(No Model.)

W. J. DUDLEY.

ELECTRICAL SIGNALING APPARATUS.

No. 264,264. Patented Sept. 12, 1882.

Fig. 1.

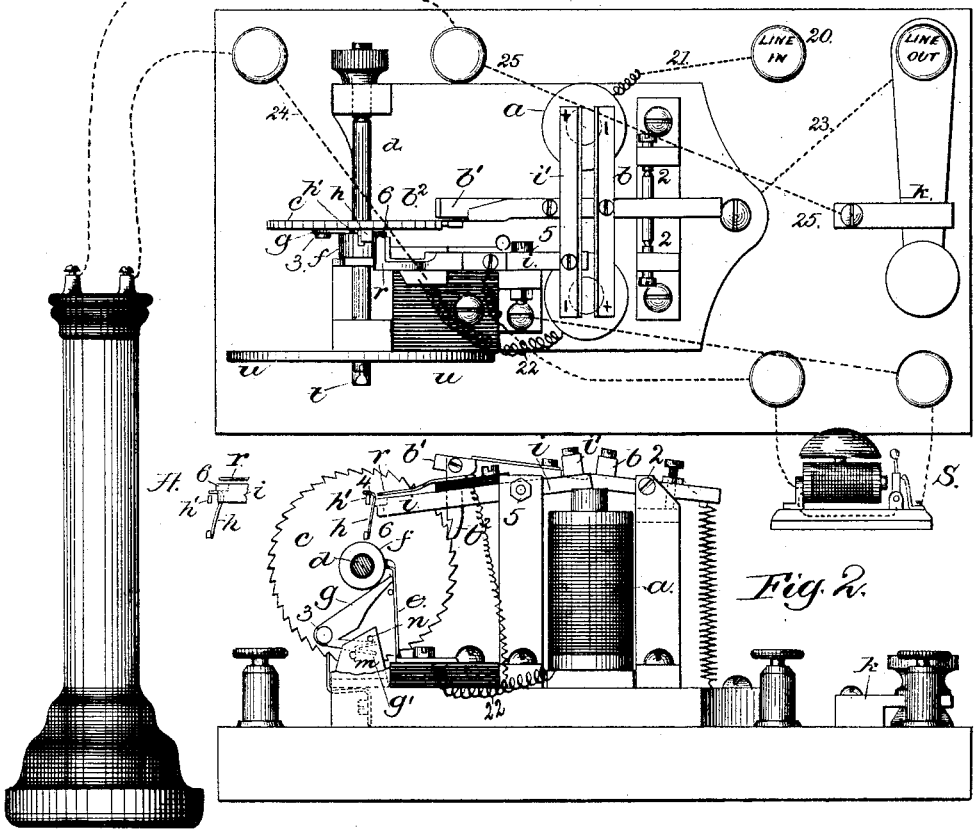


Fig. 2.

Fig. 3.

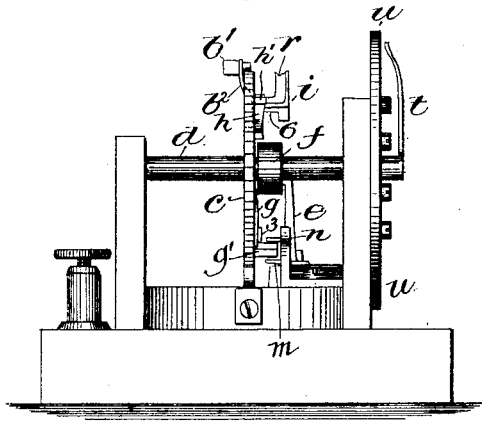
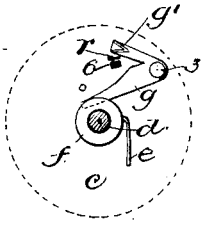


Fig. 4.



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ELECTRICAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 264,264, dated September 12, 1882.

Application filed November 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. DUDLEY, of the city of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electrical Signal Apparatus, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to an electrical signaling apparatus, and has for its object to enable a telephone or other instrument to be placed in circuit at one only of a series of stations upon the same circuit, and also to enable a signal to be operated at the said station, but at none other. The apparatus at each station contains an electrical switch controlling the circuit of the telephone or other instrument, in combination with means to move the said switch bodily in unison with the corresponding ones in the apparatus at the other station, and with means to act upon the said switch when in one definite position in its said movement. The switch, when thus acted upon, places the telephone or desired instrument in circuit; and the invention consists in the combination, with the said switch and means to move it in unison with others, of a stopping device to arrest its movement at a given point, and means to act upon the said switch just before it is stopped to place the instrument in circuit, and means to act upon it just after it is started to remove the said instrument from the circuit.

The invention also consists in the combination, with the movable controlling-switch and mechanism to act upon it when in a certain definite position, of a signal-controlling circuit-closer carried by the said mechanism, and operated to place the said signal in circuit only when the mechanism also acts upon the said movable switch to place the telephone in circuit. The switch employed in this instance is pivoted on a rotating disk shown as actuated with a step-by-step movement by successive electrical impulses acting through an electro-magnet and its armature, in the manner commonly employed in apparatus of this class, the said actuating-armature being in this instance polarized and affected by currents of one polarity only—for instance, positive. The said switch is movable on its pivot to control the circuit of the telephone, and moves with sufficient friction to cause it to remain in any position until positively moved therefrom. The said switch has an operating-projection, by which it is moved on its pivot to control the circuit of the telephone. The rotating disk is stopped and permitted to start in unison with the others of the series by the action of an armature oppositely polarized to that employed for actuating the disk, substantially as in Letters Patent No. 234,663, granted to me January 23, 1880. The operating-projection of the controlling-switch is brought at the end of one of the step-movements of the disk, by which it is carried into proper position to be operated by the said stopping and releasing armature, which is shown as also provided with a circuit-closer controlling the signal and operated by its engagement with the said operating-projection of the controlling-switch. The controlling-switch can thus be moved to place the telephone or other instrument in circuit only at one point in the movement of the disk, but if once operated will remain in the same condition, although the disk is subsequently moved—a feature not found in most individual signal apparatus heretofore in use. A projection fixed relative to the said disk is properly located to engage the operating-projection of the controlling-switch, as it moves by and acts upon it to place the instrument in circuit at the moment when the disk is arrested for the purpose of placing it in unison with those of the other instruments, so that when all the instruments are in their normal position or at their common starting-point the telephones will all be in circuit. A similar projection is properly located to act upon the said switch to remove the telephone from the circuit in the first movement of the disk after it has been released, so that the telephones will then all be removed from circuit, and any desired one can subsequently be placed in circuit without the others, as before described.

Figure 1 is a plan view of a signal and telephone controlling apparatus embodying this invention; Fig. 2, a side elevation thereof, the dial and arbor supporting post being removed; Fig. 3, an end elevation viewed from the left hand of Fig. 1, and Fig. 4 a detail showing the controlling-switch in position to be operated or shifted to put the telephone in circuit.

The main actuating-magnet *a*, its polarized armature *b*, mounted upon an armature-lever, *b'*, pivoted at 2, and provided with an actu-

ating-pawl, b^2, operate the ratchet-disk c, mounted upon the arbor d, substantially as in my former patent hereinbefore referred to, the said armature b being polarized to respond to currents of but one polarity—for example, positive—passing through the said magnet a. The main-line wire, entering at the binding-post 20, passes by wire 21 to the magnet a, and thence by wire 22 to a spring, e, resting in contact with a metallic drum, f, mounted upon the arbor d, but insulated from the said arbor and ratchet-disk c, which latter, in electrical connection with the entire metallic frame-work of the apparatus, is connected by wire 23 with the main line leaving the next station. An electrical switch, g, is pivoted at 3 upon the ratchet-disk c with such friction as to be retained in any position until positively moved therefrom, its movement in one direction being limited by a stop-pin, g'. The said switch is in electrical connection with the disk c and line 23, and is adapted to be moved on its pivot into connection with the drum f, thus completing the main circuit of the wire 22 to the wire 23. The wire 22 has connected with it a branch wire, 24, passing through the telephone or other instrument the circuit of which is to be controlled, from which the circuit is continued by wire 25 to the break-circuit key k and line leading to the next station, so that when the switch g is moved out of contact with the drum f, as shown in Fig. 2, the direct portion of the main circuit by wires 22 and 23 will be broken, and the currents will pass through the telephone and key k, which are thus controlled by the movements of the said switch g on its pivot 3.

It will be understood that the ratchet-disks c of a series of instruments like the one illustrated, the magnets a of which are in the same circuit, will all be rotated in unison as the armature b is vibrated by an interrupted positive current, and the said disks c are provided with a stop-spring, h, the free end 4 of which is slightly separated from a rigid stop, h', fixed to the ratchet c.

An armature-lever, i, pivoted at 5, and provided with an armature, i', oppositely polarized to the one b, and consequently repelled by the currents employed to actuate the armature b and rotate the disk c, has its end 6, when the armature i' is thus repelled, in the path of the stop-spring h, and consequently arrests the said spring and ratchet c in its movement caused by the armature b, all the disks of the series of instruments being thus stopped at a common point, as shown in Fig. 2. The spring h yields somewhat on coming in contact with the armature-lever i, and when the armature i' thereof is attracted the end of the lever will be moved from the path of the spring h, which, by its elasticity, passes beneath the end of the said lever and supports it until the stop-spring has moved beyond it in the next movement of the ratchet c, as shown at A, Fig. 2.

The telephone-controlling switch g is provided with an operating-projection, g', and a switch-operating device, shown as a stud, m, is properly located to engage the said projection g' in the first movement of the disk c, after it has been released by the lever i', the said stud m causing the switch to turn on its pivot from the position shown in Fig. 2 to that shown in Fig. 4, so as to make contact with the drum f, and thus cut out the telephone and key. The projection g', in the subsequent rotation of the disk c, is brought above the end of the armature-lever i, which projects toward the disk c, as shown at 6, Fig. 1, and if the armature i is attracted at the moment when the projection g' is thus above its end 6, as shown in Fig. 4, it will turn the said switch on its pivot 3 to disconnect it from the drum f, and thus throw the telephone in circuit. The projections g' in the different instruments are in different positions relative to the stopping-springs h and armature-levers i, so that only one projection g' will be in position to be acted upon by the said lever at any given time in the simultaneous rotation of the different disks c.

It will be seen that the switch g thus has two movements—one on its pivot, produced by what may be termed a "shifting device," to change the condition of the circuits, and an independent bodily movement to bring it within or move it from the range of the said shifting device.

It will thus be seen that by operating the lever i at the desired times in the simultaneous rotation of the different disks c the telephone and keys can be placed in circuit at any desired ones of the stations without thus placing them in circuit at the other stations, so that communication can be established between two or more stations on the same line, or between stations on different lines, while the instruments at all the other stations will be cut off, so that it will be impossible to overhear or interrupt a communication going on between the station at which the instruments are thus placed in circuit.

It is obvious that the disks c may be actuated by a mechanical motor or clock-work and the switches g operated in passing, the single armature-lever i then serving to release the said disks and to operate the switches, and the armature b being dispensed with. The said disk and means for driving it constitute actuating mechanism for presenting the switch to its shifting devices.

A projection, n, is properly located to engage the projection g just before the disks are stopped, and move the switches to the position shown in Fig. 2, thus placing the telephone and keys in circuit at all the stations, so that a subscriber at any station can at once signal and communicate with the central office.

A signal-controlling circuit-closer, shown in this instance as a spring, r, mounted upon the lever i, but insulated therefrom, has its free end just above the end 6 of the armature-lever, so that when the projection g' is above the said end 6 and the armature i' is attracted it

will, in acting upon the said projection g', to move the switch g, also press the spring r into contact with the lever i, closing the circuit between them.

As herein shown, the lever i and spring r are connected with the terminals of the local circuit, including a vibrating signal-bell, S; but it is obvious that the said spring may operate to introduce a signal into the main circuit, as is done in my former patent referred to, or in any other way be operated by engagement with the projection g', either as a circuit closer or breaker, to set the bell in operation as long as the said armature i' remains attracted.

The arbor d is provided with a pointer, t, which co-operates with the dial u in substantially the same manner and for the same purpose as shown in my former patent.

In operation the instruments are all stopped in the position shown in Figs. 1 and 2, the telephone and key being in circuit. If a subscriber desires to communicate with another, he signals the central office by means of the said key k or other signal-transmitting apparatus, and makes known through the telephone what connection he desires. The central-office operator, (after the stops h are disengaged by the action of a negative current,) by sending a positive current interrupted the proper number of times on the circuit of the subscriber with whom the communication is desired, brings the projection g' above the end 6 of the armature-lever i' at the station of the said subscriber, and then by sending a reverse current operates the armature i', causing its lever i to move the switch g to place the telephone in circuit, and at the same time, by the circuit-closer r, to operate the signal at the said station. No other station will be affected, as the projection g' of the apparatus will either have passed or not yet reached the position above the end of the lever i. The central-office operator will also operate the apparatus upon the circuit of the subscriber who is called in the same manner, thus placing his telephone also in circuit, and it will be seen that any number of stations on the same or different circuits can be placed in communication, while all the other stations are cut out and prevented from interfering. When the communication is ended the instruments on the circuits that have been connected will be moved around by the further operation of the armature b until they are all arrested by the lever i in the position shown in Fig. 2, where they will remain until it is again desired to operate them.

I claim—

1. The combination, substantially as hereinbefore set forth, of the controlling-switch having a movement by which the circuit of an instrument is governed, and being retained in a given condition until positively shifted therefrom, mechanism by which the said switch is moved bodily without shifting or changing its condition, and a shifting device by which the said switch is shifted or moved to change the condition of the circuit governed by it only at a definite point in its said bodily movement.

2. The controlling-switch retained in a given condition until positively moved therefrom, combined with actuating mechanism by which the said switch is moved bodily without change in its electrical condition or relation, a stopping device, and a fixed shifting device whereby the said switch is engaged and acted upon just before the actuating mechanism is arrested by the said stopping device, substantially as and for the purpose described.

3. The frictionally-held pivoted switch-lever and actuating mechanism to move it bodily with but not on its pivot, combined with the fixed shifting devices arranged to engage and shift or turn the said lever on its pivot at definite points in the movement of the said actuating mechanism, substantially as described.

4. In a signaling apparatus, an armature-lever and circuit-controlling device mounted thereon, combined with a disk and means to rotate it, and a projection connected therewith, arranged, as described, to co-operate with the said circuit-controlling device at a definite point only in the movement of the said disk, substantially as described.

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