May 6, 1924. 1,492,781

J. ERICKSON

SEMAPHORE SIGNAL FOR AUTOMATIC SWITCHES

Filed June 1, 1920 2 Sheets-Sheet 1

Fig. 3

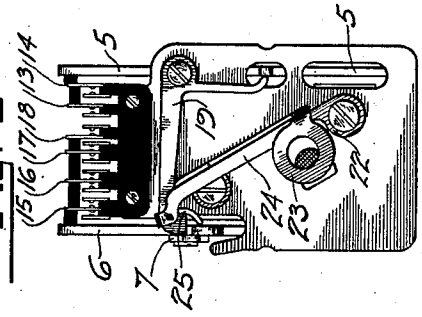


Fig. 4

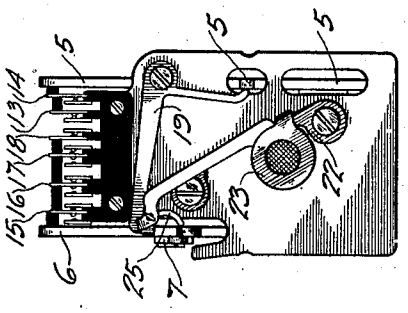


Fig. 2

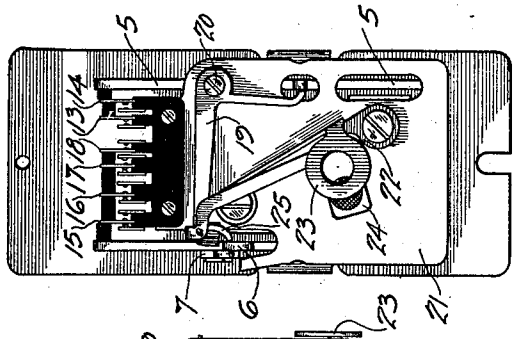
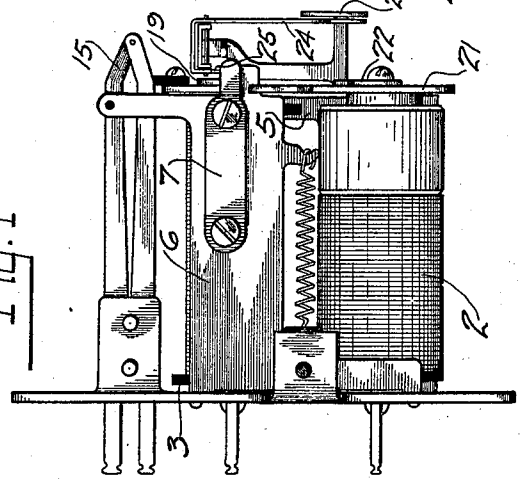


Fig. 1



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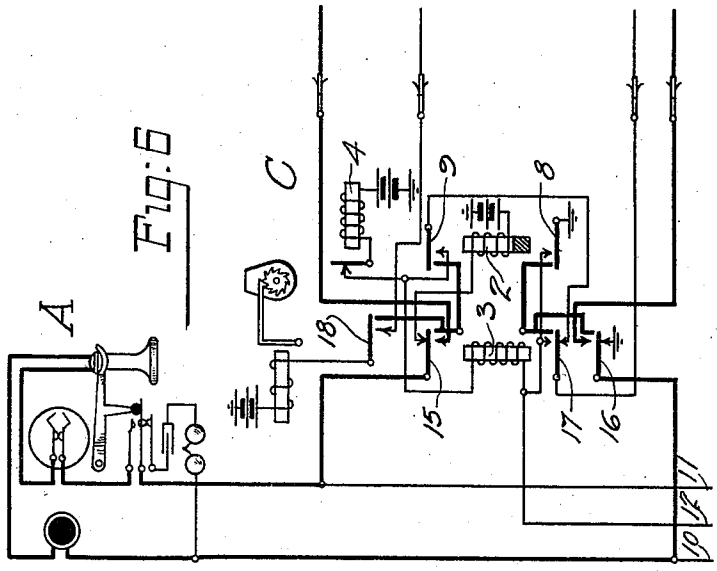


Fig. 6

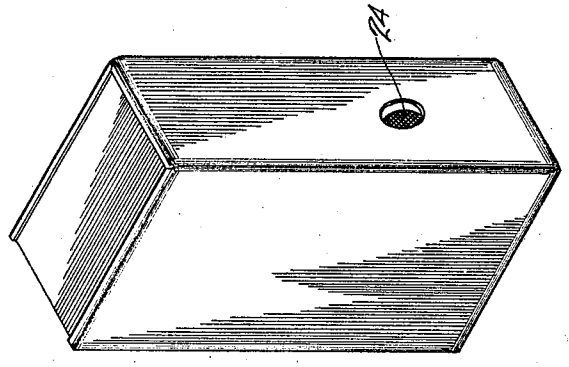


Fig. 5

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UNITED STATES PATENT OFFICE.

JOHN ERICKSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SEMAPHORE SIGNAL FOR AUTOMATIC SWITCHES.

Application filed June 1, 1920. Serial No. 385,600.

To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and a resident of Chicago, Cook County, and State of Illinois, have invented certain new and useful Improvements in Semaphore Signals for Automatic Switches, of which the following is a specification.

My invention relates in general to semaphore signals for automatic switches, and more particularly to a semaphore or off normal signal for an automatic switch of the so called individual rotary type.

Among the objects of my invention are to provide a signal or semaphore which is operated in a novel manner to indicate the normal position of the switch in one instance, the operated position of the same when the line thereof is called, and the operated position when the line is calling. In the past certain off normal signals have been designed which simply indicate when a switch is in operated position, but I believe this to be the first time that a semaphore signal has been devised which not only indicates the off normal position of a switch but which also indicates whether a line is calling or is being called.

In Figs. 1, 2, 3 and 4 of the accompanying drawings, I have shown the details of the relay mechanism for controlling a rotary line switch of well known type (the wipers and bank having been omitted for the sake of clearness) together with the semaphore controlled thereby.

Figure one is a side view of the mechanism and Figures 2, 3 and 4 are front views showing the semaphore in its various positions. Figure 5 shows the cover for the relay mechanism of Figs. 1–4 inclusive showing the opening in the front thereof through which the semaphore may be observed by an attendant while the cover is in position.

Fig. 6 is a circuit diagram of the line switch in connection with which the semaphore is herein illustrated and is shown here merely to make clear the operations of the various relays which enter into the control of the semaphore.

The relay mounting shown in Figs. 1–4 inclusive comprises two relays which are the line and switching relays represented as 2 and 3 respectively in Fig. 6. It is common practice to assemble these two relays on a single mounting as shown to permit the inter action of their armatures, while the bank of the switch C, the wipers and the rotary magnet 4 are mounted on a separate mounting close to the relays. I will first explain in general the operations of the line switch C (Fig. 6) in order to make clearer the operation of the armatures of relays 2 and 3. Relay 2 is the usual slow acting line relay of the switch which is energized when the receiver at substation A is removed over the two sides of said line. Relay 2 then closes a series circuit for relay 3 and magnet 4 at the springs 8 and also prepares a direct circuit from the private wiper to the rotary magnet at springs 9 to step the wipers in case the trunk upon which the wipers are standing is busy. When an idle trunk, upon which there is no guarding potential, is found, relay 3 will energize to fully attract its armatures to cut off the line relay 2 and switch the line circuit to the line wipers. Relay 3 is permitted to attract its armatures fully because of relay 2 being first energized to remove a stop from the path of the armatures of relay 3.

In case however, that the line A is being called and connection is extended thereto via the normal conductors 10, 11 and 12 then a circuit will be completed for the relay 3 before relay 2 has been energized and relay 3 will of course attract its armatures only part way to meet the stop which has not in this case been removed by relay 2. When relay 3 is thus permitted to only partly attract its armatures the line relay 2 and ground are disconnected from the line A but the connection is not put thro to the line wipers.

Referring now to Fig. 1, the two relays here shown are the line relay 2 having an armature 5 which may be more clearly seen in Figs. 2, 3 and 4, and the switching relay 3, mounted just above relay 2 and controlling the armature 6. Referring to Fig. 3 it will be seen that the armature 5 of relay 2 has an upwardly extending arm which operates the springs 13 and 14 when the relay 2 is energized to close contact between said springs and their front contacts. Also when relay 3 is energized it attracts armature 6 and by means of the upper armature thereof moves the springs 15, 16, 17 and 18. Attached to the armature 6 is a plate 7 hav-

ing one end thereof projecting over the edge of armature 6. An arm 19 is pivoted at 20 on the front plate of the mechanism and is adapted to be moved about its pivot by the attraction of the armature 5. Fig. 4 shows armature 5 attracted and arm 19 in operated position. The left hand end of the horizontal portion of this arm 19 lies normally in the path of the plate 7 on armature 6, so that, if armature 6 is attracted while arm 19 is in normal position then plate 7 will engage the end of arm 19 and prevent further movement of armature 6. Fig. 3 shows the armature 6 in this position and it will be seen that the springs 15–18 inclusive are moved away from their back contacts but not into engagement with their front contacts. As it has been previously pointed out the circuit is arranged so that relay 3 by means of its springs, opens the circuit of line relay 2 so it will be understood that relay 2 must be first energized in order to permit the armature 6 of relay 3 to be fully attracted.

Mounted on the front plate 21 is a brass portion 22 having a bracket end 23 projecting forward and having a circular opening therein. The other end of the part 22 forms a support or pivot point for a swinging arm 24 which has a projecting finger 25 lying directly in the path of the armature 6 of relay 3. The lower or target carrying portion of the arm 24 has an enlarged portion carrying preferably a white target with a black circle painted thereon. In normal position the black portion is not to be seen thro the opening of the part 23. When the armature 6 is attracted before relay 2 energizes or in other words when the line is called, then the arm 24 will be moved a short distance as shown in Fig. 3 and the black target will be half exposed. When relay 2 energizes first and then relay 3 energizes, or when a call is initiated by the line to which this switch is individual then the black target will be fully exposed as shown in Fig. 4.

In Fig. 5, I have shown the cover which is usually employed to cover the relay mechanism of Figs. 1–4 inclusive, showing the opening in the cover which permits an attendant to observe the target therethrough and therefore determine whether the line of this switch is busy as a calling or called station.

It will be seen therefore that I have provided a very simple and efficient visual signal or semaphore signal for an individual switch which informs the attendant at a glance whether or not a switch is in use and also whether a call is being extended to or from the line to which the switch is individual.

It will be understood that while I have shown my signaling device in connection with a line switch of a certain type yet it may be used in any type of switch where such a relay will be found to operate it in the manner shown.

Having fully described and ascertained the features and aspects of my invention what I consider to be new and desire to have protected by Letters Patent will be pointed out in the appended claims.

What I claim is:

1. In a telephone system a line, an automatic switch individual thereto for extending connections therefrom, and a signal associated with said switch for indicating whether the line is calling or is being called.

2. In a telephone system, a line, an automatic switch individual thereto for extending connections therefrom, and a visual signal associated with said switch for indicating whether the line is calling or is being called.

3. In a telephone system, a line, an automatic switch individual thereto for extending connections therefrom, and a signal associated with said switch for indicating whether the line is idle, is calling, or is being called.

4. In a telephone system, a line, an automatic switch individual thereto for extending connections therefrom, and a visual signal associated with said switch for indicating whether the line is idle, is calling, or is being called.

5. In a telephone system, a line, an automatic switch for said line, relays for controlling said switch, one of said relays being operated in one manner when the line is called and in another manner when the line is calling, and a visual signal for indicating to the attendant the manner in which said relay has been operated.

6. In a telephone exchange, a line having a switch associated therewith, relays for said switch, a cover for said relays, one relay of said switch being operated only partially when said line is called and fully operated when the line is calling, and a visual signal controlled by said relays for indicating the operated condition of the relays in either instance, said signal visible to an attendant without removing said cover.

7. In a telephone system, an automatic switch, a combined switching and cut off relay for the switch, and a visual signal indicating whether the relay is operated as a cut off or switching relay.

8. In a telephone system, an automatic switch, a line relay for said switch and a combined switching and cut off relay therefor, means controlled by the line relay for preventing the switching relay from operating completely, and a visual signal for indicating whether the switching relay has been fully or partially operated.

9. In a telephone system, an automatic

switch, a pair of relays therefor, circuits for controlling said relays, means controlled by one relay for preventing the other relay from closing its front contacts and a visual signal operated by said other relay for indicating to an attendant whether the other relay has opened its back contacts only or has also closed its front contacts.

10. In a telephone system, a line, a line switch therefor, a line relay and a switching relay for the switch, circuits for first energizing the line relay when a call is extended from the line and for thereafter energizing said switching relay, and means controlled by the energizing of the line relay for permitting the complete operation of the switching relay, circuits for first energizing said switching relay when a call is extended to the line, said relay rendering said line relay inoperative to permit the complete operation of the switching relay, and a signal operated in each instance to indicate whether the line is calling or is being called.

11. In a telephone system, a line, a pair of relays individual thereto for controlling the extension of calls to and from the line, and a visual signal jointly controlled by said relays for indicating whether the line is calling or is being called.

12. In a telephone system, a line, an automatic switch for said line, a pair of relays for controlling said switch, one of said relays being operated in one manner when the line is called and in another manner when the line is calling, and a visual signal operated by said relay when the line is being called and operated and maintained operated in a different manner by the joint operation of both of said relays when the line is calling for indicating to the attendant the calling or called condition of the line.

13. In a telephone system, an automatic switch, a line relay for said switch and a combined switching and cut-off relay therefor, means controlled by the line relay for preventing the switching relay from operating completely, and a visual signal mechanically associated therewith for indicating whether said relay is fully or partially operated.

14. In a telephone system, a line, a line switch therefor, a line relay and a switching relay for the switch, circuits for first energizing the line relay when a call is extended from the line and for thereafter energizing said switching relay, and means controlled by the energization of the line relay for permitting the complete operation of the switching relay, circuits for first energizing said switching relay when a call is extended to the line, said relay operating only part way rendering said line relay inoperative to permit the complete operation of the switching relay, and a signal mechanically associated with both of said relays and operated in each instance to indicate whether the line is calling or is being called.

15. In a telephone system, a line, an automatic switch for said line, two relays for controlling said switch, one of said relays being operated in one manner when the line is called, said other relay operated only when the line is calling to permit said first relay to operate in a different manner, and a visual signal mechanically associated with said relays for indicating to the attendant whether the line is a called or is a calling line.

16. In a telephone system, a line, an automatic switch for said line, two relays for controlling said switch, only one of said relays being operated when the line is called and both of said relays being operated when the line is calling, a visual signal mechanically associated with both of said relays, said signal controlled by the operation of said first relay for indicating that the line is being called, and controlled by the joint operation of said relays for causing said signal to indicate that the line is calling, and means controlled by the first mentioned relay for maintaining said signal in its operated position after the release of said other relay.

Signed by me at Chicago, Cook County, Illinois, this 26th day of May, 1920.

JOHN ERICKSON.