(No Model.)

A. DE KHOTINSKY.

TELEPHONE SUBSTATION APPARATUS.

No. 565,080. Patented Aug. 4, 1896.

Fig. 1.

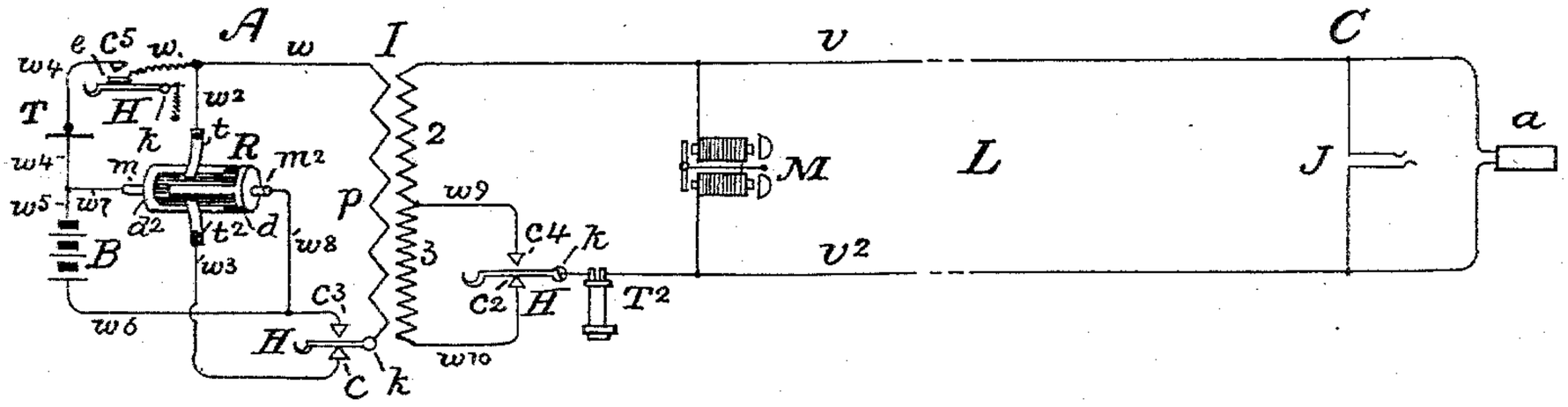


Fig. 2.

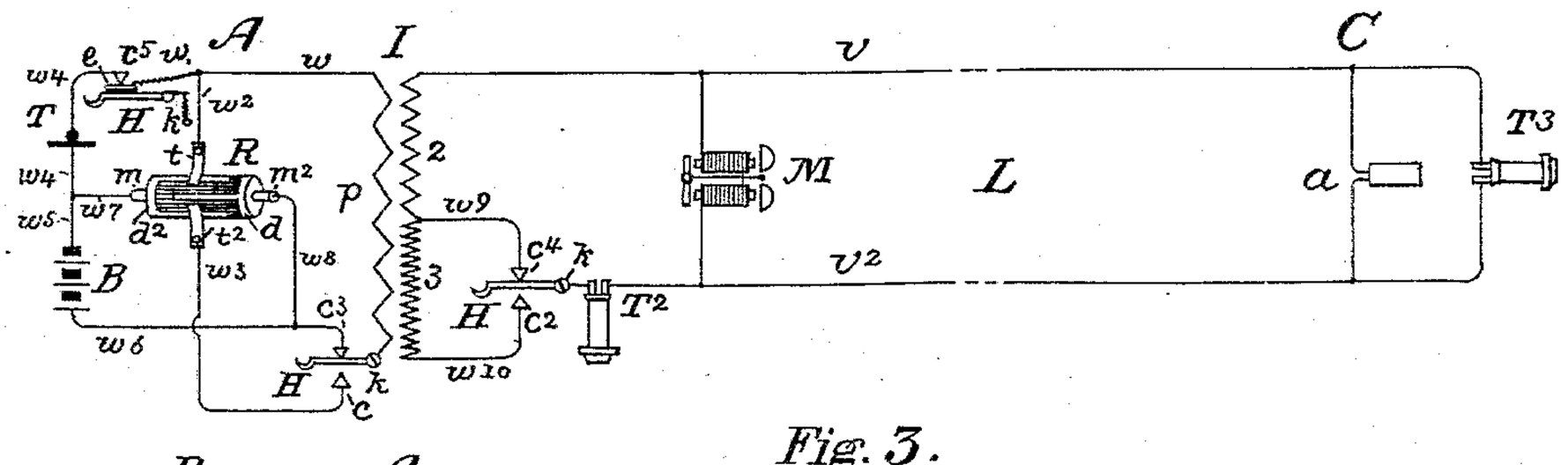


Fig. 3.

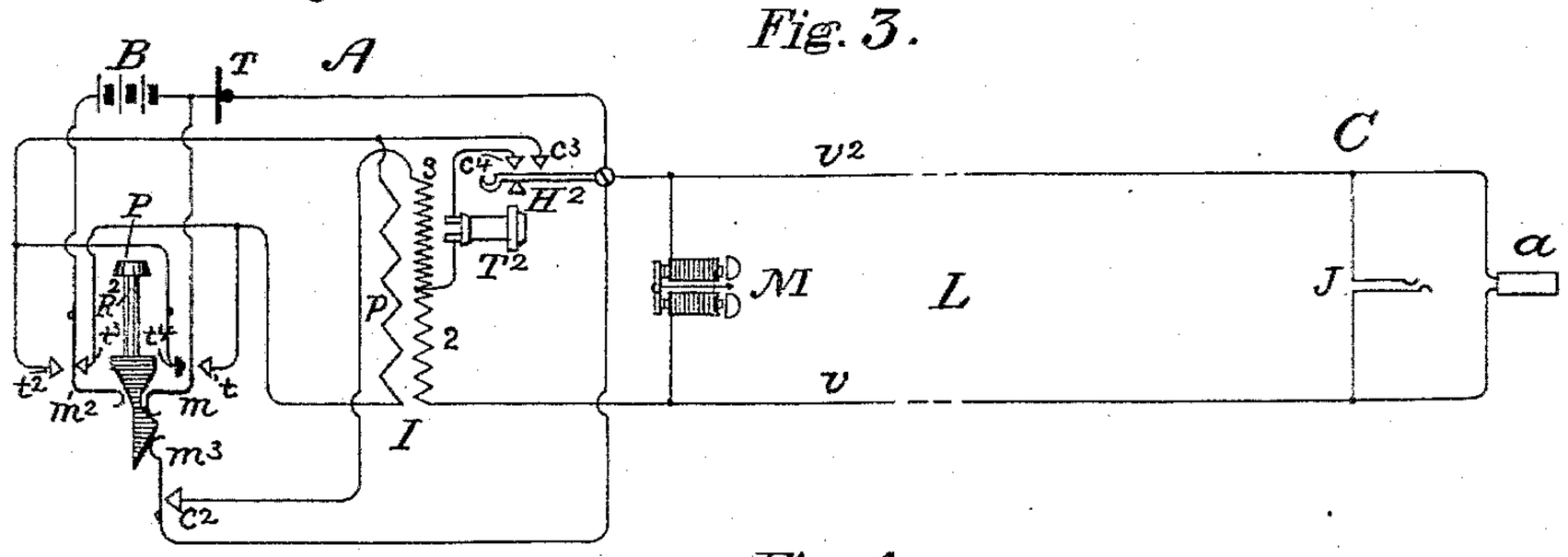
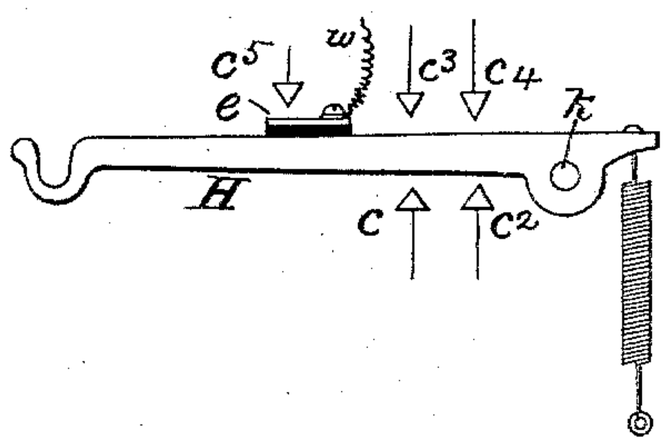


Fig. 4.



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ACHILLES DE KHOTINSKY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF SAME PLACE.

TELEPHONE-SUBSTATION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 565,080, dated August 4, 1896.

Application filed May 23, 1896. Serial No. 592,752. (No model.)

To all whom it may concern:

Be it known that I, ACHILLES DE KHOTINSKY, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Telephone-Substation Apparatus, of which the following is a specification.

The invention relates to apparatus used at the subscriber's station in a telephone system in which the telephone-transmitter and signal-sending device at such stations have a common source of current supply.

The invention consists in the combination, with such transmitter, signaling device, and common source of current supply, of an induction-coil which has different ratios of transformation according as it is operated in association with the transmitter or the signaling device.

The electromotive force required for the operation of the transmitter is not as great as that required for the operation of the signal-sending device. When, therefore, a transmitter and its associated signal-sending device have the same source, it becomes necessary to amplify the original electromotive force of such source to a greater extent when sending signals than when operating the transmitter. I proceed to describe apparatus by which I have accomplished this result.

Figure 1 is a diagrammatic sketch showing a telephone-substation equipped according to my invention, there also being shown, as will hereinafter appear, a portion of the apparatus used at the central station. Fig. 2 is a diagrammatic sketch showing the same apparatus at the subscriber's station, but at a different stage of its operation, and also showing a different condition of apparatus outside of the subscriber's station. Fig. 3 is a modification, and Fig. 4 a detail of Figs. 1 and 2.

Confining the description for the present to Figs. 1 and 2, A is the substation, C the central station, and L the main circuit.

T is the telephone-transmitter.

R is a rotary commutator or current-reverser, serving in this instance as the signal-sending device.

B is the source of current supply, and I an induction-coil having, as shown, a single primary winding p, and in series with each other a secondary winding 2 and a tertiary winding 3, both wound in the same direction.

H is a switch forming the telephone support or hook for the receiving-telephone T^2. When the receiving-telephone is upon the hook, the switch H rests upon contact-points c c^2, making electrical connection therewith; but when it is not upon the hook the switch is in contact with points c^3, c^4, and c^5, its stem making electrical connection with two of them, c^3 and c^4.

In the drawings the hook-switch H is shown as three levers, but in actual construction there is but a single lever pivoted at k, where it is in permanent electrical connection with one side of the main circuit L and with one end of the primary p of the induction-coil. It also makes an electrical connection between a conducting-plate e, carried by the switch-lever but insulated therefrom, and the third upper contact-point c^5. This plate e is in permanent electrical connection by a conductor w with the other end of the primary p of the induction-coil, and by a second conductor w^2 with one of the contact-springs t of the current-reversing device R. A second contact-spring t^2 is, by conductor w^3, in permanent connection with point c. Conductor w^4 unites contact-point c^5 with one electrode of the telephone-transmitter T, as shown. Conductor w^5 connects the other electrode of the transmitter with one pole of the battery or other source of current supply B, while w^6 connects the other pole of said source with contact-point c^3.

Conductors w^7 and w^8 respectively connect terminal m of the rotary current-reverser R with conductor w^5 at a point between T and B and terminal m^2 with contact-point c^3.

The conductor w^9 connects the secondary 2 and tertiary 3 of the induction-coil I at the point of their union with contact-point c^4. The other end of the secondary 2 is in permanent connection with the side v of the main circuit L, while the other end of the tertiary 3 is in permanent connection, by conductor w^{10}, with contact-point c^2. In practice the tertiary 3 is wound with a larger number of turns than the secondary 2.

M is the subscriber's bell, bridged between the two sides of the main circuit L, as shown.

At the central station, Fig. 1, J is the subscriber's spring-jack or switch-socket, and a his calling-annunciator.

In Fig. 2 two subscribers' circuits are represented as united for conversation, a being the disconnecting-annunciator, and T^3 the distant subscriber's telephone.

Normally the receiving-telephone T^2 is upon the switch-hook H and the two contact-springs t and t^2 of the current-reverser R are upon non-conducting segments of the said reverser. Under these conditions the source of current supply has its circuit open, both through the transmitter T and through current reversing or changing device R, while the main circuit is closed through the receiving-telephone T^2 and the secondary and tertiary windings of the induction-coil, the bell M being in a bridge of the main circuit in parallel with the said induction-coil windings.

The line being in the normal condition shown in Fig. 1, the subscriber at station A to send a call-signal turns the crank of the current-reverser R, causing the operation of the annunciator a at the central station. The local calling-circuit may be thus traced, beginning at the positive pole of the battery: by conductors w^6 and w^8, through terminal m^2 of conducting-segment d and contact-spring t^2 of the current-reverser R, and by conductor w^3, lever-hook H, primary p of the induction-coil I, conductors w and w^2, contact-spring t, segment d^2, terminal m, and conductors w^7 and w^5 to the other pole of the battery. As the crank is turned the reversals of current produced in the primary p of the induction-coil induce high-potential currents in the secondary 2 and tertiary 3, acting as a single winding, which are transmitted through the main circuit to operate the annunciator a at the central station. When the telephone is removed from the hook, the contact-springs t and t^2 rest upon the insulating-segments, and the local circuit of the battery, which it is unnecessary to further trace, is thus closed through the telephone-transmitter T and primary p; nor is it necessary to trace and describe the main circuit further than to say that the tertiary 3 of the induction-coil is now cut out, as shown.

In the modification illustrated by Fig. 3 a push-button or current changing or reversing key is substituted for the rotary current-reverser, and the said key performs also some of the functions exercised in Figs. 1 and 2 by the telephone switch-hook H; but this involves no change either in the general mode of operation or in the result to be attained.

R^2 is the current-changing key surmounted by a manipulating-button P. It is so placed with reference to the contact-springs m, m^2, and m^3 that it controls the connection of m and m^2 with their respective contact-points t, t^2, t^3, and t^4 and the connection of m^3 with the point c^2.

Normally the talking-circuit of the secondary 2 of the induction-coil is open at c^4 and is controlled by the hook-switch H^2, the receiving-telephone T^2 being contained therein, between the said point c^4 and one terminal of the said secondary, the other terminal thereof being in permanent electrical connection with the main-circuit conductor v. The main signaling-circuit, including the secondary and tertiary windings 2 and 3 of the induction-coil, is also open at c^2, and when closed by the operation of the key R^2 the free end of the tertiary coil 3 is electrically united with the main-circuit conductor v^2.

The contact-spring m, representing one pole of the battery, is free from contact with either of its points t or t^4, and the contact-spring m^2, representing the other pole of the battery, is in contact with point t^3 and out of contact with point t^2.

The key R^2 is operated by pressure on the button P and is restored when the pressure ceases by a helical spring (not shown) in a manner well understood. When the key is depressed to send the signal, it successively makes contact between spring m^3 and c^2, makes contact between spring m and point t^4, breaks the existing contact between m^2 and t^3 and also that just formed between m and t^4, and finally makes contact between m and t and between m^2 and t^2. The first of these actions results in closing the main circuit through the secondary and tertiary of the induction-coil in series, the second in closing the local circuit of the source B through the primary p of the induction-coil; third, in again opening the primary and battery circuit at both poles, thus interrupting the flow of current through the primary winding, and, fourth, in once more closing the said battery-circuit with poles reversed, permitting the battery-current again to flow through the primary p but in the reverse direction.

When pressure is removed from the key P, it returns to its normal position, making the above changes once more, but in reversed order, and the reversals of current which occur in the primary p induce an oscillatory current of high electromotive force in the secondary 2 and tertiary 3, which, passing to the line, actuate the signal a at the distant stations exactly as in the plan indicated by Figs. 1 and 2.

It is obvious that all of the changes described above could be brought about, if desired, by contacts to be made and broken by the movements of the telephone-hook-switch lever, so that they might be effected automatically when the telephone is removed for use or replaced.

Since an important feature of my invention is an induction-coil whose ratio of transformation is greater when employed to send signals than when used in talking, it is obvious that I am not restricted to an induction-coil having the construction described above.

I may, for instance, employ an induction-coil with a single primary and several sec-

ondaries, connecting the said secondaries in parallel with each other for telephonic transmission and in series with each other to send signals; or I may wind my coil with a single secondary and several primaries, giving a high ratio of transformation to send signals when the primaries are connected in parallel, and a low ratio of transformation to transmit conversation when they are connected in series.

Having now fully described my invention and its mode of operation, I claim—

In a telephone-station apparatus, the combination with a telephone-transmitter, a current-changing signal-sending device, and a source of current supply common to both, of an induction-coil for transforming the currents of said source of supply in both talking and signaling, having different ratios of transformation, according as it is operated in association with the transmitter, or with the signaling device.

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

ACHILLES DE KHOTINSKY.

Witnesses:

GEO. WILLIS PIERCE,

JOSEPH A. GATELY.