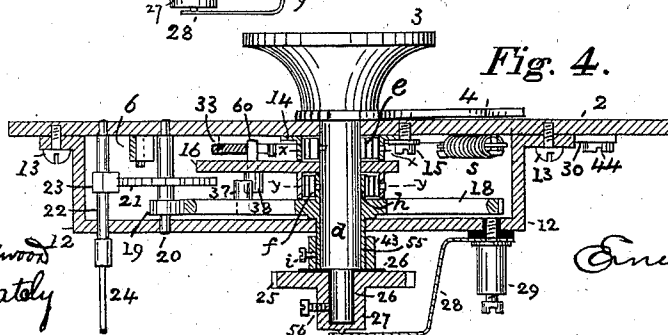
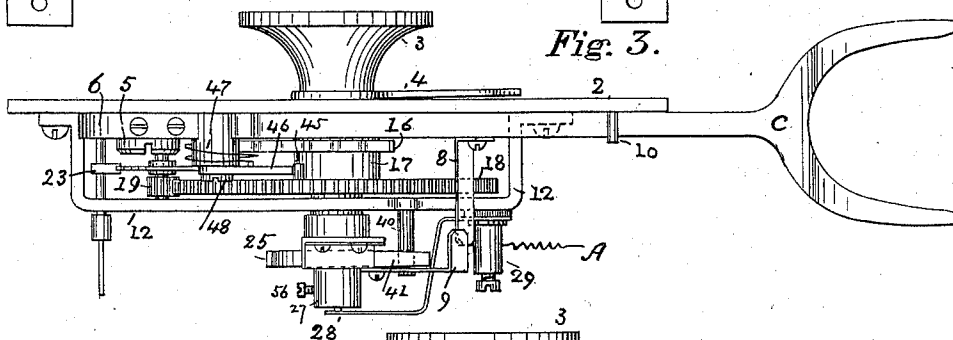
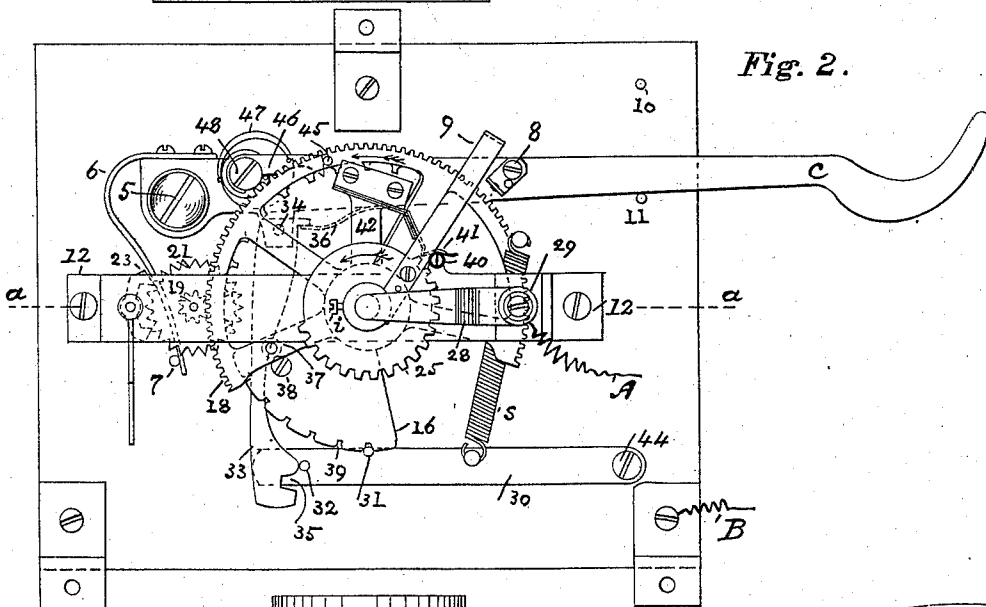
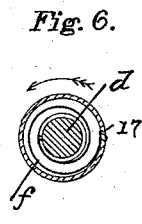
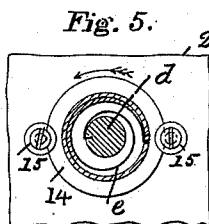
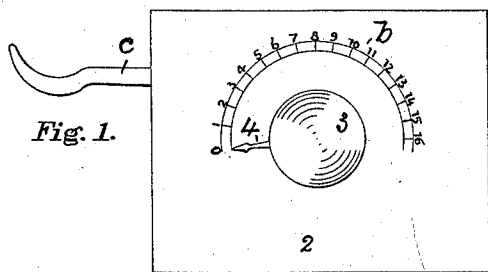


E. C. ROBES.
TELEPHONE SIGNAL TRANSMITTER.

No. 576,472.

Patented Feb. 2, 1897.



Attest.
Thomas D. Lockwood
Joseph A. Gately

Inventor,
E. C. Robes

(No Model.)

2 Sheets—Sheet 2.

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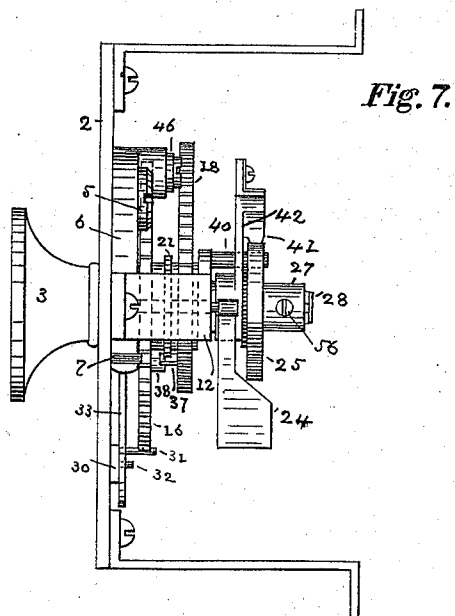


Fig. 7.

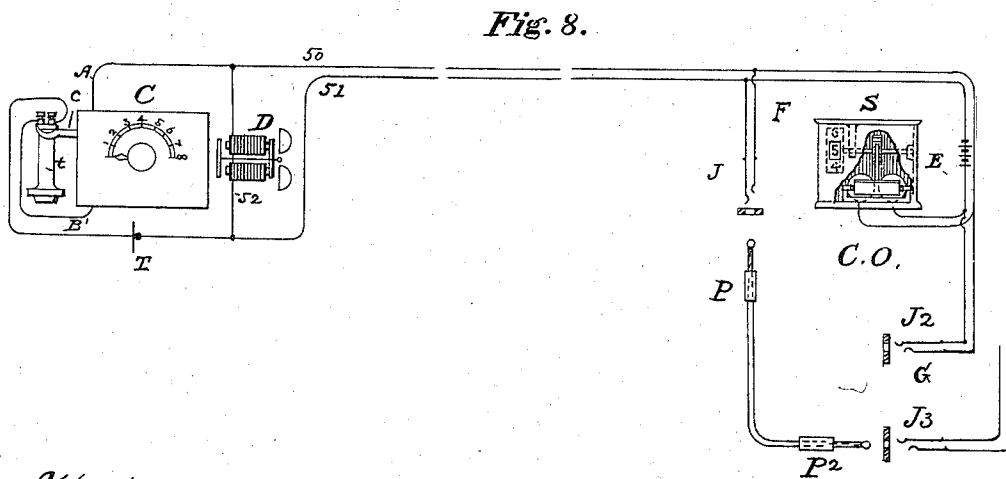


Fig. 8.

Attest.

Phoebe Rockwood
Joseph A. Gately

Inventor,
E. C. Robes

UNITED STATES PATENT OFFICE.

ERNEST C. ROBES, OF MEDFORD, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

TELEPHONE SIGNAL-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 576,472, dated February 2, 1897.

Application filed July 25, 1896. Serial No. 600,477. (No model.)

To all whom it may concern:

Be it known that I, ERNEST C. ROBES, residing at West Medford, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Telephone Signal-Transmitters, of which the following is a specification.

The present invention relates to signal-sending devices for electric circuits, and especially to a form of signal-transmitter for the subscriber's station of a telephone-circuit adapted to automatically send multiple, independent, arbitrary, and determinate signals for the operation of a suitable signal-receiving instrument and provided with means for simultaneously setting the signal-sending mechanism and for winding a motor, and also with means actuated by the telephone hook-switch for releasing the signal-sending and the motor mechanism to operate the signal-receiver for closing the circuit at the substation and finally for restoring the mechanism to its normal condition.

I prefer to describe the invention in connection with the United States Patent No. 559,367, issued May 5, 1896, to Joseph P. Davis, in which is described an invention which permits a telephone-subscriber to designate to an attendant at a central station a particular group of subscribers among which the desired correspondent may be found.

I may employ any suitable signal-receiver, but a device similar to that described in Patent No. 72,742, issued December 31, 1867, to S. S. Laws, in which there is a wheel having upon its rim characteristic signals adapted to be rotated opposite a window or opening by electric impulses from the transmitter, is found to be convenient.

The signal-transmitter may be inclosed in a case at a telephone-substation, and in circuits of modern arrangement may be placed a normally open bridge between the circuit-conductors, with the telephones. It is brought into operation by the conjoint action of a turn-wheel and pointer and the automatic hook telephone-switch. Two ways are provided for connecting the telephone instruments into the circuit and for indicating a call to the central-office operator: First, by

removing the telephone from the hook-switch, which closes a circuit at the substation around the signal-transmitter and causes the signal-receiver at the central office to indicate that a call is made for a substation-line upon the same switchboard-section; second, when a call is to be made for a subscriber whose line terminates upon another section of the switchboard or in another central office the pointer of the signal-transmitter is turned by means of the turn-wheel to the number representing upon the index the section or central office desired, and by removing the telephone from the hook-switch a corresponding number is automatically indicated by the receiver at the central office. The rotation of the turn-wheel and its spindle winds up two springs and places a circuit-breaking signal-transmitting device in position to break and make the circuit a sufficient number of times, and thereby to send a sufficient number of impulses over the circuit to operate the receiver and cause it to indicate the central station or switchboard desired, and the removal of the telephone allows the switch-lever to rise and release the signal-sending mechanism, which is thereupon automatically operated by one of the said springs, and the impulses sent or successive circuit interruptions cause the signal-receiver at the central station to indicate the number representing the said desired station, while at the same time the substation-telephones are connected into the circuit through the circuit-breaker contact and break-wheel.

After the signal has been sent the apparatus comes to a stop, the circuit is closed, and simultaneously therewith the mechanism is automatically locked and cannot be released except by means of the hook-switch. When the telephone is hung up or replaced on the hook-switch, the latter is depressed and releases a second mechanism operated by the second spring, and this acts to restore the pointer to its original or resting position and brings the instrument into readiness for another call. When a substation is called, the telephone is removed from the hook-switch to answer, whereupon the latter rises and closes the circuit around the signal-trans-

mitter to include the telephones, as first described in the calling of the central office, without in any way affecting the signal-sending portion of the apparatus.

5 I will now proceed to describe the invention in detail in connection with the appended drawings, in which Figures 1, 2, 3, 4, 5, 6, and 7 refer to the signal-transmitter, and Fig. 8 to its association in a substation-circuit
10 which terminates in a central station: Fig. 1 is a front view; Fig. 2, a rear view; Fig. 3, a top view; Fig. 4, a section on line *a a* of Fig. 2. Figs. 5 and 6, respectively, are sections on lines *x x* and *y y* of Fig. 4; and Fig.
15 7 is an end view.

Fig. 1 is on a scale of one-half the size of the other figures, and shows the supporting-plate 2, the turn-wheel 3, pointer 4, and index *b*, *c* being the telephone hook-switch,
20 which is represented as being depressed in all of the figures, although the telephone is not shown as being thereon.

The hook-switch *c* is pivoted by the screw 5 to the plate 2 and is limited in its movement by the pins 10 and 11. It is provided with the pawl-detent 46, pivoted thereto by the screw 48 and held in a downward position by means of the spiral spring 47, and when the hook switch *c* is depressed the end of the
30 detent 46 is opposite and in the path of the pin 45 on the spur-wheel 18. The turn-wheel 3 is secured to the spindle *d*, which projects through the plate 2 and supporting bracket or bridge 12 and supports the index-wheel 16,
35 the spur-wheel 18, the hub 43 of the circuit-breaker contact-spring or brush, and the break-wheel 25. A flanged annulus 14 surrounds the spindle *d* and is secured to the plate 2 by screws 15. One end of a volute spring *e* is
40 secured to the annulus, its other end being connected to the spindle. The index-wheel 16 has a hollow hub 17, in which is placed another volute spring *f*, one end of which is secured to the hub and the other to the hub *h*
45 of the spur-wheel 18. The wheel 16 is secured to the spindle *d* and moves with it, while the wheel 18 is loose upon the spindle *d*. The spring *e* winds to the right and the spring *f* to the left.

50 The wheel 16 has a pin 38 in the path of the pin 37 on the wheel 18, and its periphery is divided into depressions or notches equal in number to the divisions of the index *b* on the front of the plate 2, and in one of these
55 notches the pin 31 on the locking-lever 30 normally rests. The lever 30 is pivoted on the screw 44, and the pin 31 is held in the depression in the wheel 16 by the spiral spring *s*. A second locking-lever 33 is pivoted at 34 to
60 the under side of the hook-switch lever *c* and is provided with a lip under which the spring 36 bears, tending to force the lower end of the lever 33 against the pin 32 in the lever 30, while a pin 60 on the wheel 16 normally
65 holds the lever 33 away from the pin 32. The spur-wheel 18 meshes with the pinion 19 on the spindle 20, which also carries a ratchet-

wheel 21, which is provided with an escape-ment 23, located on the spindle 22, which has upon one of its ends a retarding-fan 24. 70

The circuit-breaking contact-spring consists of the hub 43, secured to the hub 55 of the wheel 18 by the set-screw *z*, with an arm 42 extending therefrom upon which is secured the contact-spring 41, the end of which normally rests upon the insulating-pin 40 in the bridge-support 12, which holds it away from contact with the break-wheel 25. The wheel 25 is insulated from the spindle *d* by the thimble 26 and is secured thereto by the set-screw 56. 75 80

29 is a binding-post insulated from but secured to the bridge-support 12, from which a contact-arm 28 extends to the end of the hub of the break-wheel. 85

Fig. 8 shows the signal-transmitter C at a telephone-substation with the telephones T and *t* in a normally open branch between the conductors 50 and 51, which extend to the central station C O. 90

D is a high-resistance call-bell bridged in between the said conductors. At the central office the conductors are shown as being provided with a connecting-socket J and a signal-indicator S at one section F of a switch-board, with connecting-socket J² at another section G thereof and with a battery E. 95

When a subscriber wishes to call the section F or receives a call, the telephone *t* is removed from the hook-switch *c*, which rises and brings the spring 8, Figs. 2 and 3, into contact with the spring 9, closing the circuit from A to B, through screw-post 29, spring 28, hub 27, springs 9 and 8, and plate 2, and including therein the telephones *t* and T. 100 105

If the subscriber wishes to call a substation belonging to another group, or to another section of the switchboard, or to another central office, as the case may be, the wheel 3, with its pointer 4, is turned to the number or other mark of the index *b* by which said section or central office is designated. The rotation of the wheel 3 and its shaft *d* simultaneously performs several operations. First, it winds up the two volute motor-springs *e* and *f* as follows: The spindle *d* rotates in the direction of the feathered arrow in Fig. 5, and winds the spring *e*, its other end being held by the stationary annulus 14. At the same time the end of the spring *f* moves with the wheel 16 and the hub 17, while its other end is held by the hub *h* and wheel 18, which in turn is held stationary by the locking-lever 46. Second, as the spindle *d* is rotated, carrying with it the wheel 16, the pin 31 on the lever 30 is forced down as the successive notches 39 pass over it until the wheel comes to a stop, when it presses into the resting-notch and prevents the wheel from going backward. Third, at the same time the pin 60 moves away from the edge of the locking-lever 33, so that when the hook-switch *c* rises its notch 35 will clasp the pin 32. Fourth, the break-wheel 25 is also rotated in the direction of the feathered arrow, 110 115 120 125 130

Fig. 2, carrying away beyond the bearing-point of the make-and-break contact-spring 41 as many teeth as there are impulses to be sent for the definite signal required. The telephone *t* is then removed from the switch-support, which moves up under the influence of the spring 6, carrying the pawl-detent 46 with it, whereupon the spring *f* is permitted to react and causes the wheel 18 to rotate in the direction of the feathered arrow, Fig. 2, carrying with it the contact-spring 41, which as it moves drops off from the pin 40 and makes contact with as many of the teeth of the break-wheel 25 as have been moved beyond it, after which the pin 37 on the wheel 18 strikes the pin 38 on the wheel 16, and is thereby brought to a stop. Meanwhile the lever 33 has been forced forward by the spring 36 until the pin 32 is engaged by its notch 35, and the mechanism is thereby locked and cannot be operated by the manipulation of the turn-wheel 3 or by any means except by the hook-switch. By this operation, therefore, the signal has now been sent, and the circuit is closed at the substation, and is traced as follows: from A through binding-post 29, spring 28, break-wheel 25, circuit-breaker 41, and the metal parts of the transmitter to the wire B. The operator at the central office seeing the indication on the signal-receiver S, whose signal has been stepped round by its electromagnetic mechanism, actuated by the successive current-impulses, connects the switch-socket J with the switch-socket, say J³, of the trunk or circuit represented by the signal by means of the plugs P and P³ and their cord-conductor. At the end of the conversation the telephone *t* is returned to the hook-switch *c*, which, being depressed, carries down the lever 33, now engaging the pin 32 of the lever 30, and consequently the latter lever is likewise depressed against the pull of the spring *s*, freeing the pin 31 from its notch in the wheel 16, whereupon the volute motor-spring *e* is permitted to react and rotates the wheel 16 and the break-wheel 25 to the right, restoring the pointer 4 to its unison. At the same time, as the pin 38 on the wheel 16 is in contact with the pin 37 on the wheel 18, the latter, with the contact-breaker 41, are also rotated with the wheel 16 and returned to their normal positions. When the wheel 16 reaches the end of its rotation, the pin 60 forces the lever 33 away from the pin 32, and the pin 31 on the lever 30 enters the last notch 39 on the wheel 16, and as the hook-switch comes to rest the locking-lever 46 springs in behind the pin 45. The entire apparatus is thus enabled to resume its normal or quiescent condition.

The escapement 23 controls and retards the reactionary movements of the motor-springs *e* and *f* in a manner well understood.

Having thus described my invention, I claim—

1. A signal-transmitter for a telephone-substation circuit adapted to automatically send

multiple independent arbitrary signals, consisting of a motor mechanism, a signal-sending mechanism, a telephone hook-switch controlling the detents of both, and means for simultaneously setting the required signals, and winding the actuating power of said motor and signal-sending mechanisms; whereby when the signal-sending device is set the motor is wound up, when the telephone is removed from the hook-switch the signal is sent to line and the circuit closed, and when the telephone is returned to the hook-switch the apparatus is restored to its normal condition.

2. A multiple-transmitter signal for a telephone-substation, comprising a motor mechanism for sending the signal, a second and independently-actuated motor mechanism, a device for simultaneously setting or determining the specific signal for transmission and winding both of the said motors, a releasing device for the signal-sending motor actuated by the movement of the automatic telephone-switch as the telephone is removed therefrom, and a releasing device for the said second motor actuated by the opposite movement of the said telephone-switch as the telephone is replaced thereon, the said second motor being adapted to restore the signal-setting device to its normal condition.

3. A signal-transmitter in a normally open telephone circuit or branch comprising means for sending successive independent arbitrary signals, motor mechanism actuating the same, a telephone hook-switch controlling the said motor mechanism, means for closing the circuit round the signal-sending mechanism, and means for closing it through the said mechanism.

4. The combination in a signal-transmitter organized to automatically send multiple determinate signals from a subscriber's station to the central station over a telephone-circuit, of a signal-sending device comprising a circuit-wheel and associated contact-spring; a double spring-actuated motor mechanism; a signal-determining device including a turn-wheel, index-pointer, and a shaft operated by the said turn-wheel, secured to the circuit-wheel and one end of each motor-spring, and adapted to turn the circuit-wheel to any desired point indicated by the index, and to simultaneously wind both springs; and a telephone switch-lever controlling the said double-motor stop devices, and adapted on the removal of the telephone therefrom to allow the said motor mechanism to be actuated by one of its springs in a definite direction to move the contact-spring over the advanced portion of the circuit-wheel, and thereby transmit the signal, and on the replacement of the telephone, to permit the said motor mechanism to be actuated by its other spring in a reverse direction, whereby the circuit-wheel and index-pointer are restored to their normal position.

5. The combination in a telephone-circuit of a signal-transmitter and a signal-receiver,

as set forth, the former being adapted to automatically send and the latter to receive multiple independent arbitrary signals; the transmitter comprising means for simultaneously
5 setting the signal-sending device and for winding the motor; and with means controlled by the hook-switch for releasing the signal-sending device, and also for restoring the mechanism to its normal condition.

10 6. The combination in a telephone-circuit of a signal-transmitter and a signal-receiver, as set forth, the former being adapted to automatically send and the latter to receive successive independent arbitrary signals; the
15 transmitter being provided with means for simultaneously setting the signal-sending device and for winding the motor, and with means actuated by the hook-switch for releasing the signal-sending device and actuat-

ing the signal-receiver, for closing the circuit, 20 and for restoring the mechanism to its normal condition.

7. A signal-transmitter in a normally open telephone-circuit comprising means for sending successive independent arbitrary signals, 25 motor mechanism actuating the same, a telephone hook-switch controlling the said motor mechanism, and means as specified for simultaneously closing the circuit and locking the transmitter mechanism, as set forth. 30

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of July 1896.

ERNEST C. ROBES.

Witnesses:

WINFIELD S. HUTCHINSON

THOMAS D. LOCKWOOD.

Correction in Letters Patent No. 576,472.

It is hereby certified that in Letters Patent No. 576,472, granted February 2, 1897, upon the application of Ernest C. Robes, of Medford, Massachusetts, for an improvement in "Telephone Signal-Transmitters," an error appears in the printed specification requiring correction as follows: In line 81, page 3, the words "A multiple-transmitter signal" should read *A multiple signal-transmitter*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 16th day of February, A. D. 1897.

[SEAL.]

JNO. M. REYNOLDS.

Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,

Commissioner of Patents.