

(No Model.)

2 Sheets—Sheet 1.

G. W. WHITEMORE.

AUXILIARY APPARATUS FOR SELECTIVE ELECTRICAL SIGNALS.

No. 596,036.

Patented Dec. 21, 1897.

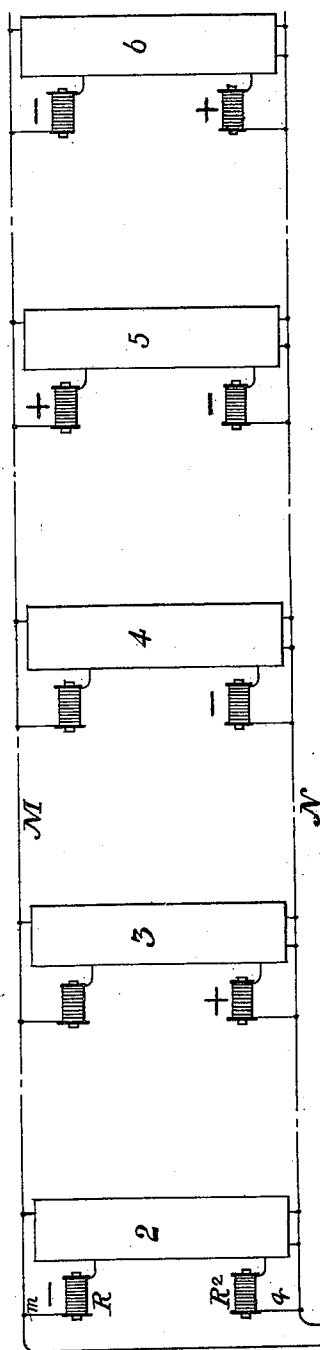
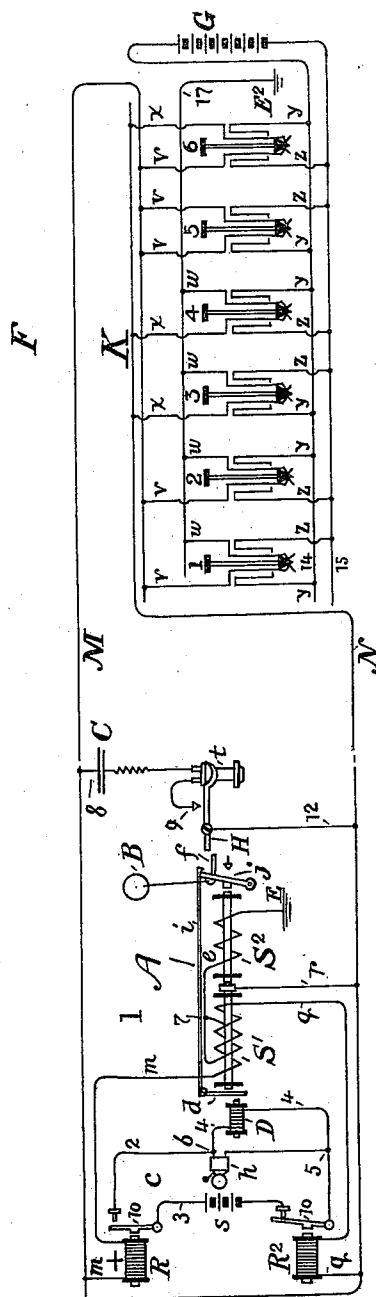


Fig. 2.

No.	M	N	Gi
1	+	0	+
2	-	0	+
3	0	+	0
4	0	-	0
5	+	+	+
6	-	+	-
Unlabeled	-	-	-

Fig. 1.



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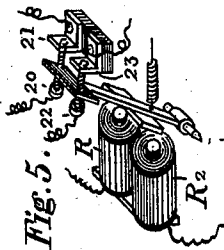
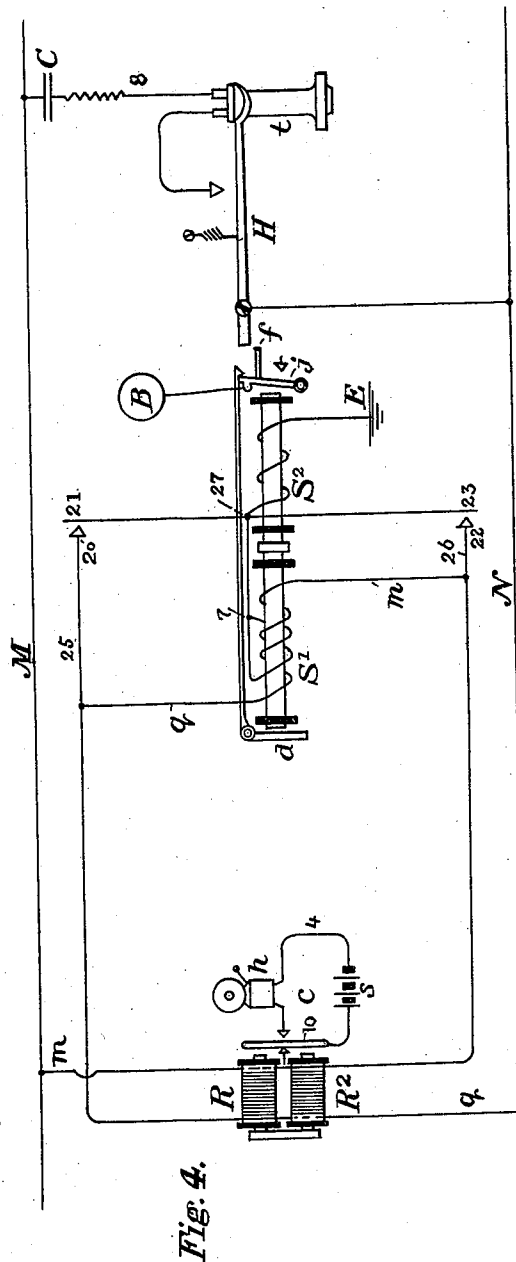
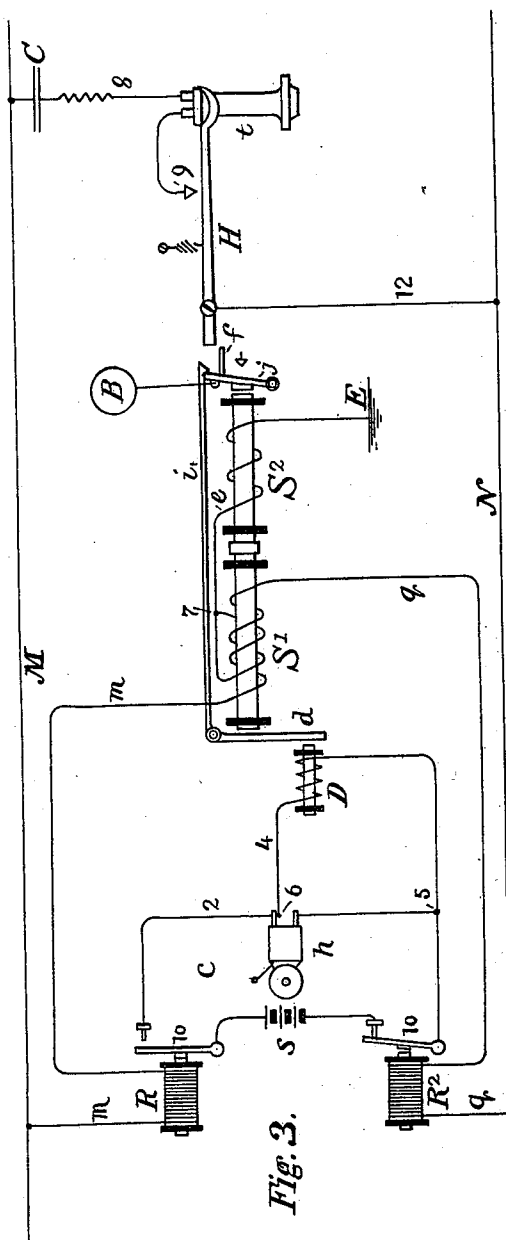
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

GEORGE W. WHITEMORE, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE
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AUXILIARY APPARATUS FOR SELECTIVE ELECTRICAL SIGNALS.

SPECIFICATION forming part of Letters Patent No. 596,036, dated December 21, 1897.

Application filed September 2, 1897. Serial No. 650,400. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WHITEMORE, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Auxiliary Apparatus for Selective Electrical Signals, of which the following is a specification.

This invention relates to auxiliary apparatus for selective electrical signals and directly to that class wherein main-line currents of different direction are employed to operate polarized signal-receiving instruments at the subscribers' stations, as fully set forth in Patent No. 582,107, dated May 4, 1897, granted to myself, John A. Barrett, and Warren M. Craft.

The present invention is supplementary to the said patent; and its particular object is to provide at each substation of a party-line an improved combined telephone-lock and busy-signal embodying the following features: first, a locking device that cannot be unlocked by jarring the box containing it; second, a device so organized that the act of signaling from the central office any one of the substations on the line will automatically lock the other substations on that line, and, third, locking apparatus of such a character that the use of permanent magnets may be avoided, increased range and greater ease of adjustment being obtained by the employment solely of electromagnets.

In carrying out the invention the calling-keys and battery at the central office and the combination of relays at the substations to close local circuits with battery and call-bell are the same as shown in the said patent, to which reference is had. The relays for the individual substations are operated by the same combinations of current; but the means for effectuating the lock-out of the uncalled substations is the particular object of this specification.

The lock-out appliance consists, essentially, of a double electromagnet resembling externally the well-known self-restoring electromagnetic annunciator, and the derived wires from the main circuit to the operating-relays continue in reversed double windings of the coil at the actuating-armature end of the double electromagnet, which end may be

termed the "locking-magnet," uniting as single-wire windings of the coil on the opposite end thereof, which I term the "unlocking-magnet," and to ground. Opposite the single-wound coil end of the electromagnet is hung an armature and shutter held upright by a hook on the end of an arm extending from another armature at the other end of the double electromagnet. The shutter-armature supports a light aluminium vane, which is adapted to serve as a busy-signal and has a pin extending outward from its face toward the path of the telephone hook-switch in such manner that when the shutter is released it is thrust in front of the switch-arm and forms a mechanical obstacle, serving to prevent the switch from rising and closing the telephone-circuit.

An electromagnet in a shunt around the call-bell magnet in the local signaling-circuit operates at the called substation to prevent its shutter from falling and from thereby locking the telephone there as it is energized when the local circuit is closed to ring the bell. All of the ringing-currents will tend to lock the telephones out at all of the substations, including the one called, but the ringing-current of each station is of a character to cause the relays of that station when its call is sent to close the local bell-circuit which contains the shunt-electromagnet, and this becoming energized by the local battery prevents the operative or actuating armature of the double magnet from releasing the shutter-armature, which thus is prevented from falling and locking out the telephone.

In the drawings which illustrate the invention, Figure 1 is a diagram of a party-line having six substations connected thereon, in only one of which is the apparatus shown in detail. The circuit is shown connected with the calling-keyboard at the central station. Fig. 2 illustrates the combination of current necessary to operate each substation. Fig. 3 is an enlarged diagram of the apparatus at a central station. Fig. 4 is a diagram of modified form of apparatus to be used at a central station, and Fig. 5 is a perspective view of a relay employed therein.

L represents a party-line extending from the central station F to the substations 1, 2,

3, 4, 5, and 6 by means of the conductors M and N. It is to be understood that the circuit L terminates in a suitable jack and line-annunciator and that the calling-keyboard K, which is of precisely the same construction, mode of operation, and combination of currents as shown with the circuit in Fig. 8 of said patent, is provided with a connecting-plug.

14 and 15 are wires extending from the poles of the central battery G, from which branches *y* and *z* extend to the outer contacts of the keys, while branches *v*, *x*, and *w* extend from the inner contacts to the main conductors M and N and the ground-wire 17, respectively.

As the apparatus at each substation is the same except as to the adaptability of their relays to predetermined combinations of current, I have shown that of substation No. 1 only in detail, and there R and R² represent relays respectively connected with the main conductors M and N by the branch wires *m* and *g*, which continue from the relay-helices to the double coil S', upon which they are formed in reversely-wound or connected helices, whose ends are joined at point 7 and are there connected with the single winding *e* of the adjacent coil S², which is grounded at E. The relay R is polarized and holds its armature 10 attracted and away from its back contact, while the relay R² is neutral and its armature 10 normally rests upon its back contact. The two armatures are connected to the battery *s* by the wire 3, and their contacts 35 are connected to the bell *h* by the wire 2, forming a local bell-circuit *c*.

A lock-preventing electromagnet D is included in a shunt 4, around the bell *h*, from point 6 to 5.

The double electromagnet A resembles externally an ordinary self-restoring annunciator and is provided with an actuating-armature *d*, located between the poles of the electromagnet D and the coil S, from which extends the lever *i*, having a hook or detent on its end, which engages and holds the drop or shutter armature *j*, provided on its outer face with the locking-pin *f*, which is adapted to fall across the path of the rear arm of the telephone hook-switch H. The shutter is preferably provided with a light arm having on its end a disk B to serve as a busy-signal or indication. The telephone *t* is located in a normally open bridge between the conductors M and N, consisting of the wire 8, which terminates at stop 9 and includes condenser C on one side and the branch wire 12 and substance of switch H on the other side.

The operation of the system is precisely the same as in the patent to which I have referred and need not be described here, except to say that the depression of the several keys 1, 2, 3, 4, 5, and 6 sends to line the combinations of current indicated in Fig. 2 and that the relays R at each substation are organized to close their local circuits *c* when operated by the proper combination.

Whenever a key is pressed, a plus or minus current circulates in one of the conductors M or N or a plus current circulates in one and a minus current in the other conductor, and the coil S' at all the substations will be energized. Under these conditions its core will attract the armature *d*, the shutter *j* will fall, and the hook-switch H will be locked, except at the substation whose relays R R² respond to the current sent to close the local circuit *c*, thereby ringing the bell *h* and energizing the electromagnet D, whose core influences the armature *d* and prevents it from being attracted to the core of the coil S'. Consequently the shutter *j* at such station does not fall, and the telephone-switch H at that station is not locked.

If the shutters *j* at the several substations should be attracted to the pole of the coil S² while a ringing-current is traversing the circuit and causing the attraction of the armature *d*, the shutter will fall after the current has ceased, as it will have passed beyond the reach of the arm *i* as the latter returns to its depressed position.

To unlock the apparatus at the substations, currents of like sign, as shown in the two final combinations of Fig. 2, are sent in parallel over both conductors M and N, which currents neutralize each other in the reversely-wound coils S', but energize the core by means of the coil S², causing the shutters *j* to be attracted and to become locked to the arms *i*.

In the modification shown in Figs. 4 and 5 the relays R and R² are combined into one piece of apparatus, and the local bell-circuit contacts are closed at one movement, and it is thereby easier to keep the signaled station unlocked. In this case the coil S' can be prevented from being energized by short-circuiting its winding through the action of the armature 10 at the station rung, as the said armature in falling back to complete the local circuit *c* closes contact-screws 20 and 22, which are the terminals of branches 25 and 26 from the wires *g* and *m*, respectively, with the back contacts 21 and 23, which are connected at the point 27 between the coils S' and S². In this case the coil S' is shunted *ab initio* and no appreciable current passes through it.

I claim as my invention—

1. In a party-line telephone system, a telephone lock-out appliance comprising the automatic switch-lever; in combination with an electromagnet having two reversely-wound or connected coils in branches extending from the main-circuit conductors respectively, to a ground connection; a second electromagnet having a single coil contained in said ground connection; an actuating-armature for the said double-wound electromagnet; a hook or detent lever attached thereto; an armature or shutter, for the said single-wound magnet normally held in its forward position by the said hook-lever, but adapted to move into its

backward position when released therefrom by the operation of the said actuating-armature, and to be restored to its forward position by the direct attraction of the single-wound magnet; and a locking-pin carried by the said shutter-armature, and adapted to lock and unlock the switch-lever, according as the said armature is in its backward or forward positions; substantially as and for the purposes set forth.

2. In a telephone party-line metallic circuit, a lock-out device at each station, consisting of two electromagnets having the same core, or cores in line with each other, one having two reversely-wound or connected helices, and the other having a single helix grounded at one end, the said two helices being each connected between the remaining end of the said single helix, and the two conductors of the main circuit respectively; an armature-shutter for the single-wound magnet carrying a locking-pin; an automatic telephone-switch moving within range of the said locking-pin, when the shutter carrying the same is in its backward position; an armature for the double-wire magnet; and a hook or detent lever controlled thereby, and normally engaging the said single-wound armature, but adapted to release the same, and lock the telephone-switch on the operation of the said controlling-armature; substantially as described.

3. In a party-line telephone system, a telephone lock-out appliance comprising the automatic switch-lever; in combination with an electromagnet having two reversely-wound or connected coils, in branches extending from the main circuit-conductors respectively to a ground connection; a second electromagnet having a single coil contained in said ground connection; an armature or shutter for the single-wound electromagnet carrying a locking-pin for the said switch-lever; an actuating-armature for the double-wound electromagnet; and a hook-lever attached to said actuating-armature and engaging by its hook the said locking-pin armature, maintaining the same normally in its unlocking position, but adapted to release it when the said actuating-armature is attracted into its forward position; substantially as described.

4. The combination in a two-wire signal and telephone circuit, extending between a central station and a series of substations, of a source of current; and keys to produce different combinations on the conductors of said circuit at the said central station; with lock-out devices at each substation, consisting of a telephone switch-lever controlling the connection of the telephones with the main circuit; locking and unlocking electromagnets having the same core, or longitudinally-adjacent cores, the locking-magnet having two reversely-wound or connected coils in branches between the main conductors respectively and

the ground, and being adapted to respond to currents of both directions in either, or to currents of diverse, direction, simultaneously in both main conductors, and the said unlocking electromagnet having a single coil included in the common conductor extending from the locking-magnet coils to ground, and being adapted to operate for the withdrawal of the lock only when currents of like direction simultaneously traverse both main conductors; a shutter carrying a locking-pin for the said switch-lever, constituting an armature for the unlocking-magnet; an armature for the locking-magnet; and an armature-lever attached thereto at one end and having a detent or hook normally engaging the said shutter-armature at its other end; substantially as and for the purposes specified.

5. In a lock-out appliance for the telephones of the substations of a double-conductor party-line telephone and signaling circuit, the combination with an automatic telephone lever-switch; a compound electromagnet, having on a portion of its core two reversely-wound or connected exciting-coils in earth branches of the two main conductors respectively, and on the remaining portion of said core a single exciting-coil in series with both of the others; an armature for the double-wound end of said magnet, and a detent-lever attached thereto; and an armature-shutter at the other end of said magnet controlled by said lever, and controlling a locking-pin for the said switch-lever; of means as indicated, for preventing the operation of the telephone lock-out at the particular substation which is being signaled, substantially as specified.

6. In a lock-out appliance for the telephones of the substations of a double-conductor party-line telephone and signaling circuit, wherein each station is signaled by a different current combination, an automatic telephone lever-switch; the compound locking and unlocking magnet S' , S'' ; the actuating-armature d ; the locking-armature i and the locking-pin carried thereby; combined with the station-bell local circuit; and the lock-preventing electromagnet D contained therein, and arranged to act on the said actuating-armature, in a direction opposite to that in which it is acted upon by the said locking-magnet at the station whose particular call-current combination is being transmitted; substantially as and for the purposes specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 24th day of August, 1897.

GEORGE W. WHITEMORE.

Witnesses:

ALFRED E. HOLCOMB,
F. M. TWOMEY.