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R. HAMILTON.

TELEPHONE SYSTEM.

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NO MODEL.

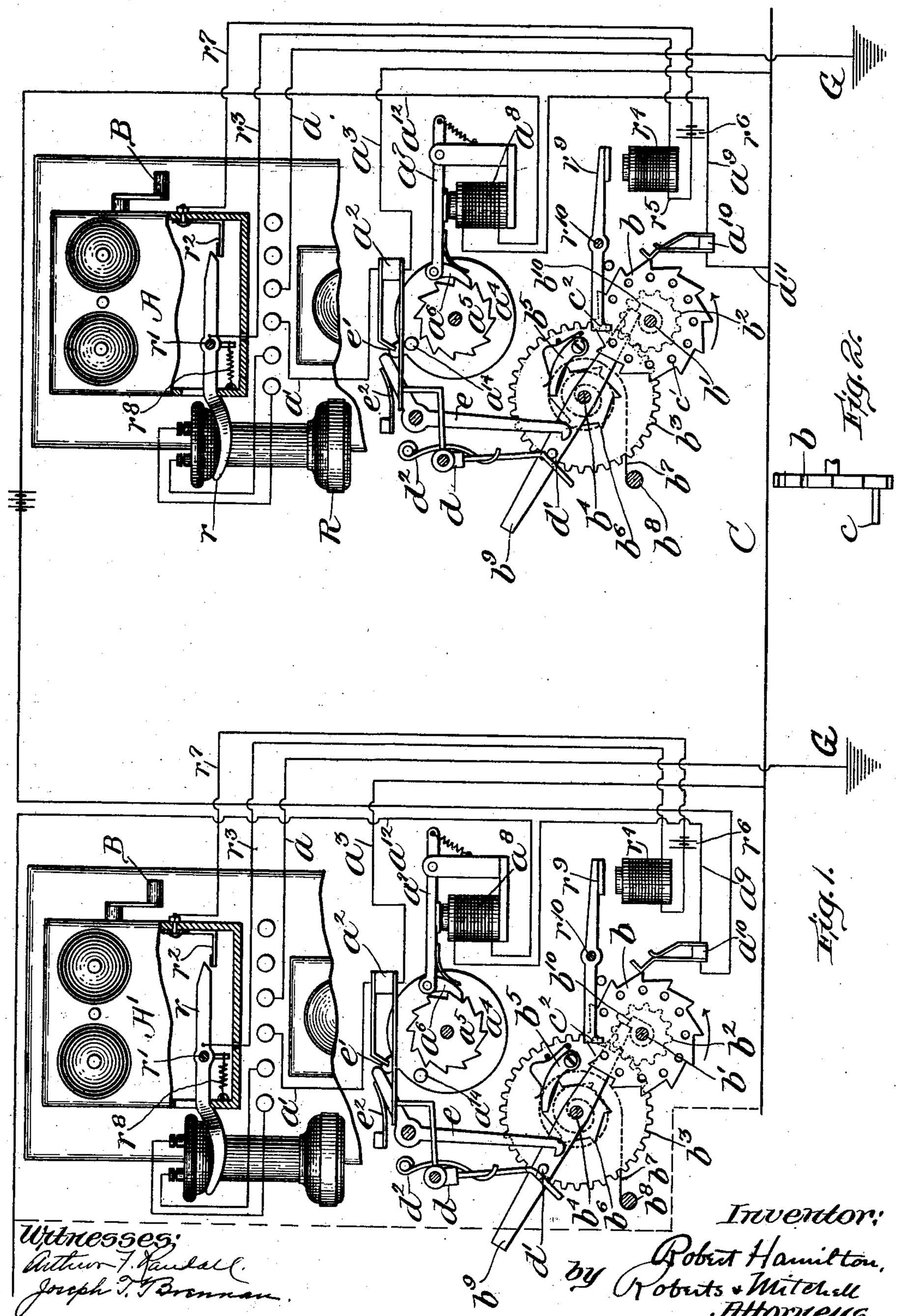

Fig. 1.

Fig. 2.

Witnesses:
Arthur J. Randall.
Joseph T. Brennan.

Inventor:
Robert Hamilton,
by Roberts & Mitchell
Attorneys.

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UNITED STATES PATENT OFFICE.

ROBERT HAMILTON, OF MILTON, MASSACHUSETTS.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 755,868, dated March 29, 1904.

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To all whom it may concern:

Be it known that I, ROBERT HAMILTON, a citizen of the United States, and a resident of Milton, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephone systems, and particularly to that class commonly called "party-line" systems, wherein a group of telephone instruments is included any one of which may be used to call up any of the others and when the call is responded to by the instrument at the station called the remainder of the instruments are excluded from using the system, thus insuring privacy of conversation and non-interference with or interruption of the persons talking. In the Patent No. 664,757, granted to U. S. Jackson December 25, 1900, a system of this class is shown and described, and in Patent No. 673,796, dated May 7, 1901, and granted to U. S. Jackson, is shown and described an instrument for use in systems of this class.

In operating telephone systems of the character described in No. 664,757 the operator at the calling-station is required to depress and to hold depressed for a time a push-button to call up another station. The depression of the push-button sets in motion a pointer which traverses a numbered dial, and when the pointer is opposite the number of the station which it is desired to call it indicates that that station is connected with the calling-station. Thereupon the operator at the calling-station releases the push-button and rings the bell of his instrument. The same operation which connects the calling and the called stations excludes all the other instruments on the line from the use of the same and locks them in such a manner that they cannot break into the talking-circuit in use nor be operated at all. After completing conversation the system is again returned to the normal condition by again depressing the push-button at the calling-station and holding it depressed until the pointer returns to its normal position at zero, when all the other instruments on the system will be unlocked and reset at zero and prepared for use in the manner above set forth. Reference is made to said Patent No. 664,757 for a more detailed description of this system. If, however, the operator at the calling-station neglects to depress the push-button after using his telephone for the purpose of returning the system to its normal condition, the system remains inoperative so far as use by any other than the calling and the called stations is concerned, and the other stations continue to be excluded from use of the system until the push-button at said calling-station is depressed a second time to return its pointer to zero.

In operating the instrument of Patent No. 673,796 the station to be called is selected at the calling-station by inserting a stop-pin in one of a circular row of numbered holes, which will bring the stop-pin in the path of a stop-engaging finger carried by a spring-actuated disk. Said disk is normally locked stationary by a movable bolt. Upon disengaging the bolt from the disk the latter is free to rotate until its finger engages the stop-pin, which indicates that the calling and called stations are connected. In order to return the system to its normal condition after use, the operator must remove the stop-pin from the path of the finger; otherwise the other instruments of the system will be excluded from use thereof.

The primary object of my invention is to prevent the possibility of telephone systems of this character being rendered practically inoperative in the manner above described and to provide a system which will be automatically returned to its normal condition when the receiver at the calling-station is returned by the user to its hook or other support. I am thus enabled to dispense with the necessity of a separate operation by the user at the calling-station, the omission of which in the existing systems, either through inadvertence or design, entails such serious consequences.

My invention resides in the combination in a telephone system of a telephone-circuit, a receiver, a movable holder for the receiver, means for controlling said circuit comprising a rotatable wheel, a stop-engaging member

adjustably fixed to the wheel, a stop movable into and out of the path of said member, and means controlled by the receiver-holder for operating the stop to disengage it from the stop-engaging member and free the wheel when the receiver is returned to its holder after use, so that the wheel will return to its normal position.

In the preferred form of my invention the stop is carried by the armature of a magnet arranged in a circuit in which is also arranged a switch adapted to be closed by the holder when the receiver is replaced thereon.

In the accompanying drawings, which illustrate one embodiment of my invention, Figure 1 is a diagrammatical view of a telephone system of the character above referred to containing my invention, and Fig. 2 is a detail hereinafter described.

Referring to the drawings, A represents a telephone instrument located at one station, and A′ a telephone instrument located at another station. Other stations and instruments may be included in the system, if desired; but two stations are sufficient to explain my invention.

The instrument A is connected by a wire a with the ground at G and by a wire a' with one contact member of a normally open switch a^2, the other contact member of said switch being connected by a wire a^3 with a wire C common to all of the instruments of the system. The instrument A′, as well as all of the other instruments of the system, is connected with the ground G and wire C in like manner and, like instrument A, is provided with a switch a^2.

Adjacent to each switch a^2 is arranged a disk a^4, fixed to an arbor on which is also fixed a ratchet-wheel a^5, engaged by a pawl a^6, carried by an armature a^7. The armature a^7 is operated by a magnet a^8. One end of the coil of magnet a^8 is connected by a wire a^9 with one contact member of a normally closed switch a^{10}, and the other contact member of switch a^{10} is connected by a wire a^{11} with the wire C. The other end of the coil-magnet a^8 is connected by a wire a^{12} with one contact member of the switch a^{10} of instrument A′, and the other contact member of the switch a^{10} of instrument A′ is connected by a wire a^9 with one end of the coil of the magnet a^8 of that instrument. The other end of the coil of the magnet a^8 of instrument A′ is connected by a wire a^{12} with the switch a^{10} of the next instrument of the system in the same manner as the magnet a^8 of instrument A is connected with the switch of instrument A′, and the magnet a^8 of the last instrument of the system is connected by its wire a^{12} with the wire C, as indicated by dotted lines in Fig. 1.

Each switch a^{10} is operated by a toothed wheel b, fixed to an arbor b', on which is also fixed a pinion b^2, driven by a gear b^3, loose on an arbor b^4. Mounted on gear b^3 is a pawl b^5, engaged by a ratchet-wheel b^6, fixed to arbor b^4. Power is applied to arbor b^4 through a spring b^7, fixed at one end to said arbor and anchored at its other end to a fixed stud b^8. Fixed to the arbor b^4 is a lever b^9, by means of which said arbor and ratchet may be turned in one direction relatively to gear b^3 and pawl b^5 to wind up spring b^7, and when moved in this direction and then released spring b^7 tends to return said lever b^9 to its original position. The return movement of the spring transmitted through pawl b^5, arbor b^4, and gear b^3 rotates wheel b in the direction indicated by the arrow. Thus it will be observed that if any wheel b be permitted to make a complete revolution the switch a^{10} will be opened and closed twelve times, once for each notch in wheel b, and that as all of the magnets a^8 are in the same circuit with the switches a^{10} they will all be caused to operate their armatures a^7 twelve times and each disk a^4 will make a complete revolution. It will be observed also that if any wheel b be permitted to rotate to the extent of one notch only all of the magnets a^8 will operate their armatures a^7 once and all of the disks a^4 will be moved one-twelfth of a revolution, or one step. Each disk a^4 carries a laterally-projecting pin or stud a^{14} for operating switch a^2, and the pin a^{14} of instrument A, which may be regarded as station No. 1 of the system, is normally separated from its switch a^2 one step, while the pin a^{14} of instrument A′, which may be regarded as station No. 2 of the system, is normally separated from its switch a^2 two steps. The pin a^{14} of the next instrument of the system (No. 3, not shown) is separated from its switch a^2 three steps, and thus throughout the system. Therefore when the magnets a^8 are caused to operate their armatures once only the pin a^{14} of instrument A will be shifted into position to close its switch a^2, while the pins a^{14} of the other instruments, which are normally distant from their respective switches a^2 more than one step, are simply moved one step nearer their switches a^2, but not far enough to close said switches. Thus an operator at any instrument may by controlling the movement of wheel b connect his instrument with any one of the other instruments of the system he may desire. To enable the movement of the wheels b to be controlled, I provide each with a stop-engaging member c, herein shown as a pin adapted to be inserted in any one of the sockets c' provided in wheel b and numbered to correspond with the numbers of the different stations of the system. When an operator at any instrument desires to connect his instrument with any one of the other stations, he inserts the member c in the socket c' corresponding in number of the station to be called and then depresses lever b^9. The re-

lease of this lever causes wheel b to be rotated, as already described, until member c engages stop c^2, which is normally in the path of member c, and limits the extent of movement of wheel b, so that switch a^{10} is operated only that number of times which corresponds to the number of the station being called. The operation of the switch a^{10} at the calling-station results in the operation of all of the disks a^4, yet when wheel b is stopped by stop c^2 only the switch a^2 at the station being called and corresponding to the number of the socket occupied by c will be closed by the pin a^{14} of its disk a^4.

In order that the switch a^2 at the calling-station also will be closed to complete the telephone-circuit which is made up through the wire C and the ground and the wires a, a', and a^3 at the calling and called stations, I provide each instrument with a bell-crank lever d, one arm of which engages switch a^2 and the other arm a stud d' on lever b^9. When lever b^9 is thrown down by the operator at the calling-station to start wheel b in motion, stud d' is carried out of engagement with lever d and the latter is swung by a spring d^2 in a direction to close its switch a^2, so that the switch a^2 at the calling-station is closed as well as the switch at the called station. When member c engages stop c^2, the movement of lever b^9 toward its normal position is arrested, thus preventing said lever from opening switch a^2 while the system is in use. After having connected his instrument with the instrument he has selected the operator manipulates the usual bell-handle B and removes the receiver R from its hook r to place it to his ear. Each receiver holder or hook is pivoted at r' and arranged to coöperate with a spring contact member r^2, fastened to the frame of the instrument. The receiver-holder r is connected by a wire r^3 with one end of the coil of a magnet r^4, and the other end of the coil of magnet r^4 is connected by a wire r^5 with one pole of a battery r^6, the other pole of which is connected by a wire r^7 with the spring member r^2. The top side of the spring contact member r^2 is covered with an insulating layer, so that when the receiver R is removed from the hook r and the inner end of the latter is forced by a spring r^8 down past contact member r^2 and into a position below it the circuit through battery r^6 and magnet r^4 is not closed. The armature r^9 of magnet r^4 carries the stop c^2 and is pivoted at r^{10}, so that when operated by magnet r^4 the stop c^2 is swung into and out of the path of the stop-engaging member c. When the operator at the calling-station replaces the receiver on its hook r, the inner end of the latter is carried up past the spring contact member r^2 and in contacting with the under or conductor side of said member closes the circuit through battery r^6 and magnet r^4, and the armature r^9 is moved under the influence of magnet r^4 in a direction to disengage the stop c^2 from the member c, and thereby free the wheel b, which, together with lever b^9, then resumes its movement toward normal position, to which it returns, together with all of the disks a^4.

Normally the inner end of lever b^9 by engagement with a finger b^{10}, fixed on arbor b', serves as a stop to prevent rotary movement of wheel b under the influence of spring b^7 beyond its normal or zero point; but when lever b^9 is operated to set wheel b in motion its inner end is carried away from finger b^{10}, thus freeing wheel b. When stop c^2 is operated as above described, and wheel b is freed to complete its revolution, the return of said wheel to its normal position carries the inner end of lever b^9 into the path of finger b^{10} and also carries said finger against the end of said lever.

In order to prevent the operation of any other instrument while any two are connected, each instrument is provided with a bell-crank lever e, one arm of which rests normally against a finger e', provided on its respective disk a^4, and the other arm of lever e is in the form of a hook. When all of the disks a^4 are operated through the operation of the lever b^9 of the instrument at the calling-station, all of the fingers e' move out of engagement with the levers e simultaneously and the latter are swung each by a spring e^2 so as to carry the hooked arms under the studs d' of all of the levers b^9, thus locking all of the levers b^9 in normal position, except, of course, the lever b^9 at the calling-station, which is then out of coöperative relation with its lever e.

From the foregoing it will be clear that a separate operation other than hanging up the receiver is not required of the operator to return the system to normal condition after being used, but that the mere act of the operator at the calling-station in returning his receiver onto its hook automatically accomplishes this result and prevents the possibility of excluding any of the instruments from the system except during a conversation.

What I claim is—

1. In a telephone system, a telephone-circuit; a receiver; a movable holder for the receiver; means for controlling said circuit comprising a rotatable wheel; a stop-engaging member adjustably connected with the wheel; a movable stop normally occupying an operative position in the path of said member, and means controlled by the receiver-holder for operating the stop.

2. In a telephone system, a telephone-circuit; a receiver; a movable holder for the receiver; means for controlling said circuit comprising a rotatable wheel; a stop-engaging member adjustably connected with the wheel; a movable stop normally occupying an operative position in the path of said member; and means controlled by the receiver-holder for

shifting the stop out of and then back into the path of said member when the receiver-holder is moved in one direction.

3. In a telephone system, a telephone-circuit; a receiver; a movable holder for the receiver; means for controlling said circuit comprising a rotatable wheel; a stop-engaging member adjustably connected with the wheel; a movable stop normally occupying an operative position in the path of said member; an armature by which said stop is carried, a magnet for operating the armature; a circuit in which said magnet is arranged, and a switch in said circuit controlled and operated by the receiver-holder.

4. In a telephone system, a telephone-circuit; a receiver; a movable holder for the receiver; means for controlling said circuit comprising a rotatable wheel; a stop-engaging member adjustably connected with the wheel; a movable stop normally occupying an operative position in the path of said member; an armature by which said stop is carried; a magnet for operating the armature; a circuit in which said magnet is arranged, and a switch in said circuit adapted to be closed by the holder when the receiver is replaced thereon.

5. In a telephone system, a telephone-circuit; a receiver; a movable holder for the receiver; means for controlling said circuit comprising a rotatable wheel; a stop-engaging member adjustably connected with the wheel; a movable stop normally occupying an operative position in the path of said member; an armature by which said stop is carried; a magnet for operating the armature; a circuit in which said magnet is arranged, and a switch in said circuit adapted to be momentarily closed by the holder when the latter is depressed by the weight of the receiver.

Signed by me at Boston, Massachusetts, this 3d day of February, 1903.

ROBERT HAMILTON.

Witnesses:

ARTHUR F. RANDALL,

ROBERT CUSHMAN.