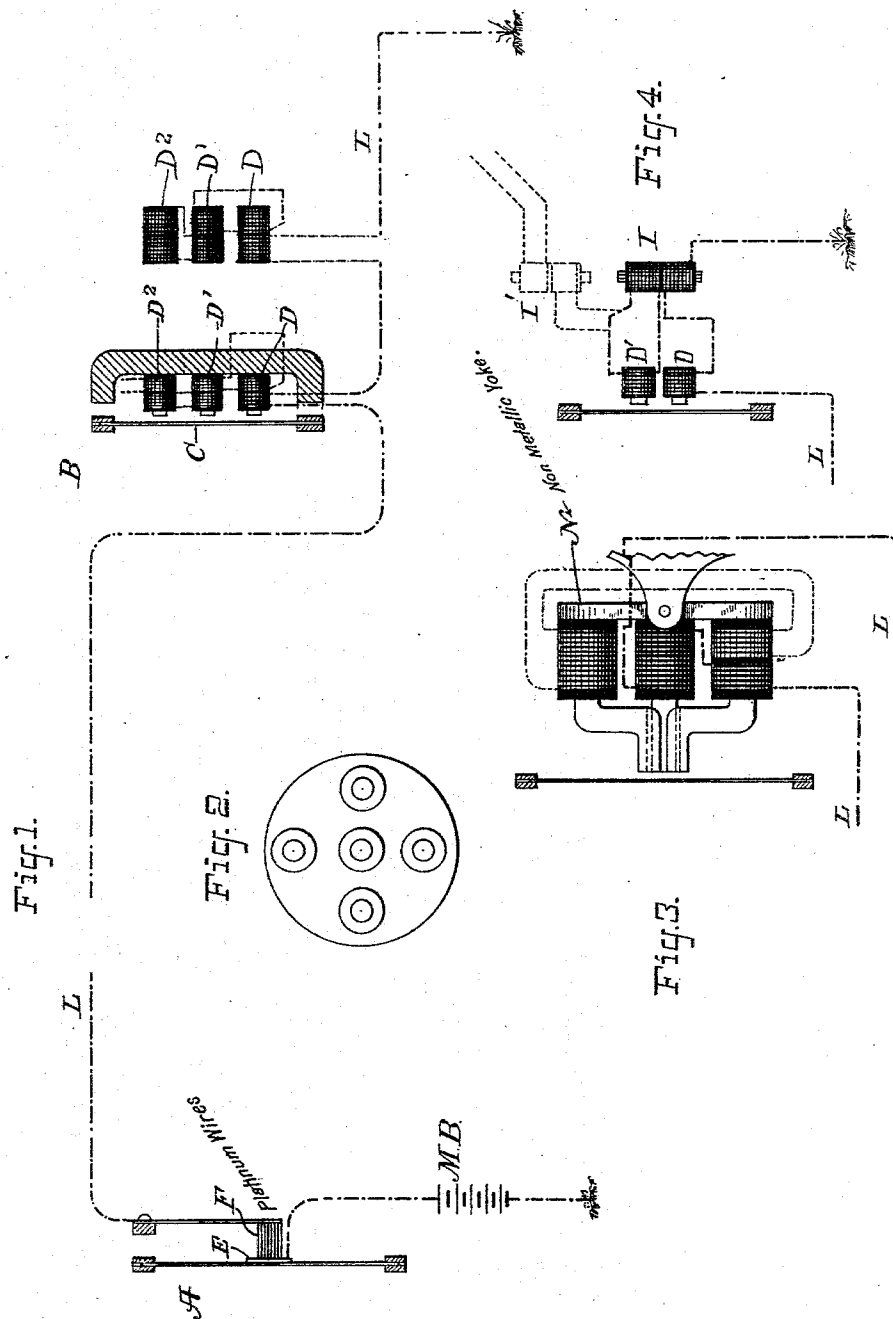


(No Model.)

C. SELDEN.
TELEPHONE RECEIVER.

No. 515,797.

Patented Mar. 6, 1894.



ATTEST:
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UNITED STATES PATENT OFFICE.

CHARLES SELDEN, OF BALTIMORE, MARYLAND.

TELEPHONE-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 515,797, dated March 6, 1894.

Application filed December 10, 1889. Serial No. 333,259. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SELDEN, a citizen of the United States, and a resident of Baltimore, in the State of Maryland, have invented a certain new and useful Telephone-Receiver, of which the following is a specification.

My invention relates to telephone receiving apparatus designed for use on telephone lines in connection with a telephone transmitter of any desired construction but more especially adapted for use with a telephone transmitter in which the transmitting contacts are of metal as in the form of transmitter hereinafter referred to.

My invention consists in a novel compound telephone receiving apparatus in which two or more electro magnets are properly combined or connected to act in conjunction for producing the sound impulses, the magnetic pulses of the several magnets being however made to follow or be delayed one beyond the other slightly instead of being substantially coincident or simultaneous in all the magnets. This dissimultaneous or successive action I bring about through electric induction. Thus, for instance, in the case of a compound telephone receiver having two magnets, one of such magnets would be energized by electric impulses following or corresponding to the electrical changes produced by the transmitter, while the second magnet would be energized by impulses inductively produced by the currents which flow in the coils of the first magnet or by currents exactly following or coincident with the same. In case the invention be extended to include a series of three or more magnets, each magnet of the series would receive its energizing electric impulse by induction from the circuit including the coil of the preceding magnet of the series or by induction from a circuit where the electric impulses exactly follow or coincide with those which energize such preceding magnet.

My invention is applicable to any form of telephone receiver, though for the sake of illustration I have herein illustrated it as carried out in connection with a receiver wherein a diaphragm is employed.

I prefer, in carrying out the invention, to generate the series of induced impulses for the successive magnets of the receiver by

means of coils each placed on the magnet core of a preceding magnet in the series and connected to the energizing coil of the succeeding magnet. The effect of energizing the magnets in rotation by inductive actions transmitted from one to the other of the series of circuits is in effect to slightly prolong the action of any received electric impulse generated or transmitted over the line.

By my invention there is a tendency to tide or bridge over the effects produced by sharp or sudden pulsations so that although the intermittent currents or electrical pulsations may be severe or sudden enough to produce in an ordinary receiver a confused or inarticulate sound, they will each, in my form of receiving apparatus, produce magnetic effects for each electrical impulse which will exist in the receiver as pulsations following or succeeding each other so as to be blended into a single impulse, and the practical use of a telephone apparatus will become feasible although its transmitter may be so delicately adjusted as to produce frequent makes and breaks of the circuit when spoken into forcibly.

In the accompanying drawings:—Figure 1, is a diagrammatic view illustrating my invention. Fig. 2, is a plan of a series of magnets in a receiver embodying my invention. Fig. 3, illustrates in side elevation a modification in the manner of arranging the several magnets. Fig. 4, illustrates a modification in the manner of producing the successive electric inductions from one to the other of the magnets or magnet circuits.

Referring to Fig. 1, L, indicates an electric line of any desired construction connecting a telephone transmitter A, and the receiving instrument B, of my invention. C, indicates the diaphragm of a telephone, upon which act the several magnets D, D', D'', &c. These magnets are properly mounted in any support or casing as well understood in the art with their poles presented to the diaphragm or armature. This support or casing is of non-magnetic material so that the cores of the magnets are practically independent of one another or are free from a magnetic induction from one to the other which would cause them to operate practically as one magnet through the action of any current circulating in the coil of either.

In the form of my invention shown in Fig. 1, the electrical induction from the circuit of the coil of one electro magnet to the circuit of the next is produced by the agency of coils on the cores of said magnets. The main line coil of magnet D, is included in the line circuit to earth as shown, but upon the core of said magnet is placed an additional coil subject to the electric induction of the first and connected in turn with a coil for energizing magnet D'. The energizing coil of magnet D² is connected to a coil on the core of D', which latter coil acts as the secondary to the energizing coil of said magnet. Any number of magnets may be joined in series and inductively related as described, and may be disposed in any desired manner with relation to the diaphragm or in a suitable sound case or resonator.

As shown in Fig. 2, the magnets are arranged concentrically around a central magnet which may be the line magnet or one which receives the primary inducing impulse flowing over the line circuit. If it is desired to concentrate the magnetic actions upon the center of the diaphragm the cores of the outside magnets may have their poles prolonged so as to surround the pole of the central magnet as illustrated in Fig. 3.

The telephone transmitter which I prefer to employ is provided with two contacts or electrodes E, F, of metal such for instance as platinum, though other materials may be employed. One of the electrodes, as F, consists of a wire brush which has a bias toward the opposite electrode E, through any suitable influence as a spring or gravity. The electrode E, may have a plain or roughened surface upon which F, bears. The circuit from the battery or generator M, B, is through said electrodes as indicated to line and through the coils of magnet D, to the earth or return circuit. The form and manner of mounting the electrodes are immaterial and may be varied indefinitely. On the production of any electric pulse or change of electrical condition on the line L, the magnet D, will be energized. Attendant upon such action is the development of an electric impulse in the coils connected with the energizing coil of magnet D', which impulse in turn results in the production of an energizing impulse for magnet D², and so on through the series of magnets in such way as to slightly prolong the primary energizing effect which would be produced alone if magnet D, were alone depended upon to set up an audible impulse.

If but one magnet were employed or a series of magnets whose cores are in sufficiently close inductive proximity to make them operate as substantially one magnet, then any single electrical pulse or vibration in the coils of the magnet would cause the diaphragm to move from its normal position and allow it to return to normal position instantly, the period of its to and fro movement coinciding substantially with the period of the pulse or

vibration. In my invention, however, such an electric pulsation would have the same effect upon the diaphragm and the diaphragm would at once return to its normal position were it not for the fact that immediately following and in succession, other magnets are energized having an effect upon the diaphragm and allowing it to return to its normal position gradually and by degrees rather than instantly and violently as in other systems. The effect is, therefore, a practical retention of control over the diaphragm for a greater period of time for the same initial pulsation, and this prolongation is such that a cessation of pulsation on the main line would be permitted and yet the diaphragm would be controlled or held up to a certain extent by the additional magnets, and tone and speech, which would be otherwise lost become intelligible owing to the diaphragm returning to its normal position, are, reproduced.

I find in practice that exceedingly beneficial effects are produced by the employment of a compound receiver such as hereinbefore described in those cases where with ordinary forms of receiver the action of the transmitter is such as to produce sounds which are so confused as to make the apparatus practically useless. This beneficial effect I attribute to the prolongation of each pulse through the succession of inductive actions before described, but it is to be understood that I do not bind myself to such theory of action since it is possible that the effects noted by me may be due to other interactions or combined effects of the magnets energized at different points in a train of inductive operations.

The form of receiver shown works well with the form of transmitter described.

In the form of receiver shown in Fig. 3, the several magnets are connected at their rear by a non-magnetic yoke N, in which the cores are secured. The same non-magnetic yoke practically exists in the form of receiver shown in Figs. 1, and 2, where the magnet cores are supposed to rest in a wooden case.

In Fig. 4, I have illustrated a way in which the same electrical and magnetic effects may be produced by the employment of a separate induction coil I, which contains, as a primary, a coil in the circuit with the energizing coil of magnet D, and has as a secondary the coil which is connected to the energizing circuit of the magnet D'. In case other magnets were employed it would be necessary, according to the plan shown in Fig. 4, to use another induction coil as I', shown in dotted lines the primary of which would be connected into the circuit with the energizing coil of D'. By this means the before described succession of inductive actions could be produced obviously with the same practical effect as in the case of Fig. 1. It will be seen that in the case of Fig. 1, the coils and cores connected as described are practically induction coils, each energizing coil for the magnet being likewise

a primary while the coil on the same core connected to the next energizing coil is the secondary therefor.

What I claim as my invention is—

5 1. In a telephone receiver two or more magnets having magnetically independent cores and operating in conjunction but in immediate succession to produce sound impulses, one of said magnets having a coil which carries
10 currents received from the line while the others are excited in succession by inductive currents of the first, second, third, &c., order primarily induced from the line current.

15 2. In a telephone receiver a number of dissimultaneously acting electro-magnets operating in conjunction to reproduce the transmitted sound and excited respectively by induction currents at different points in a series of magneto-electric inductive actions primarily produced by the main line current.

20 3. The combination in a telephone receiver, of a diaphragm, a central solid magnet core acting thereon, and one or more supplemental magnet cores conformed to the first and having their pole ends arranged like the first in

proximity to the center of the diaphragm constituting the armature of the magnet.

4. The combination in a telephone receiver, of a diaphragm and two or more magnets the pole ends of which are disposed near the diaphragm, said magnets being connected and placed in circuits forming links in a chain of induction, as and for the purpose described. 30

5. The herein described improvement in reproducing vocal sounds corresponding to electric pulsations sent from a transmitter, consisting in setting up by said pulsations a train of consecutive electric inductions and producing the mechanical sound effects by the compound action of consecutive magnetic pulsations developed individually by electric pulsations which being at different parts of the train of electric inductions are definitely displaced or delayed behind one another. 35 40

Signed at Baltimore city and State of Maryland, this 9th day of December, A. D. 1889. 45

CHARLES SELDEN.

Witnesses:

MURRAY HANSON,
WILLIAM H. BERRY.