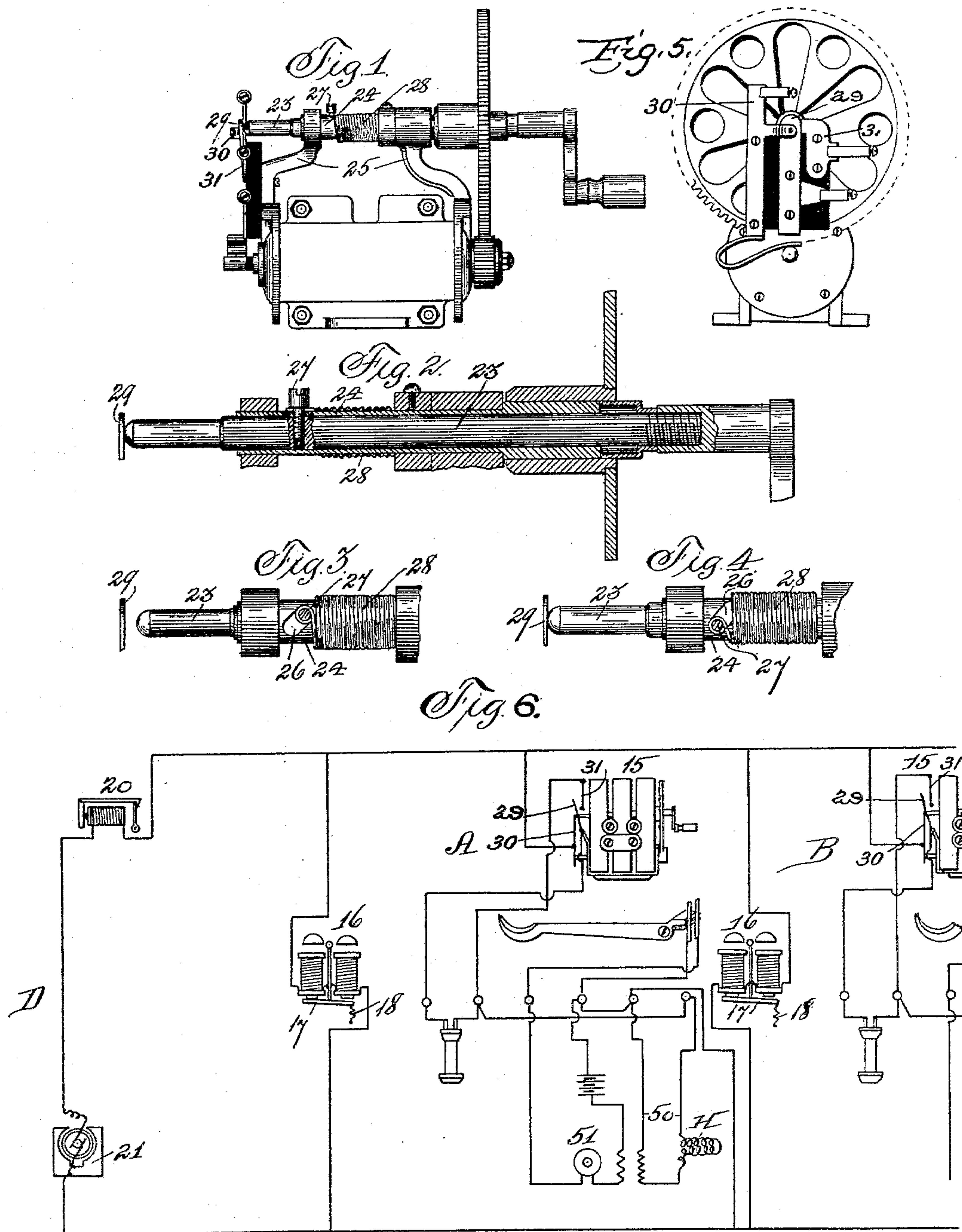


(No Model.)

F. B. COOK.
APPARATUS FOR TELEPHONES.

No. 596,806.

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APPARATUS FOR TELEPHONES.

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To all whom it may concern:

Be it known that I, FRANK B. COOK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in an Apparatus for Telephones, of which the following is a specification.

My invention relates to certain improvements in those appliances used in telephone systems, and more particularly to magneto signaling apparatus and appliances and circuits connected therewith.

It is well known that the magneto-bell apparatus which is now most generally used for subscribers' stations requires that the switch which is operated by the hand-telephone be in its normally-depressed position, thus cutting out the telephone before a signal can be received from or a call sent to other stations; also, that all bells on a circuit ring when a call is being sent over that circuit.

My invention has for its object, first, the provision of means whereby each subscriber is required to extend a call to any other subscriber through the intervention of an operator at the central office, thereby invariably affording an opportunity for recording the connection given to the subscriber and preventing surreptitious communications between subscribers on the same circuit or two different circuits which may be temporarily connected together forming one circuit; also, to avoid the inconvenience resulting from one subscriber signaling another when desiring only to call central office.

A further object is to provide means whereby a signal may be received or a call sent from any station on a line, even should one of the subscribers on that line have the telephone removed from the hook and in circuit.

My invention has certain other objects in view; and it consists in certain features about to be described, and pointed out in my claims, reference being now had to the accompanying drawings, in which—

Figure 1 is a side view of a calling or signaling generator embodying my improvement whereby to prevent the extension of a call or signal except through the central switch-board, the permanent field-magnets being removed. Fig. 2 is an enlarged detail view of

the generator-shaft, the surrounding parts being shown in section. Fig. 3 is an enlarged detail plan view of a portion of the generator-shaft and conjunctive parts, showing the position assumed when the short circuit about the generator is broken and the line-circuit established. Fig. 4 is a like view showing said short circuit established. Fig. 5 is an end view of the generator and other parts shown in Fig. 1. Fig. 6 is a diagrammatic view of the circuit connections and arrangement employed to carry out my invention whereby to prevent surreptitious interchange of communication between subscribers on the same circuit.

In what are known as "party-circuits" the apparatus of several subscribers is connected to one circuit, and when each subscriber is required to pay for service in accordance with the actual number of calls extended to and communication had with other subscribers it becomes necessary to provide means whereby one subscriber can extend a call to another subscriber only through the intervention of the operator at the central office where the call may be recorded.

It is often the case in ordinary systems not confined to party-circuits that when two subscribers have completed their conversation and one subscriber has hung up his receiver and left the telephone it is frequently the case that the other subscriber desires to immediately call the central office and obtain another connection. Under these circumstances it oftentimes occurs that the operator having failed to disconnect the lines of these subscribers the call of the subscriber to the central office is extended to the same subscriber with whom conversation has been completed, ringing the bell of that subscriber, who returns to the apparatus only to find that the call was not intended for that station, but for the central office. So, also, the operator often misunderstands the number desired or otherwise makes mistakes and calls the wrong subscriber, and when this error is discovered the subscriber extending the call of course desired to call the operator at the central station and obtain the proper connection. Under such circumstances the same trouble and annoyance arise, as previously explained, if

the operator has failed to disconnect the two subscribers' lines previously connected.

In my invention, which consists in the provision of certain character of apparatus and in circuit arrangement about to be described, I overcome the annoyance and deficiency of service which arises by reason of the above conditions.

I provide at each subscriber's station (designated at A and B in Fig. 6) a calling-generator 15 of the ordinary type capable of generating intermittent-current impulses, which pass out upon the line and traverse or circulate in the coils of the signal-bells 16 of the subscribers in one direction only, thus polarizing the magnets of all of said bells of the same polarity, and as all of the polarized armatures 17 of the bells 16 are normally held by a spring 18 against one of said magnets the relative polarity of the magnets of the bells and the armatures is such as to produce no effect in ringing the bells by the circulation of the current in that one given direction in the coils of the bell-magnets. I also provide at the central station D an annunciator 20, which is actuated by the current from the subscribers' generators, and a central-station generator 21 capable of generating a current which passes over the line and through the coils of the subscribers' bells in a direction opposite to that of the current from the subscribers' generators, or I may provide an alternating-current generator, in either of which cases the subscribers' bells may be sounded from the central station. I thus provide means whereby the central office only can signal the subscriber, the subscribers' bells relatively to each other being unresponsive to the current from the subscribers' generators, thus avoiding the annoyance arising from a subscriber again calling one with whom conversation has just been completed.

In the party-circuit arrangement previously generally outlined surreptitious communication could be obtained were it possible to generate and send out upon the line a current opposite in direction to that generated when the crank of the generator is rotated forwardly in the usual manner, for whereas in the ordinary forward rotation of the crank a calling-current is sent over the line to which the bells of the subscribers do not respond if the crank were rotated backwardly in an unusual manner a current would be generated to which the bell or bells of the subscribers would respond, or should the crank be turned back and forth or oscillated a signal could be extended directly from one subscriber to another, and perhaps without the knowledge and intervention of the operator at the central station, who could not record the call. In order to overcome this objectionable feature, I provide the construction shown in Figs. 1 to 5, inclusive, which relates to certain structural arrangements whereby the generator-circuit remains short-circuited or

shunted except when the crank thereof is rotated forwardly in the usual and proper manner.

In Figs. 1 and 5 is shown my automatic shunt-switch, which consists of the spring-contact strips 29 and 30 and the contact-piece 31, all of which are mounted upon an insulating-block, which block is attached to the generator-frame. The lower end of spring 30 rests upon the insulated end of the generator-armature, to which one end of the windings thereof is connected in the manner usual for straight-current generators and the other end of the windings connected to the frame in the customary way. The screws which serve to secure spring-contact strip 29 to the insulating-block extend through the block and into the frame of the generator, thereby connecting the frame with said strip. The spring 29 alternately makes contact with the spring 30 and contact-piece 31, the latter contact being made by the resiliency in the free end of spring 29, and is only used to shunt the generator-current around the telephone. To insure a reliable contact between the springs 29 and 30, which, besides serving as a shunt for the generator, is a vital contact for the talking-circuit, I employ a laterally-movable crank-shaft 23, which is mounted within a stationary sleeve 24, held by the standards 25 from the generator-frame. Within the sleeve 24 is a diagonally-extended slot 26, through which slot projects a stud 27, fixed on the crank-shaft, a spiral spring 28 engaging said stud 27 and holding it normally in the position shown in Fig. 4 at one extreme end of the slot 26, and also holding the shaft 23, so that its end opposite the crank is engaged against the contact-spring 29, which spring is by the pressure of the shaft forced into good contact with the contact-spring 30, thereby closing the branch circuit between the hand-telephone and line, (diagrammatically shown in Fig. 6,) and also closing the shunt-circuit of the generator, thus cutting it out. The shaft is geared to the armature with cog-wheels in the regular way, and when the crank thereof is rotated forwardly in the usual and customary manner the stud 27, traveling with the diagonal slot 26, moves the crank-shaft 23 in the direction of the arrow, thus moving the shaft away from its engagement against the spring 29, which spring by its resiliency moves out of contact with the contact-spring 30, opening the generator-shunt and allowing the current from the insulated end of the generator-armature to pass direct to line by means of the spring 30 and from the other end by means of the spring 29 and piece 31, the parts being then in the position shown in Fig. 3.

It is now evident that if the crank of the generator is released the spring 28 shifts the crank-shaft laterally against the spring-contact strip 29, forcing said spring away from contact-piece 31, opening the telephone shunt-circuit, and into contact with spring-contact

30, closing the circuit of the generator-shunt, and if the crank is rotated backward it is manifest that the only result is to cause the generator-current to pass around through the shunt and not out upon the line; also, should the crank be oscillated back and forth no result other than to call central office will be produced. As this spring 28 is secured at one end to stationary sleeve 24 and at the other end to the stud 27, projected above the diagonal slot 26, it makes and preserves a superior contact between the springs 29 and 30. This is accomplished because the spring 28 not only exerts a direct lateral thrust or pressure to return the stud to its normal position, but also exerts a torsional pull thereon, and these two pressures combine to produce and maintain the superior contact mentioned; also, by reason of the attachment of the spring to the stud the spring is wound up by the movement of the stud.

By referring to Fig. 6 it will be observed that at each subscriber's station the signal-bell 16, which bell is necessarily of relative high resistance, is permanently bridged across the circuit in parallel with another bridging-circuit normally open, comprising the generator, hand-telephone, and secondary circuit of the transmitter induction-coil. It will also be observed that provision is made whereby the resistance of the generator is normally not included in the circuit, and as is well known the joint resistance of the telephone and coil aforesaid is relatively low it is evident that if some provision be not made for increasing the total resistance of this second bridging-circuit under certain conditions it would be impossible to extend a call. Such a condition would arise should a near subscriber on a party-line circuit fail to hang up the telephone and open the circuit, and should the central office undertake to ring a distant subscriber on the same circuit a large portion of the calling-current would be shunted through the low-resistance bridging telephone connections at the first subscriber's station and the signal-bell would not respond. In order to overcome this difficulty, I provide an interposed resistance (shown at H) in the secondary circuit 50 of the transmitter 51. This interposed artificial resistance may be an ordinary resistance-coil of, say, five thousand ohms resistance, which will prevent the shunting of such a large portion of the calling-current and the signal-bell will respond. The coil being differentially wound—that is, wound with two wires of the same size and length connected together at the inner end and lying together throughout their length—does not interfere with conversation to any noticeable degree. I am aware that to some this additional resistance in the talking-circuit would appear very detrimental, but in practice it is impossible to detect with the telephone whether such a coil is in the circuit or not. Another way of accomplishing a similar result, only the generator is changed from a

normally-shunted to a normally-open generator, consists in insulating the spring 29 from the frame of the generator and in its place making a permanent connection between contact 31 and the generator-frame and discontinuing the telephone-shunt. This will change the armature-circuit from a normally-shunted to a normally-open armature-circuit. Therefore I do not wish to be understood as limiting all my claims to the normally-shunted generator-armature.

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

1. In a telephone system, two connected subscribers, a central office, means for preventing the calling of one subscriber when the other subscriber rings off, consisting of calling-generators at each subscriber's station and signal-bells for each subscriber's station unresponsive to the current from the calling-generator of the other subscriber, substantially as described.

2. In a telephone system in which a plurality of subscribers are connected in one circuit, a central switchboard, means for preventing a false signal consisting of calling-generators at each subscriber's station, signal-bells for each subscriber's station, unresponsive to the current from the calling-generators of the subscribers, signaling devices at the central switchboard operated by the current from the subscribers' generators and a central-switchboard generator to the current from which the signal-bells of the subscribers are responsive.

3. In a telephone system in which a plurality of subscribers are connected in one circuit, a central switchboard, means for preventing a false signal consisting of calling-generators at each subscriber's station, capable of generating a straight current, signal-bells for each subscriber's station unresponsive to the current from the calling-generators of the subscribers, signaling devices at the central switchboard operated by the current from the subscribers' generators and a central-switchboard generator to the current from which the signal-bells of the subscribers are responsive.

4. In a telephone system, in which a plurality of subscribers are connected in one circuit, terminating at a central switchboard, means for preventing surreptitious intercommunication between two or more subscribers, consisting of calling-generators for each subscriber's station, a shunt about each of said calling-generators, means operated by the crank of the generator to open the shunt-circuit and include the generator in circuit with the line, signal-bells for each subscriber's station unresponsive to the current from the subscribers' generators, when the crank of the subscriber's generator is actuated in the ordinary manner, means for maintaining the shunt-circuit about the subscriber's generator closed when the generator-crank is actuated abnormally, whereby no current passes out upon the line, signaling devices at the central

switchboard operated by a current from the subscriber's generator and a central-station generator to the current from which the bells of the subscribers are responsive.

5 5. In a telephone system, in which a plurality of subscribers are connected in one circuit, terminating at a central switchboard, means for preventing surreptitious intercommunication between two or more subscribers,
10 ers, consisting of calling-generators for each subscriber's station, capable of generating straight currents, a shunt about each of said calling-generators, means operated by the crank of the generator to open the shunt-circuit and include the generator in circuit with
15 the line, signal-bells for each subscriber's station unresponsive to the current from the subscribers' generators, when the crank of the subscriber's generator is actuated in the ordinary manner, means for maintaining the shunt-circuit about the subscriber's generator closed when the generator-crank is actuated abnormally whereby no current passes out upon the line, signaling devices at the central switchboard operated by a current from
20 the subscriber's generator and a central-station generator to the current from which the bells of the subscribers are responsive.

6. In a calling-generator the combination
30 with the shaft, of a sleeve thereon having a diagonal slot therein, a stud on the shaft projected through the slot and a spiral spring coiled about the sleeve, secured at one end to the sleeve and at the other end to the end of the stud projected above the sleeve whereby
35 a combined lateral and torsional spring-pressure is obtained.

7. In a telephone system in which a plurality of subscribers are connected in one circuit, terminating at a central switchboard,
40 means for preventing surreptitious intercommunication between two or more subscribers, comprising calling-generators for each subscriber's station capable of generating straight currents, a shunt about each of said
45 generators, signal-indicators for each subscriber's station non-responsive to the current from the subscribers' generators, signaling devices at the central switchboard operated

by a current from the subscribers' generators. 50
a central-station generator to the current from which the signals of the subscribers are responsive and means for imparting to the crank-shaft a lateral movement to open the shunt-circuit when the crank-shaft is rotated
55 forward and to prevent such lateral movement when the shaft is rotated in an opposite direction.

8. In a telephone system, in which a plurality of subscribers are connected in one circuit, terminating at a central switchboard, means for preventing surreptitious intercommunication between two or more subscribers,
60 ers, comprising calling-generators for each subscriber's station capable of generating straight currents, a shunt about each of said generators, signal-indicators for each subscriber's station non-responsive to the current from subscribers' generators, signaling devices at the central switchboard operated by
70 a current from the subscribers' generators, a central-station generator to the current from which the signals of the subscribers are responsive and a laterally-movable crank-shaft, together with a spring acting on said shaft to
75 normally maintain the shunt-circuit closed, a sleeve having a diagonal slot therein and an abutment from the crank-shaft traveling within the diagonal slot.

9. Telephone apparatus consisting of a high-resistance signal-bell, a telephone set in parallel therewith, the telephone-circuit being open when the receiver is on the hook and a non-inductive resistance-coil interposed in the secondary circuit of the telephone which
85 is closed when the telephone is off the hook, whereby the signal-bell is not shunted by the telephone-circuit but will respond to a signal while the telephone is off the hook and the voice-currents will be undiminished by the
90 non-inductive resistance.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK B. COOK.

Witnesses:

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