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SECRECY SYSTEM

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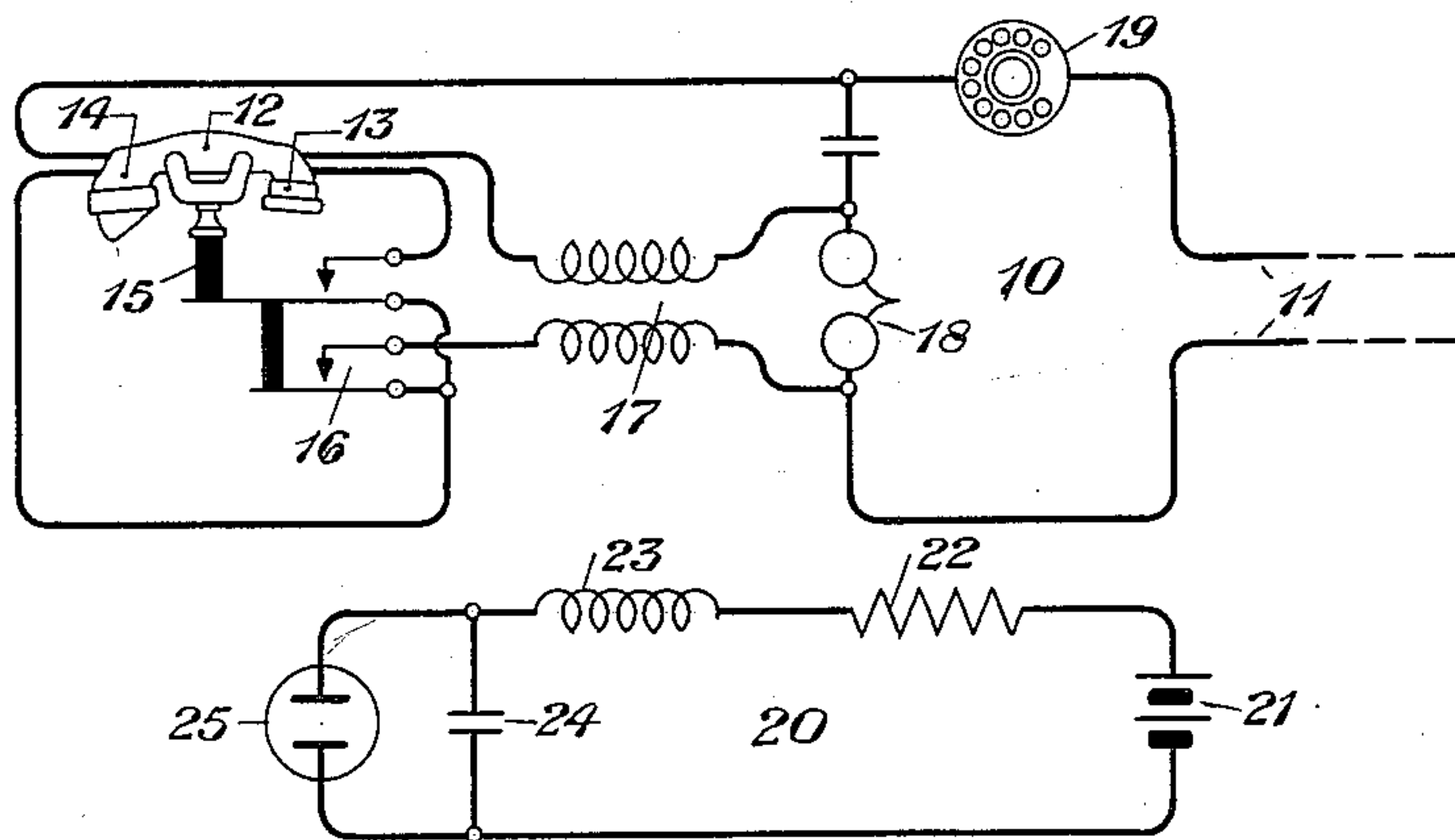


Fig. 1

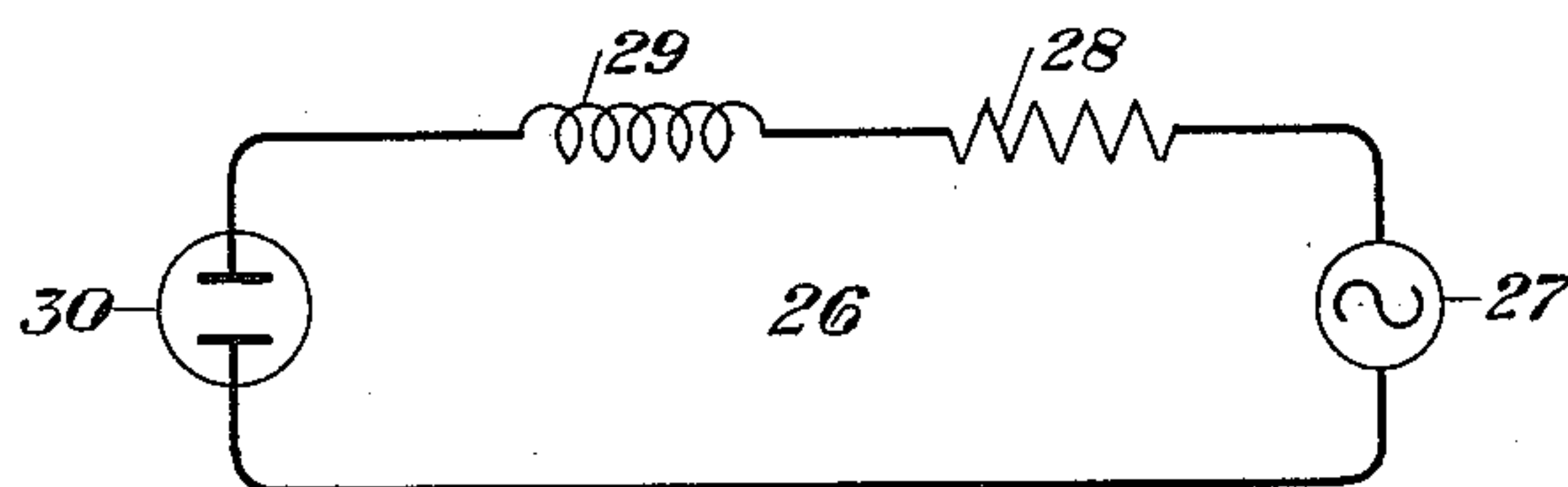


Fig. 2

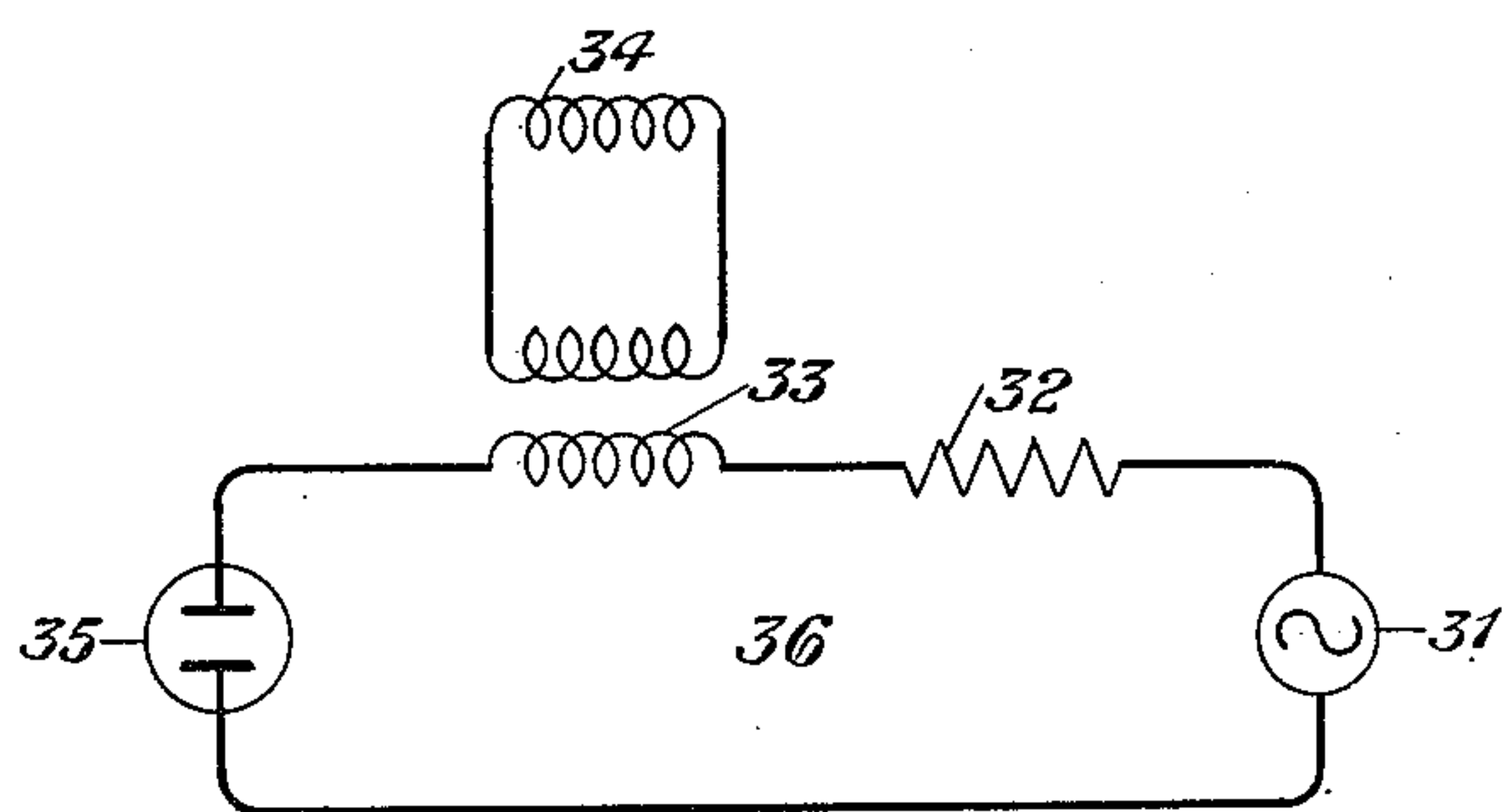


Fig. 3

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SECURITY SYSTEM

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7 Claims. (Cl. 179—1.5)

This invention relates to signaling systems and more particularly to a method of and apparatus for preventing the messages transmitted over such systems from being intercepted by persons not authorized to have access to such messages.

Certain types of signaling apparatus may, incidentally to producing signals for transmission over the system, set up signal fields in the vicinity of the apparatus and so make possible the unauthorized pick-up of signals from these fields, even though no physical connection with the line or other medium of transmission is established. For example, certain types of telephone subscribers' sets include an induction coil through which voice currents pass during the transmission thereto and from the respective receiver and transmitter embodied therein. As a consequence a magnetic field is set up in the vicinity of the induction coil. Under certain circumstances such a magnetic field may be utilized by unauthorized persons to listen in on the conversations of a telephone subscriber.

The general object of the invention is to provide for secrecy in the operation of signaling systems. A further object of the invention is to provide for secrecy in the operation of signaling systems which include apparatus which sets up an incidental signal field in its vicinity. A further object is to provide means for preventing unauthorized persons from listening in on telephone conversations.

The objectives of the invention are accomplished by providing apparatus for creating in the vicinity of the signaling apparatus, a masking noise field. When the unauthorized person attempts to pick up the message he will of necessity pick up the created noise as well and this will render the message unintelligible. The arrangements of the invention have the advantage that, due to the fact that the created noise field will have substantially no effect on the transmitted message currents, there will be no need for any counterpart or compensating apparatus at other points in the system.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1, 2 and 3 of which the invention is illustrated. Fig. 1 illustrates one form of the invention. Figs. 2 and 3 show modifications of a portion of Fig. 1.

Referring to Fig. 1, a telephone subscriber's set 10 including leads 11 connected to a signaling transmission line, not shown, comprises a unitary handset 12 including a receiver 13 and a transmitter 14. The handset is mounted on a standard 15 which controls a switch 16 and thereby transmission of voice currents through an induction coil 17. Across the latter is disposed a ringer 18. A dial 19 may also be embodied in the subscriber's set. The operation of such an

arrangement is well understood, although specific mention is now made that the transmission of voice currents through the induction coil or other parts of the subscriber's set causes the production of a magnetic field in the vicinity thereof. Such a magnetic field may be utilized under some circumstances by unauthorized persons to listen in on conversations taking place through the subscriber's set. Placed in general proximity to the subscriber's set is a noise field generating device 20. This comprises a battery 21 in circuit with a resistance 22, a coil 23 and an ionic tube 25. Across the circuit is bridged a condenser 24. Voltage from battery 21 will build up across resistance 22 and across condenser 24 until the breakdown voltage of tube 25 is reached. At this point the tube will break down and complete the circuit and cause current to flow through coil 23. The voltage will then fall below the sustaining voltage of tube 25 and cause the tube to cease discharging. This will abruptly change the current flow in the circuit and cause an oscillation of current in the circuit 21, 22, 23 and 24. This oscillation will in a small time die out. The foregoing sequence of events will then be repeated. This will result in succeeding impulses of oscillating current through the coil 23. This flow of current through coil 23 will set up a magnetic or noise field in the vicinity of the subscriber's set. In other words, a noise magnetic field will be superimposed on the voice magnetic field of the subscriber's set. The result will be that the unauthorized pick-up device will pick up both noise and speech currents, but the magnitude of the noise will predominate to such an extent as to mask completely whatever speech may also be present. Consequently, the unauthorized picked-up speech is rendered unintelligible by the noise and the unauthorized interception of speech from the subscriber's set is defeated.

In Fig. 2 is shown an alternative form of noise generator 26 which may be used in place of noise generator 20 when a source of alternating current is available. The noise generator 26 comprises a circuit including a source 27 of alternating current, a resistance 28, a coil 29 and an ionic tube 30. Voltage from the source 27 will during the first half-cycle build up across resistance 28 until the breakdown voltage of ionic tube 30 is reached. This will complete the circuit and cause current to flow through coil 29. The voltage will then fall below the sustaining voltage of the tube and cause it to cease functioning. This will interrupt the current flow through coil 29. The same sequence of events will occur each half-cycle with the result that an irregular pulsating current flow will take place through coil 29. This will superimpose an irregular noise magnetic field on the magnetic

speech field set up by the induction coil 17 or other apparatus of the subscriber's set.

In Fig. 3 is another alternative form of noise generator 36 which may be used in place of noise generator 20. It comprises a circuit including a source of alternating current 31, a resistance 32, a coil 33 and an ionic tube 35. This portion is identical with that shown in Fig. 2. It also includes a second coil 34 inductively related to coil 33. The coils 33 and 34 may be placed in a position with respect to each other so that their axes are not in the same plane so as to create a multi-dimensional magnetic noise field which is superimposed on the speech magnetic field. This means that the unauthorized pick-up device will pick up both the noise and speech currents regardless of its orientation relative to the induction coil.

While the arrangements of the invention have been disclosed as embodied in certain specific forms which are deemed desirable, it is understood that they are capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. The method of preventing unauthorized inductive pick-up of signals substantially adjacent to apparatus producing a signal magnetic field, which comprises producing a noise magnetic field substantially adjacent to said apparatus, said noise magnetic field when superimposed on said signal magnetic field being of such small intensity with respect to the intensity of said signal magnetic field that it will not interfere with the signals in said apparatus, said noise magnetic field when superimposed on the field of an unauthorized pick-up device substantially adjacent to said apparatus being of such large intensity with respect to the intensity of said signal magnetic field superimposed on the field of the unauthorized pick-up device that it will prevent the unauthorized pick-up of such signals.

2. The method of preventing unauthorized pick-up of signals substantially adjacent to apparatus producing a signal magnetic field, which comprises producing a multi-dimensional noise magnetic field substantially adjacent to said apparatus, said noise magnetic field when superimposed on said signal magnetic field being of such small intensity with respect to the intensity of said signal magnetic field that it will not interfere with the signals in said apparatus, said noise magnetic field when superimposed on the field of an unauthorized pick-up device substantially adjacent to said apparatus being of such large intensity with respect to the intensity of said signal magnetic field superimposed on the field of the unauthorized pick-up device that it will prevent the unauthorized pick-up of such signals.

3. In combination, signaling apparatus producing a signal magnetic field and means substantially adjacent to said apparatus to superimpose a noise magnetic field on said signal magnetic field, said last-mentioned means including a generator for producing currents having frequencies at least coextensive with those produced by said signaling apparatus, said noise magnetic field when superimposed on said signal magnetic field being of such small intensity with respect to the intensity of said signal mag-

netic field that it will not interfere with the signals in said apparatus, said noise magnetic field when superimposed on the field of an unauthorized pick-up device substantially adjacent to said apparatus being of such large intensity with respect to the intensity of said signal magnetic field superimposed on the field of the unauthorized pick-up device that it will prevent the unauthorized pick-up of such signals.

4. In combination, signaling apparatus producing a signal magnetic field, and means to superimpose a multi-dimensional noise magnetic field on said signal magnetic field, said noise magnetic field when superimposed on said signal magnetic field being of such small intensity with respect to the intensity of said signal magnetic field that it will not interfere with the signals in said apparatus, said noise magnetic field when superimposed on the field of an unauthorized pick-up device substantially adjacent to said apparatus being of such large intensity with respect to the intensity of said signal magnetic field superimposed on the field of the unauthorized pick-up device that it will prevent the unauthorized pick-up of such signals.

5. A subscriber's telephone set including apparatus which in response to speech will produce a signal magnetic field, and a generating device located substantially adjacent to said apparatus, said device including a coil through which noise currents having frequencies at least coextensive with those of speech currents are passed whereby a magnetic field of such small intensity that it will not interfere with the signals in said subscriber's set will be superimposed on said signal magnetic field, and the unauthorized inductive pick-up of signals substantially adjacent to said subscriber's set will be prevented.

6. A subscriber's telephone set including apparatus which in response to speech will produce a signal magnetic field, and a generating device located substantially adjacent to said apparatus, said device comprising a circuit including a source of current, a resistance, a coil and an ionic tube so arranged that said tube will function intermittently whereby an irregular oscillating current having frequencies at least coextensive with those of speech currents will be transmitted through said coil and a magnetic field of such small intensity that it will not interfere with the signals in said subscriber's set will be superimposed on said signal magnetic field and the unauthorized inductive pick-up of signals substantially adjacent to said subscriber's set will be prevented.

7. A subscriber's telephone set including apparatus which in response to speech will produce a signal magnetic field, and a generating device located substantially adjacent to said apparatus, said device comprising a plurality of coils through which noise currents having frequencies at least coextensive with those of speech currents are passed, said coils having their axes disposed in different planes whereby a multi-dimensional noise magnetic field of such small intensity that it will not interfere with the signals in said subscriber's set will be superimposed on said signal magnetic field and the unauthorized inductive pick-up of signals substantially adjacent to said subscriber's set will be prevented.

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