11 are closed as by the switch 12 the telephone circuit is complete just as if there was no condenser 8 and as though the device of the present invention were not present. Normally the switch 12 may be kept closed by the operation of a suitable key actuated lock, not shown. The switch may be locked open so that the condenser 8 and the other elements of the lock out must be reckoned with in considering the operation of the system.

It is obvious that with the switch 12 in open position as shown, and the condenser 8 across the gap in the line wire 6 which the branch wires 10 and 11 and the switch 12 normally serve to close, it is impossible for one lifting the receiver 4 from the hook 9, to transmit any direct current through the line. Consequently, with the switch 12 locked, in the open position as shown, it is impossible to transmit an outgoing call. The operation of the lock out therefore, concerns the selective adaptation of its parts to the transmission of the direct current bearing the incoming calls, a description of which will be the substance of the remaining part of the specification.

In carrying out the principles of the invention two electro-magnets 13 and 14 are provided, their poles confronting with an

armature 15 therebetween, and actuated alternatively by said magnets. As shown in Figure 1, the common axis of the magnets is horizontal but if desired, the instrument may be installed in a vertical or in any other position, and so the armature which is pivoted at 16 to a stationary support is counter-balanced by a weight 17 so that it is equally stable in any position and the bias of gravity may be neglected regardless of the position in which the device is mounted.

The electro-magnet 13 is associated with the ringing circuit and consequently, it is solely activated by the alternating current. The sole function of this magnet is to draw the armature 15 into the position shown in Figure 1. The sequence of electrical circuits resulting in the energization of this magnet may be traced as follows: Operator closes the ringing circuit, alternating current passes as has heretofore been explained through the line wire 5 across the condenser 7 through the line wire 6 and condenser 8 back to the source. Subscriber upon removing the receiver 4 from the hook closes the transmitter circuit, by-passing the condenser 7 so that the alternating current upon reaching the point 18 at the condenser 8 divides, part going through the condenser and thence to the source, part going through the branch wires 19, 20 and 21 through the windings of the electro-magnet 13 and by way of the branch wires 22 and 23 back to the line wire 6. The electro-magnet 13 being thus energized attracts the armature 15 drawing it to the position shown.

The armature was originally in contact with the pole of the electro-magnet 14. The latter is provided with three windings which in order to avoid confusion have been designated by the reference characters *a*, *b* and *c*. Windings *a* and *b* are wound in reverse directions as indicated by the arrows. Therefore, when windings *a* and *b* are energized at the same time, they have a choke effect upon one another and at the same time neutralize the magnet 14. Winding *c* is wound in the same direction as winding *b* and may be considered a booster winding. Winding *a* is in circuit with a pair of contacts *a'*, and winding *b* is in circuit with a pair of contacts *b'*. The booster winding *c* is in circuit with a pair of contacts *c'*.

Referring to the pairs of contacts *a'* and *b'* these are normally open when the armature 15 is in its leftward position, that is to say, when it is against the pole of the electro-magnet 14.

When the subscriber has lifted the receiver 4 and diverted a part of the alternating current of the ringing circuit through the electro-magnet 13, the armature 15 has been attracted to its right-hand position shown in Figure 1.

The end of bottom contact spring *a* has cammed upon it an inclined portion 24 of one of the pair of contacts *a'* closing the pair of contacts *a'*, and thus it closes the circuit through the winding *a*. At the same time, the end of the contact which the armature has directly engaged and which overlaps one contact of the pair of contacts *b'*, raises that contact and closes the pair of contacts *b'*. Thus the armature in its traverse from left to right position simultaneously closes the pairs of contacts *a'* and *b'* and puts the windgs *a* and *b* of the electro-magnet 14 in condition to be energized. When the operator switches from the alternating current of the ringing circuit to the direct current of the talking circuit, the direct current cannot pass the condenser 8 nor can it pass the condenser 25 associated with the electro-magnet 13. Consequently, the electro-magnet 13 is deenergized. At this time, however, the direct current passes simultaneously through the following circuits; from wire 19 through winding *a* of the electro-magnet 14, through branch wire 26, through the pair of contacts *a'*, branch wire 27, branch wire 28, and branch wire 23, back to the line wire 6.

It also at the same time traverses a circuit from the line wire 5 through the branch line 29, branch line 30 through the winding *b*, branch wire 31, pair of contacts *b'*, branch wire 32 to the line wire 6. A balancing resistance 33 may be placed in this circuit if desired in order to ensure equal distribution of the direct current through both of the windings. It is thus obvious that while the incoming call is in progress the electro-magnet 14 is deenergized and the two windings *a* and *b* have a choke effect upon one another so that none of the current of the talking circuit is used in the operation of the device. It will be understood that while current is thus flowing through the windings *a* and *b*, the electrical impulses from the distant transmitter are permitted to travel unimpeded to the receiver.

When the incoming call has been received, and the receiver has been replaced upon the hook, the transmitter circuit is broken in the usual manner and consequently, the limb of the direct current circuit which energizes the winding *a* of the electro-magnet 14 is broken, consequently the winding *a* is deenergized. However since the winding *b* receives its energy from a point in the line wire 5 in advance of the transmitter circuit, the circuit through this winding is not interrupted. The magnet 14 therefore, becomes energized and exerts an attractive effect upon the armature 15.

At this point it may be noted that the armature 15 is of duplex construction. As shown in Figure 3, it consists of two halves 34 and 35, the half 35 having a lateral arm 36, which extends behind the half 34. Thus

when the two halves of the armature were attracted by the magnet 13 in the initial stage of operation of the device, both parts must move together, but when the armature is attracted in the opposite direction by the electro-magnet 14 it is possible for the half 34 to move away from the half 35. It is noted in Figure 3 that the half 35 is longer than the half 34 and therefore, it bears the brunt of frictional engagement with the lower contact of the pair of contacts a'. Consequently, when the electro-magnet 14 is energized by the breaking of the circuit of the winding a, the short half 34 being unburdened, will be first attracted to the magnet 14. The pair of contacts c' which closes the circuit of the booster winding c has a cam end 37 with which the end of the short half 34 collides as it returns to the magnet 14, closing the pair of contacts c' so that the booster winding c now becomes energized by current passing through the branch wire 38, winding c, pair of contacts c', pair of contacts b', branch wire 39 back to the line wire 6.

The opening of the contacts b' places a gap in the circuit of the windings b and c so that the magnet 14 is entirely deenergized.

While I have in the above description endeavored to describe what I believe to be a preferred and practical form of my invention, it is to be observed that the details of construction and the precise connections as shown are immaterial to the embodiment of the principles of the invention and are therefore, to be regarded as merely by way of example and not as limiting the scope of the invention as claimed.

What I claim as my invention is:

1. Lock out for telephone systems comprising means for producing a gap in the line circuit in series with the gap produced at the hook switch in the telephone instrument, and an armature actuated by the ringing circuit for closing a shunt circuit around first mentioned gap, a magnet for returning said armature, said shunt circuit including branches reversely wound upon said magnet so as to be energized in bucking relation during the period of incoming speech, preventing return of said armature, said hook switch being in one of said branches whereby when the transmitter circuit is opened by the placing of the telephone receiver upon the hook, one of said branch circuits is opened permitting the other to energize said magnet for returning said armature.

2. Lock out for telephone systems comprising means for producing a gap in the line circuit in series with the gap produced at the hook switch in the telephone instrument, and an armature actuated by the ringing circuit for closing a shunt circuit about said first mentioned gap, said shunt circuit including said hook switch, an electro-magnet for returning said armature to normal position, said shunt circuit including parallel branches reversely wound upon said magnet and being simultaneously energized when direct current is passing through the transmitter circuit of the telephone instrument, neutralizing the magnetism of said return magnet during the period of incoming speech, said branch circuits emanating from said line circuit on opposite sides of a condenser whereby, when said transmitter circuit is opened by the placing of the telephone receiver upon the hook, one of said branch circuits is blocked by said condenser permitting energization of said magnet by the other branch circuit for returning said armature to normal position and opening said line circuit.

3. Lock out for telephone systems as claimed in claim 2, in which the branch circuit on the source side of said condenser is in series with a resistance, said electro-magnet being provided with a booster winding by-passing said resistance, said armature being in two parts responding successively to the stages of magnetism in said electro-magnet produced successively, by said branch circuit and by said branch circuit enforced by said booster circuit, the part of said armature first attracted engaging a switch for closing said booster circuit.

4. Lock out for telephone systems as claimed in claim 2, the parts of said armature being weighted so as to be in a state of indifferent equilibrium.

5. Lock out for telephone systems comprising means for producing a gap in the line circuit in series with the gap produced by the hook switch in the telephone instrument, an armature, an electro-magnet energized by the ringing circuit, a shunt circuit about said first mentioned gap, said shunt circuit including said hook switch, an electro-magnet on the opposite side of said armature for returning the latter to normal position, said shunt circuit including parallel branches reversely wound upon said magnet and including switches simultaneously closed by said armature when attracted by said first named electro-magnet, said branch circuits being simultaneously energized when direct current is passing through the transmitter circuit for neutralizing the magnetism of said electro-magnet during the period of incoming speech, said branch circuits emanating from said line circuit on opposite sides of a condenser, whereby when said transmitter circuit is broken by the return of the telephone receiver to the hook, the passage of direct current through one of said branch circuits is blocked by said condenser permitting the energization of the second mentioned electro-magnet by the other branch circuit, said last named branch circuit including a resistance, and a booster circuit including a winding on said electro-magnet by-passing said resistance and including a switch actuated by said ar-

mature, the latter being constructed in two parts attracted to said second mentioned electro-magnet successively by the stages of magnetism of said electro-magnet successively produced by said last mentioned branch circuit and by said branch circuit re-inforced by said booster circuit, the part first attracted closing the switch which closes said booster circuit and the part last attracted opening the switches which it controls, deenergizing both of the active windings of said electro-magnet.

In testimony whereof I affix my signature.

CHARLES V. RICHEY.