

No. 724,451.

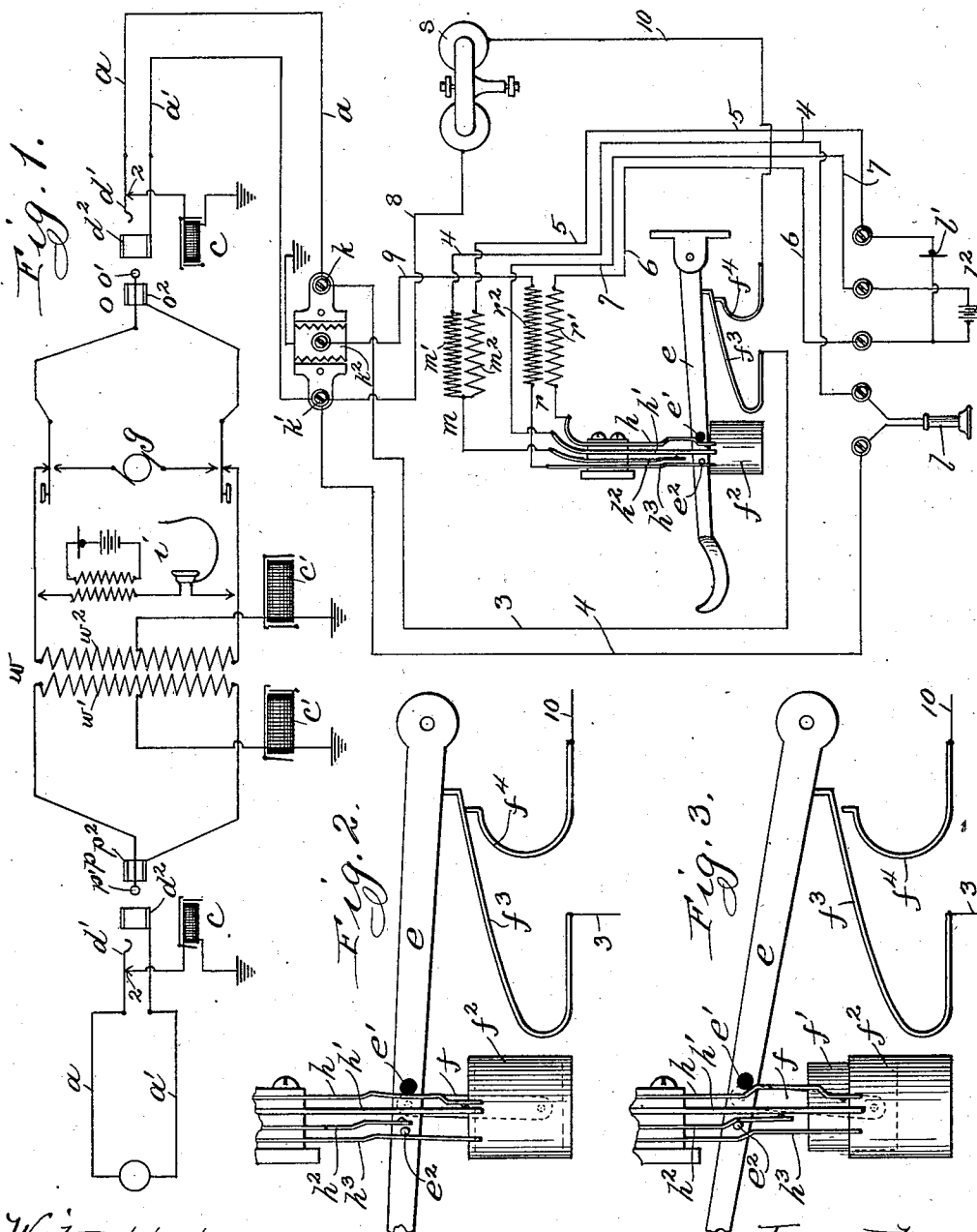
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SIGNALING APPARATUS.

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NO MODEL.



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UNITED STATES PATENT OFFICE.

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SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 724,451, dated April 7, 1903.

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To all whom it may concern:

Be it known that we, FRANCIS W. DUNBAR and WILLIAM W. DEAN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Signaling Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to a telephone system, and more particularly to signaling apparatus for sending signals from the substation to the central station.

It has been the usual practice in telephone systems to employ a magneto-generator at the substation adapted when operated to send a signaling-current to the central station to actuate the individual annunciator or indicator thereat.

It is the object of the present invention to provide means for sending a signaling-current without the employment of the usual magneto-generator. In accordance with our invention we employ a large induction-coil, preferably operated by the subscriber in removing his telephone-receiver from the switch-hook upon which it normally rests. In practice the switch-hook is associated with a suitable spring, which serves when the weight of the telephone-receiver is lifted from the hook to raise the hook, thereby actuating the contacts which control the circuit through the primary of an induction-coil, thereby inducing a current in the secondary of the induction-coil, which passes to the central station to actuate the individual annunciator located thereat. The contacts actuated by the switch-hook are preferably arranged so that circuit is first closed through the primary of the induction-coil, the current continuing to flow for a considerable period to thoroughly magnetize the iron in the core and coils, at the end of which time the circuit is opened to thereby produce in the induction-coil a decided inductive effect, thus inducing a current of substantial value, which will pass to the central station. In order that the current may thus flow for the desired pe-

riod of time, we associate with the switch-hook a retarding device, such as a dash-pot, which limits the movement of the switch-hook as the same is impelled by the spring. The circuit through the primary of the induction-coil may thus be maintained closed for a sufficient length of time to thoroughly magnetize the core and coils before the circuit is opened by the further movement of the switch-hook.

We have illustrated our invention in the accompanying drawings, in which—

Figure 1 is a diagrammatic view illustrating two telephone-lines and connecting apparatus at the central station, one of the lines being illustrated as equipped in accordance with our invention. Fig. 2 is a view showing the switch-hook during its upward movements. Fig. 3 is a view showing the switch-hook in its uppermost position.

Like characters refer to like parts in the several figures.

We have shown upon the left in Fig. 1 the conventional illustration of a telephone-line, the same extending in two limbs a a' to the terminals d' d^2 of the switch-socket at the central station, the line-spring d' normally resting against contact 2, which is connected through individual annunciator to ground. The plug p is provided with the usual tip p' and sleeve p^2 and the plug o is provided with a tip o' and sleeve o^2 . The plugs are united through the windings w' and w^2 of the repeating-coil w . The clearing-out indicator c' is connected between the winding w' and ground. The operator's telephone set i is adapted to be bridged between the strands of the cord connectors, and likewise the calling-generator g is adapted to be bridged between the said strands.

In connection with the telephone-line upon the right we have illustrated the apparatus which constitutes the present invention. The switch-hook e is pivoted at one end and is formed at the other end in the usual manner to receive the telephone-receiver. Upon the hook e are mounted a pin e' of insulating material and a pin e^2 of conducting material. In proximity to the pin e' is a spring h , lat-

erally bent at an intermediate portion, as shown, and adapted when flexed to engage a rigid contact h' . In proximity to the contact h' , but normally out of contact therewith, is a spring h^2 , and a short distance from the spring h^2 a spring h^3 is mounted. When the switch-hook e is in its lower position, as shown in Fig. 1, the spring h rests out of contact with bar h' , as does also the spring h^2 , while the spring h^3 engages pin e^2 . Connected to the switch-hook e by means of a link f is the piston f' of a dash-pot, said piston working in a cylinder f^2 , which is mounted in a stationary position. This dash-pot retards the movement of the switch-hook and may be adjusted in a well-known manner to move at the desired speed.

The switch-hook e is adapted to be moved upward by means of a spring f^3 , the free end of which engages said switch-hook. When the switch-hook is in its lower position, the end of the spring f^3 also engages stationary contact f^4 . The spring f^3 is connected by conductor 3 with the right-hand binding-post k , with which the limb a of the telephone-line is connected. The limb a terminates in line-spring d' at the central station normally resting against contact 2, which is connected to ground through individual annunciator c . The limb a' , terminating in line-contact d^2 , extends to the left-hand binding-post k' . From this binding-post conductor 4 extends through the telephone-receiver l to the winding m' of the induction-coil m . The opposite end of said winding m' is connected with spring h^2 . The spring h^2 is also connected with one end of the winding m^2 of induction-coil m , the opposite end of said winding being connected by conductor 5 through microphone l' with one side of the local battery b^2 at the substation. The same side of the battery b^2 is connected by conductor 6 with one end of the primary winding r' of induction-coil r , the other end of said winding being connected with spring h . One end of the secondary winding r^2 of said induction-coil is connected with spring h^3 and the other end of said winding is connected by conductor 9 with the grounded plate k^2 . The opposite pole of battery b^2 is connected by conductor 7 with the stationary contact h' . The subscriber's bell s is connected between the conductor 8 and the contact f^4 , which is adapted to be engaged by spring f^3 when the hook is in its lower position.

When the receiver is removed from the switch-hook, the spring f^3 moves the switch-hook upward, and the engagement of the pin e' with the laterally-deflected portion of the spring h moves the spring h into contact with the contact h' . The circuit of battery b^2 is thus closed over conductor 7, contact h' , spring h , through winding r' and conductor 6 to the opposite side of the battery. The closing of the circuit through winding r' induces a current in winding r^2 . The induced current in winding r^2 passes through the cir-

cuit, which may be traced from said winding through the spring h^3 , pin e^2 , switch-hook e , spring f^3 , conductor 3, binding-post k , limb a , spring d' , contact 2, through the individual annunciator c to ground, and from ground through plate k^2 and conductor 9 to the opposite side of winding r^2 . Current is thus sent through the individual annunciator c to the central station. As the switch-hook continues to move upward the pin e' serves to maintain the circuit through winding r' closed until said pin e' reaches the upper end of the deflected portion, when the spring h is permitted to separate from contact h' , and the circuit of the battery b^2 through winding r' is thus opened, permitting a second impulse to be induced in winding r^2 , which traverses the annunciator c . This second impulse will be much stronger than the first impulse and is the one relied upon in practice for actuating the annunciator. The deflected portion of spring h is made of sufficient length to close the circuit for a sufficient length of time to thoroughly magnetize the core of induction-coil r before the circuit is opened. A strong induced current is thus insured.

While the switch-hook is raised and during the time when the signaling-current will be traversing the winding r^2 the pin e^2 remains in contact with spring h^3 . When, however, the hook e reaches the upper end of its travel, the pin e^2 is carried out of contact with the spring h^3 , to thereby open the signaling-circuit. The pin e^2 thereupon engages spring h^2 to move the same against contact h' , thereby closing the local transmitter-circuit and the telephone-circuit. The local transmitter-circuit may be traced from battery b^2 over conductor 7, contact h' , spring h^2 , winding m^2 of induction-coil m , conductor 5, microphone l' to the opposite side of the battery. The ringing-circuit may be traced from limb a of the telephone-line and binding-post k , over conductor 3, spring f^3 , spring f^4 , conductor 10, bell s , conductor 8 to binding-post k' , and thence to limb a' . When the switch-hook is in its upper position, the spring f^3 moves out of contact with contact f^4 , and the circuit through the bell s is thus opened.

When the subscriber desires to send a clearing-out signal to the central station, he hangs his receiver upon the switch-hook, and the switch-hook descends, due to the weight of the receiver, first closing the spring h against contact h' and then permitting the same to separate from said contact, whereby currents are induced in the winding r^2 , which will traverse the clearing-out signal c' at the central station. The circuit of the induced current may be traced from winding r^2 through spring h^3 , pin e^2 , hook e , spring f^3 , conductor 3, limb a , contact d' , tip o' , through a portion of the winding w^2 of the repeating-coil to ground, through the clearing-out indicator c' , and from ground to plate k^2 , and thence by conductor 9 to the opposite end of the winding r^2 .

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination at a telephone-substation of an induction-coil for talking and a larger induction-coil for signaling, with a source of current for use with either coil, a switch for closing and opening the circuit through the primary of said signaling-coil and current source, means for causing said circuit to be closed an appreciable and determined time, and a signaling device at the central station adapted to be included in the circuit of the secondary of said signaling-coil, substantially as described.

2. The combination with an induction-coil for talking and a larger induction-coil for signaling, of a source of current for use with either coil, a switch at the substation automatically actuated when the subscriber places his line in connection with the coil for talking, to close and open the circuit through the primary of the signaling-coil, and a signaling device at the central station arranged to be included in the circuit of the secondary of said signaling-coil, substantially as described.

3. The combination with an induction-coil, of a switch at the substation automatically actuated when the subscriber places his line in condition for talking to close and open the circuit through the primary of said coil, and a signaling device at the central station arranged to be included in circuit with the secondary of said signaling-coil, said switch being adapted to finally open circuit through the secondary of said coil, substantially as described.

4. The combination with an induction-coil, of a switch at the substation automatically actuated when the subscriber places his line in connection for talking to close and open the circuit through the primary of said coil, and a signaling device at the central station arranged to be included in circuit with the secondary of said signaling-coil, said switch being adapted to close and open circuit through the secondary of said coil, substantially as described.

5. The combination with an induction-coil for talking and a larger induction-coil for signaling, of a switch at the substation automatically actuated when the subscriber places his line in connection with the coil for talking to close and open the circuit through the primary of the coil for signaling, and a signaling device at the central station adapted to be included in the circuit of the secondary of said signaling induction-coil, substantially as described.

6. The combination with an induction-coil for talking and a larger induction-coil for signaling, of a switch at the substation automatically actuated when the subscriber places his line in connection with the coil for talking to close and open the circuit through the primary of the coil for signaling, said switch before the end of its movement being arranged

to open the circuit through the secondary of the signaling-coil, and a signaling device at the central station adapted to be included in the circuit of the secondary of said induction-coil, substantially as described.

7. The combination with an induction-coil for talking and a larger induction-coil for signaling, of a switch at the substation automatically actuated when the subscriber places his line in connection with the coil for talking to close and open the circuit through the primary of the coil for signaling, said switch in its final movement being arranged to open the circuit through the secondary of the signaling-coil and to close the circuit of the primary of the talking-coil, and a signaling device at the central station adapted to be included in the circuit of the secondary of said signaling-coil, substantially as described.

8. The combination with an induction-coil for talking and an induction-coil for signaling, of a switch at the substation automatically actuated when the subscriber places his line in condition for talking to close and open the circuit through the primary of the signaling-coil, a signaling device at the central station adapted to be included in the circuit with the secondary of said signaling-coil, said switch in its final movement serving to close the circuit through both windings of the induction-coil for talking, substantially as described.

9. The combination with an induction-coil for talking and an induction-coil for signaling, of a switch at the substation automatically actuated when the subscriber places his line in condition for talking to close and open the circuit through the primary of the signaling-coil, said switch being adapted to close the circuit through the secondary of said signaling-coil while the primary circuit is being closed and opened, a signaling device at the central station adapted to be included in the circuit of the secondary of said signaling-coil, said switch in its final movement serving to open the circuit of said signaling-coil and to close the circuit through both windings of the induction-coil for talking, substantially as described.

10. The combination with a metallic telephone-line, of a signal at the central office connected between one limb of said line and a third conductor, an induction-coil at the substation, and a switch at the substation to close and open circuit through the primary of said coil and to simultaneously connect the secondary thereof between the said limb and third conductor, and means to operatively disconnect said coil during conversation, substantially as described.

11. The combination with a metallic telephone-line, of a signal at the central office located between one limb of said line and a third conductor, of an induction-coil located at the substation, a switch automatically actuated when the subscriber places his line in condition for talking to close and open cir-

cuit through the primary of said coil and to simultaneously connect the secondary thereof between the said limb and third conductor, and in the final movement thereof to operatively disconnect said parts and place the line in condition for conversation, substantially as described.

12. The combination with a metallic telephone-line, of a signal at the central office connected with one limb of said line and a third conductor, an induction-coil for talking and a larger induction-coil for signaling at the substation, a hook-switch adapted to connect the induction-coil for talking at the substation with the metallic line, and to automatically connect the signaling-coil with the said limb and third conductor to operate the signal at the central office, substantially as described.

13. The combination with a metallic telephone-line, of a signal at the central office connected with one limb of the line and ground, a pair of induction-coils at the substation and a battery, a hook-switch adapted when relieved of the weight of the receiver to close and open a circuit including the primary of one of the coils and the battery and to connect the secondary of said coil with the said limb of the telephone-line and ground, said switch in its final movement serving to open the circuit through both said primary and secondary windings and to complete circuit through the primary of the other induction-coil and the said battery and to close the secondary of said coil in circuit with the metallic line for talking, substantially as described.

14. The combination with an induction-coil located at the subscriber's station, of a part adapted to be moved when the subscriber places his line in condition for conversation for first closing and then opening the circuit through the primary of said induction-coil, a regulator, as a dash-pot, for retarding the movement of said part to permit the thorough energization of the said winding, and a signaling device at the central station adapted to be included in circuit with the secondary of said induction-coil, whereby when the said primary circuit is opened, a strong current is induced in the secondary circuit to operate said device, substantially as described.

15. The combination with an induction-coil, of a switch-hook adapted when the receiver is removed from the hook or is placed thereon to close and subsequently open the circuit through the primary of said induction-coil, a regulator, as a dash-pot, for retarding the movement of said switch-hook, to permit a continued flow of current through the said primary, and a signaling device adapted to

be included in circuit with the secondary of said induction-coil and to be actuated by the increased current caused by the opening of the primary circuit substantially as described. 65

16. The combination with an induction-coil, of a telephone switch-hook, a spring, *h*, and a stationary contact therefor, said spring having a portion thereof laterally deflected adapted to be engaged by the switch-hook when moved in either direction to press the spring against its contact to first close and then open the circuit through the primary of said induction-coil, and a signal in circuit with the secondary of said coil adapted to be actuated by the induced current therefrom, substantially as described. 70 75

17. The combination with an induction-coil, of the switch-hook, *e*, carrying an insulating-pin, *e'*, of a contact, *h'*, and the spring, *h*, having a portion thereof laterally deflected adapted to be engaged by said pin, *e'*, to press the spring against its contact to thereby first close and then open the circuit through the primary of said induction-coil, and a signal in circuit with the secondary of said coil adapted to be actuated by the induced current therefrom, substantially as described. 80 85

18. The combination with the switch-hook carrying the insulating-pin, *e'*, and the contact-pin, *e²*, the contact, *h'*, the spring, *h*, having a deflected portion against which pin, *e'*, bears when the hook rises to cause it to engage the contact, *h*, and to open circuit between them when the said pin passes off the deflected portion, the spring, *h³*, against which the pin, *e²*, bears as long as the spring, *h*, engages contact, *h'*, and the spring, *h²*, the said pin, *e²*, in its final movement moving from engagement with spring *h³* to spring, *h²*, substantially as described. 90 95 100

19. The combination with a large induction-coil capable of transmitting powerful single impulses, of means at the substation for automatically closing the circuit through the primary of said coil for an appreciable time and for opening the said circuit, and a signaling device at the central station incapable of operation by weak or short current impulses but adapted to be operated by powerful single impulses, said device being included in circuit with the secondary of said induction-coil, substantially as described. 105 110

In witness whereof we have hereunto subscribed our names in the presence of two witnesses. 115

FRANCIS W. DUNBAR.
WILLIAM W. DEAN.

Witnesses:

KEMPSTER B. MILLER,
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