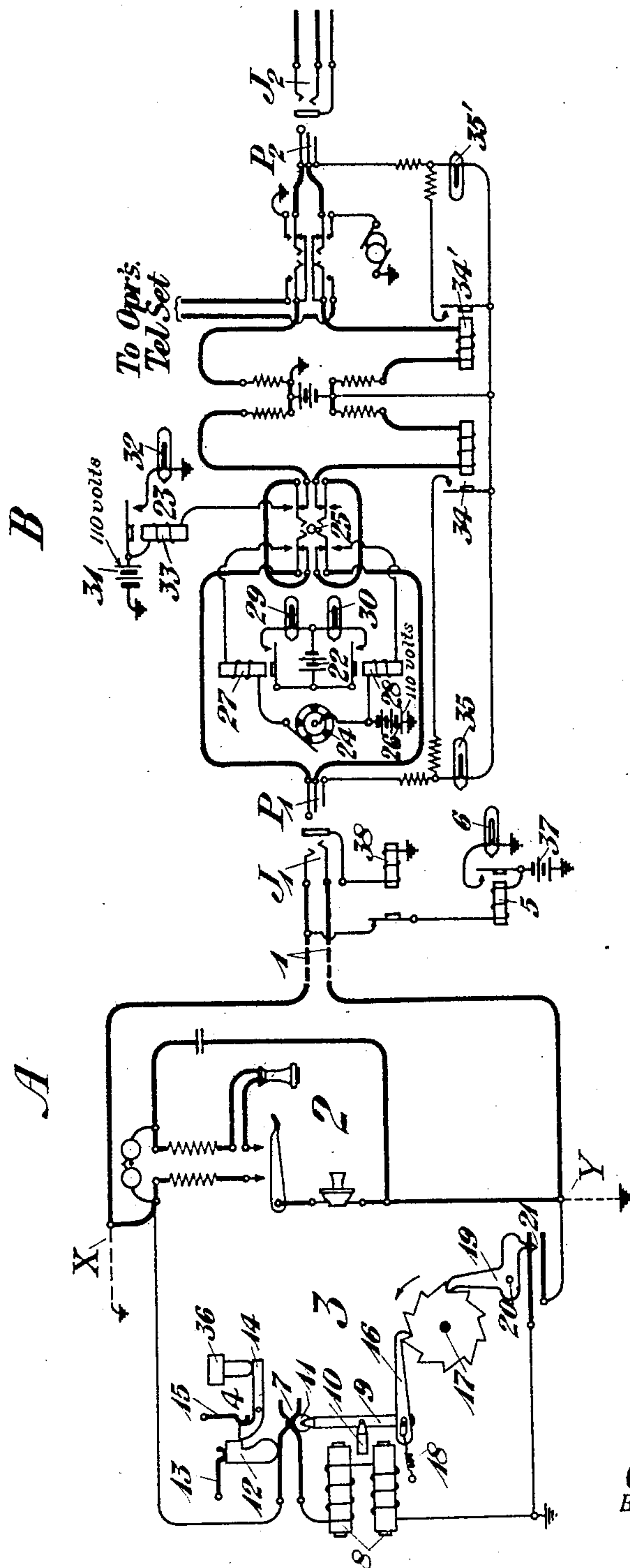


G. K. THOMPSON.
MESSAGE REGISTERING SYSTEM.
APPLICATION FILED OCT. 9, 1919.

1,397,991.

Patented Nov. 22, 1921.



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MESSAGE-REGISTERING SYSTEM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE K. THOMPSON, residing at Maplewood, in the county of Essex and State of New Jersey, have invented certain Improvements in Message-Registering Systems, of which the following is a specification.

This invention relates to message registering systems and more particularly to a system in which the registering device is locked into the circuit by the subscriber as the result of the act necessary to signal the central office, and thereafter remains under the control of the operating and releasing arrangement associated with the cord circuit at the central office.

In the use for devices for registering the number of messages transmitted over a telephone line from a particular subscriber's station at which the device is located, it is desirable to determine whether the recording mechanism has operated properly in response to the operation of the controlling device at the central office. Failure to operate might be due to a number of causes, but it is due principally either to defective mechanism or to attempts on the part of the user of the instrument to frustrate the operation of the mechanism in order to prevent the registration of the call.

In call registering systems heretofore used, the operator might receive a signal indicating the proper operation of the register, when, in reality its operation has been prevented by a fraudulent connection made by the subscriber. Likewise, the recording dials might fail to operate and yet give no indication of such failure.

One object of the invention is to provide means associated preferably with the cord circuit at the central office, to operate the registering device at the subscriber's station after a chargeable telephone connection has been established and to indicate to the operator that the registering mechanism has operated properly. A further object is to release the locking mechanism at the subscriber's station, thereby restoring the register to its normal position and to indicate to the operator that such operation has been successfully effected.

This invention will be more fully understood from the following description, together with the attached drawing which shows one embodiment of the invention.

The drawing shows a telephone station at A and a central office at B, connected by means of the telephone line circuit 1, which terminates at the office B in a jack J₁. At the subscriber's station A is a telephone set 2 of the ordinary type, bridged across the line circuit. The set represented in the drawing is a direct line single party instrument, but it should be understood that the invention is not limited to such type of subscriber's circuit, but is equally applicable to lines having a plurality of parties associated therewith. Associated with the telephone set 2 is a message registering device which is shown schematically in the drawing by the arrangement 3, but in practice may be of the type described in the patent to Wotton, 1,162,007, dated November 30, 1915, with a slight modification which will be later referred to. Associated with the registering device is a switching mechanism 4, by means of which the line relay 5 at the central office end of the line 1 may be operated and the line lamp 6 may be lighted. The switching mechanism 4, when operated in order to effect the operation of the line relay 5, closes a circuit from battery 37 through the line relay 5 and the tip side of line 1, through contact 7 associated with the registering device and the windings of the polarized magnet to ground, and remains locked in that position, until released by the actuation of the operating and releasing mechanism associated with the cord circuit at the central office.

The message registering device 3 comprises a polarized magnet 8, the windings of which are connected between the tip side of the line circuit and ground, by the closing of the contact 7, which results from the operation of the switching mechanism 4. A movable armature 9 is supported by a pivot 10, so as to swing in the plane of the polarized magnet 8. Attached to the upper end of the armature is a roller 11, which is adapted to exert an upward force upon the blades of the contact 7, which in turn transmits this force to the plunger 12, which is held in contact with the upper blade by means of the spring 13. The path of movement of the roller 11 is so designed as to lift the plunger 12 sufficiently to allow the catch 14 to be forced into the notch in the side of the plunger by means of the spring 15, thereby locking the plunger in that po-

sition. Attached to the opposite end of the movable armature 9 is an arm 16 having at one end a hook adapted to engage the teeth of a toothed wheel which is adapted to rotate about a shaft 17, upon which are also mounted a plurality of numbered disks, which constitutes the registering device. The opposite end of the arm 16 is slotted and it is attached to the armature by means of a pin adapted to move within the said slot. The connecting pin is normally located within said slot in such position that the end of the armature may be moved its full distance in one direction without causing any movement of the arm 16, but if the armature is moved in the opposite direction the arm will likewise be moved in the same direction, substantially as far as the end of the armature moves. The distance through which the arm moves is normally the distance between two adjacent teeth of the toothed wheel which the arm is adapted to engage. A spring 18 is attached to the slotted end of the arm 16, so as to withdraw the arm after it has become engaged with a tooth on the wheel and thereby cause the rotation of the said wheel and in consequence thereof the registration of the call. Associated with the toothed wheel is a pawl 19 adapted to rotate about an axis 20. As the wheel rotates in the direction of the arrow, the upper end of the pawl will be forced outward, which results in a downward motion of the lower end of the pawl, thereby causing the operation of the switch 21, the object of which will be made clear later. This constitutes the variation from the arrangement shown in Wotton, wherein the function of the pawl is simply to prevent movement of the toothed wheel in the wrong direction.

Associated with the cord circuit at the central office B, is the operating and releasing mechanism indicated by 22 and 23, respectively. The operating mechanism 22 comprises a battery 26 of 110 volts preferably, the negative side of which is connected, through an interrupter 24, to the tip side of the line circuit, by the operation of key 25 in the left hand direction. The negative side of the same battery is adapted to be directly connected to the ring side of the said circuit, without the interposition of an interrupting device, when the said switch is operated in the said direction. Associated with these circuits from battery 26 to the tip and ring sides of the line circuit, are relays 27 and 28, respectively, which, when operated, cause the lamps 29 and 30, respectively, to glow.

The releasing circuit 23 the function of which is to release the locking mechanism of the register 3 without recording the call embraces a battery 31 of preferably the same potential as battery 26, but arranged so that its positive terminal will be connected to the

tip side of the line when switch 25 is operated in the right hand direction. A lamp 32 and a relay 33 are connected with the circuit from battery 31 to the tip side of the line, in order to indicate the proper functioning of the circuit. Connected into the ring side of the cord circuit are the supervisory relays 34 and 34', with which are associated the supervisory lamps 35 and 35'. The cord circuit terminates in the plug P_1 , adapted to be inserted in jack J_1 , and plug P_2 adapted to be inserted in jack J_2 , which may be the terminus of another subscriber's line or a trunk line.

This invention will be more clearly understood from the following description of the manner in which it may be operated.

If the subscriber at station A desires to make a telephone call, he presses the button 36 of the switching mechanism 4. The pressure upon the button, which is in contact with the catch 14, overcomes the pressure of spring 15 and effects the withdrawal of the catch from the plunger 12, thereby permitting the plunger to be forced downward by the action of the spring 13, which results in the closing of the contact 7. As the result of this, a circuit is established from battery 37, winding of the line relay 5, contact of cut off relay 38, tip side of line 1, contact 7, winding of polarized magnet 8, to ground, thereby causing the lighting of the line lamp 6. The operator at office B inserts the plug P_1 of her cord circuit in the jack J_1 , which causes the operation of the cut-off relay 38 and extinguishes the line lamp. After the operator has learned from the subscriber at A the desired number, she inserts plug P_2 in jack J_2 of the desired line and establishes the desired connection.

When the subscriber at A has restored his receiver to the hook of the instrument 2, the supervisory relay 34 will be deenergized, causing the lamp 35 to glow. Thereupon the operator moves the switch 25 toward the left, and establishes a circuit from battery 26, through the interrupter 24, winding of relay 27, over the tip side of line 1, through the windings of the polarized magnet 8, to ground, which results in the movement of the armature 9, in such manner that its upper end travels toward the left and the lower end toward the right. By the movement of the upper end, the switching mechanism 4 is restored to its normal non-operated position. By the movement toward the right of the lower end of the said armature, the arm 16 is brought into engagement with the next tooth to the right. Since the interrupter 24 is designed to allow only a momentary flow of current, the armature 9 will therefore be quickly restored to its normal position and the arm 16 will be quickly withdrawn by the action of the spring 18. This results in the movement of the toothed wheel

through such an angular distance as to advance the counting mechanism one unit, thereby registering the call. The interrupter 24 is so designed as to allow the current to flow through the windings of the polarized magnet for such length of time as to insure the proper operation of the armature 9, the relation of the roller 11 to the springs carrying the contact 7 is such that the contact is maintained closed while the armature 9 is out of its normal position. Upon the return of the armature 9 to its normal position the contact 7 will be opened, provided the plunger 12 is held in its normal unoperated position by the catch 14. When such an impulse of current flows from battery 26 through interrupter 24 and over the circuit previously described, the relay 27 will be operated intermittently so long as contact 7 remains closed, which will be indicated by the lighting of the lamp 29. If the armature 9 fails to open the contact 7, a series of impulses will pass through the circuit, causing the intermittent operation of relay 27 and the flashing of lamp 29, thus signifying that the message register 3 has failed to restore the switching mechanism 4 to its proper non-operated position.

When the toothed wheel has been rotated in the direction of the arrow by the lateral movement of the arm 16, the upper part of the pawl 19 will be moved toward the right. This will cause the pawl to rotate about the axis 20 and will produce a downward motion in the lower part of the pawl, resulting in the closing of contact 21, and thereby establishing a circuit from battery 26, through the winding of relay 28, over the ring side of the line, through contact 21 to ground. Relay 28 is operated thereby and the lamp 30 associated therewith is lighted, which indicates to the operator at B that the recording mechanism associated with the message register has recorded the call. The lamp 30 will remain lighted only for the short period of time during which the pawl is passing from an intermediate part of one to an intermediate part of the next tooth in succession.

If the operator at B is unable to establish the desired telephone connection, it is necessary that the switching means 4 should be released and restored to its normal position without operating the recording mechanism associated with the message register 3. This is done in the following manner: The operator at B moves the switch 25 toward the right, thereby establishing a circuit from battery 31, through the winding of relay 33, over the tip side of the line, thence through contact 7 and the windings of the polarized magnet 8, to ground. Since the circuit connections of battery 23 are such that its positive pole will be connected with the tip side

of the line, the armature 9 will be caused to move in a direction opposite to that in which it moved when battery 26 was connected with the same circuit. The upper end of the movable armature will travel in a path toward the right, thereby elevating the springs of contact 7, which in turn will raise plunger 12, so as to allow the catch 14 to drop back into the notch in the said plunger. This will restore the switching mechanism 4 to its normal unoperated position. The lower end of the movable armature will travel toward the left, the pin moving in the slot of the arm 16. Owing to the length of the slot and the fact that the spring 18 is not under tension when the armature 9 is in its normal position the arm 16 itself will not be moved and in consequence thereof the toothed wheel will not be rotated and the recording mechanism associated with the toothed wheel will not be affected. Upon the return of the armature 9 to its normal position, contact 7 will be opened.

In addition to indicating a failure on the part of the apparatus to register properly due to some defect within the structure itself, the recording and releasing mechanism associated with the cord circuit is also adapted to indicate unusual circuit conditions which result from attempts on the part of subscribers to prevent the operator from operating the registering device. The subscriber at A may place a ground upon the tip side of the line, for example at X, in order to operate the line relay 5 and the signal lamp 6, thereby establishing telephone connection with the central office B without placing the registering device under the control of the operator at B by the operation of the switching mechanism 4. Such an attempt would be detected by the operator at the time of disconnection, by a series of flashes of the lamp 29, as long as the ground remained on the tip side at X and by the absence of any indication from the signal lamp 30. If the subscriber at A were to remove the ground from the tip side at X, after establishing the desired telephone connection and prior to the time of disconnection, the operator at B would be aware of an abnormal condition, by the failure of both lamps 29 and 30 to operate.

If a subscriber at A were to attach temporarily a ground wire to the ring side of the line at Y and remove the receiver from the hook, the operator at B would be signaled in the usual way by the operation of relay 5 and the lighting of lamp 6. If the subscriber failed to remove the ground prior to restoring the receiver to its hook on completing the call he could not give a "disconnect" signal, since the supervisory relay 34 would remain operated so long as the ground remained on the ring side of the line. If the subscriber should remove the

ground from the ring side of the line at Y, just prior to restoring the receiver to its hook, in order to operate the supervisory relay and thereby give a disconnect signal, and then were to apply the ground again with the object of deceiving the operator at the time of registering the call, no indication would be given by lamp 29 and a steady light would be given by lamp 30 so long as the ground was maintained. These conditions would, of course, attract the attention of the operator, who would immediately report them in order that they might be investigated.

It will be seen, therefore, that this invention serves not only to indicate the proper operation of the message recording mechanism, or its failure to operate properly due to defects within the structure itself, but it also acts as a detector or indicator of any abnormal condition which may occur at the substation, due either to line circuit trouble or to an attempt on the part of the subscriber to make a call without having the same registered.

Although this invention has been shown as embodied in the specific form, it is not desired to restrict it to this particular form, since it is capable of embodiment in other forms without departing from the spirit of the appended claims.

What is claimed is:

1. In a message registering system, the combination of a subscriber's line circuit having a telephone set and a message registering device associated therewith, a cord circuit adapted for connection with said subscriber's line circuit and means associated with said cord circuit to restore said registering device to its normal unoperated position and to indicate to the operator that the registering device has registered.

2. In a message registering system, the combination of a subscriber's line circuit

having a telephone set and a message registering device associated therewith, a cord circuit at a central office adapted for connection with said subscriber's line circuit, switching means associated with said registering device adapted to be locked when operated, and means to unlock said switching means, and to indicate to the operator that the said registering device has registered.

3. In a message registering system the combination of a subscriber's line circuit having a telephone set and a message registering device associated therewith, lockable switching means associated with said registering device to connect said device operatively with said line circuit, a cord circuit adapted for connection with said line circuit, means associated with said cord circuit adapted to cause said registering device to register and to indicate such registration, and releasing means associated with said cord circuit adapted to restore said switching means to its normal position, and to indicate such restoration.

4. In a message registering system, the combination of a telephone line, a message registering device associated therewith, a cord circuit adapted for connection with the said telephone line, a register controlling means associated with the said cord circuit comprising a source of potential and a plurality of indicating devices, the said source being adapted for connection with one side of the said line for operating the said registering device and one of said indicating devices and adapted for connection with the other side of the said line for operating the other of said indicating devices, in order to show that the said registering device has properly functioned.

In testimony whereof, I have signed my name to this specification this 6th day of October, 1919.

GEORGE K. THOMPSON.