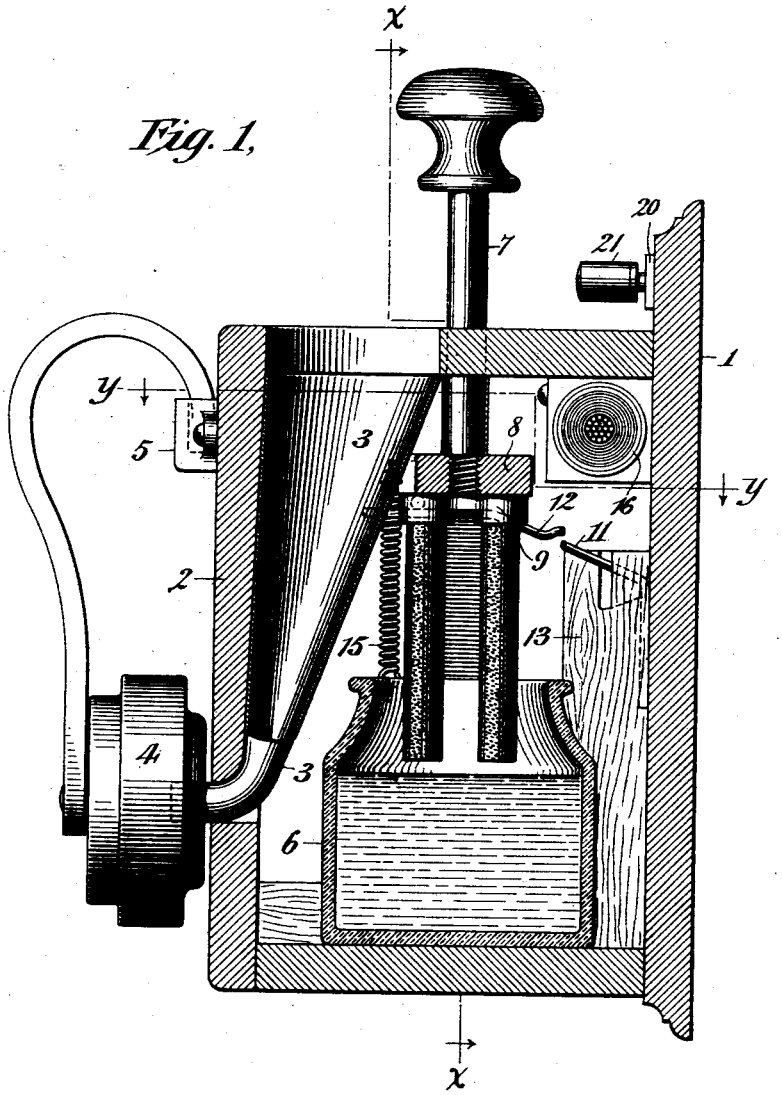
(No Model.) 3 Sheets—Sheet 1.

E. T. GILLILAND.

TELEPHONE CALL SYSTEM.

No. 525,702. Patented Sept. 11, 1894.

Fig. 1,



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(No Model.) 3 Sheets—Sheet 2.

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TELEPHONE CALL SYSTEM.

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Fig. 2,

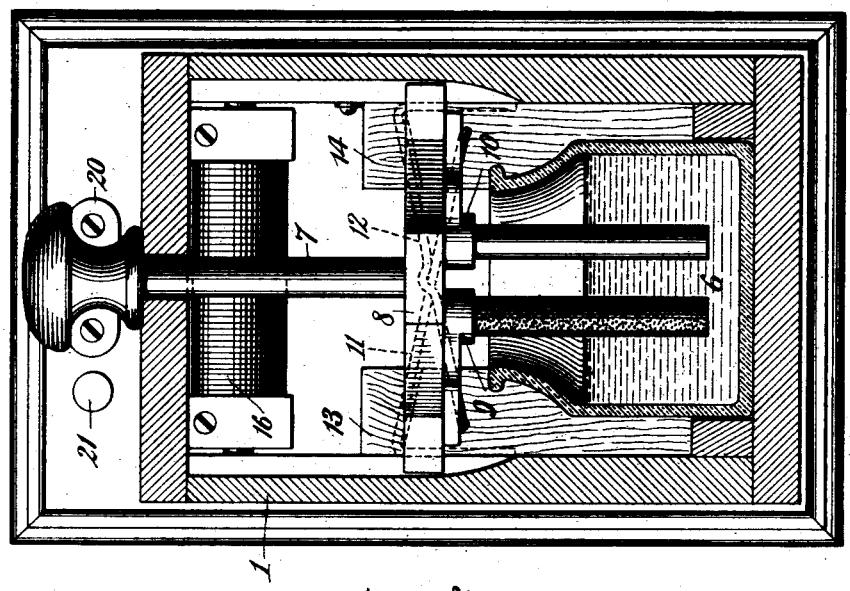


Fig. 4,

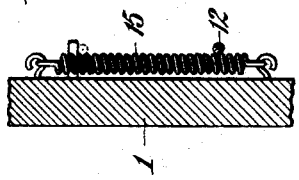
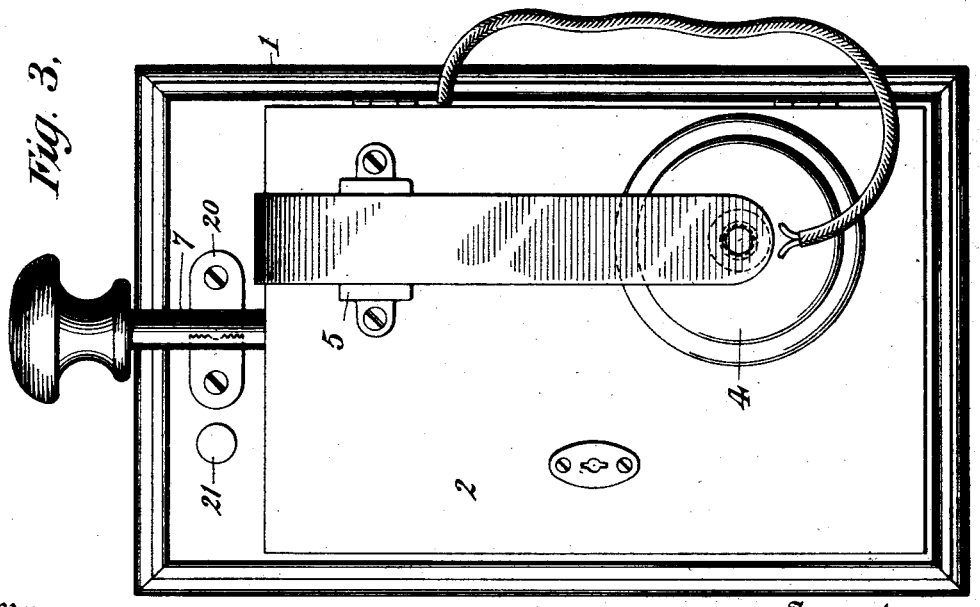


Fig. 3,



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(No Model.) 3 Sheets—Sheet 3.

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TELEPHONE CALL SYSTEM.

No. 525,702. Patented Sept. 11, 1894.

Fig. 6.

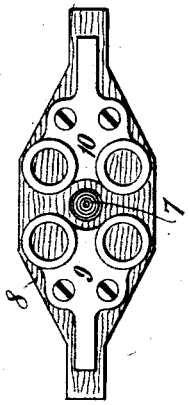


Fig. 7.

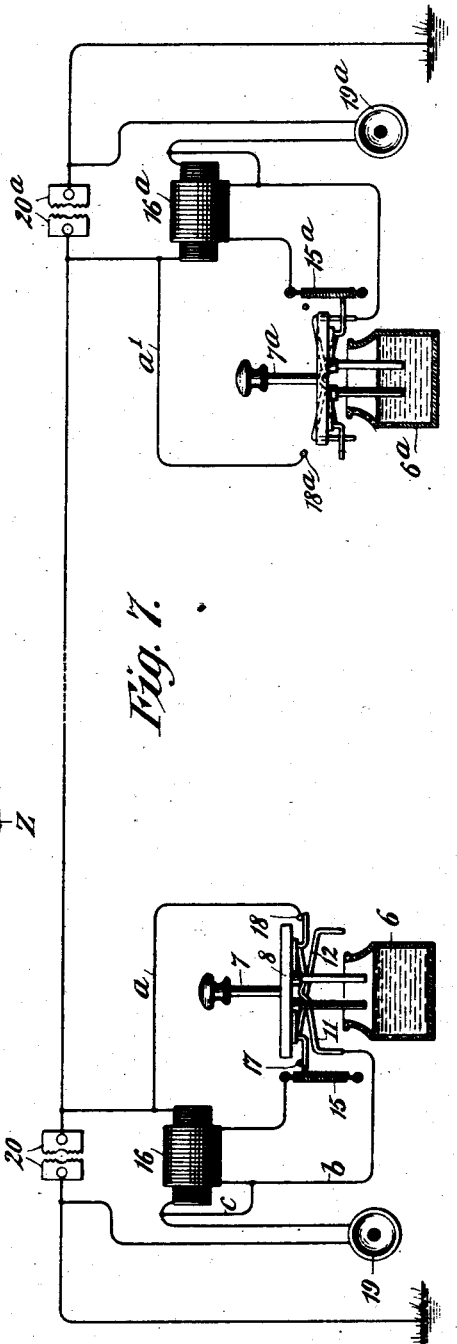
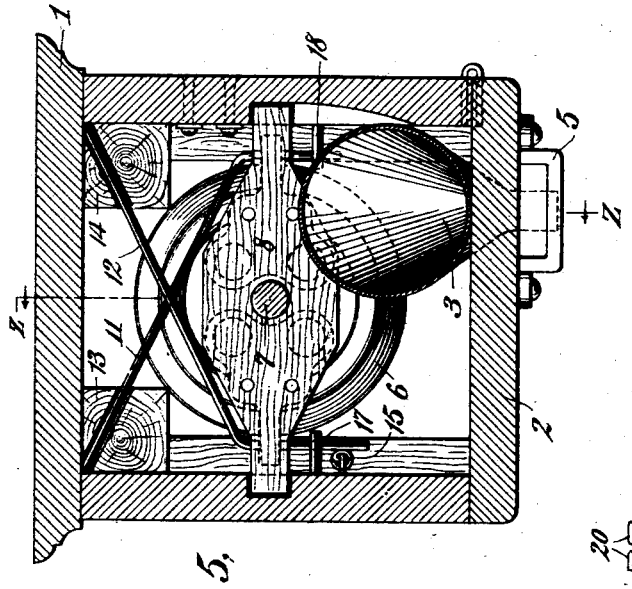


Fig. 5.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-CALL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 525,702, dated September 11, 1894.

Application filed November 27, 1893. Serial No. 492,065. (No model.)

To all whom it may concern:

Be it known that I, EZRA T. GILLILAND, a citizen of the United States, residing at Pelham Manor, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Telephony, of which the following is a specification.

This invention relates to telephony, its principal object being to produce a cheap and efficient apparatus which may be used for establishing telephonic inter-communication between two or more stations.

The invention involves various features, some of which may be used independently of others, but in its organized form comprises a magneto telephone instrument which may act either as a transmitter or receiver, and connections by which such instrument is ordinarily in the line circuit, and means for imposing upon such line circuit intermittent or pulsatory currents, which, passing through the receiver, will actuate its diaphragm and produce a call signal. In operative relation to the receiver is a resonator or sound-intensifier by which the vibratory movement of the diaphragm produced by pulsatory currents will be rendered audible at a considerable distance from the instrument. The preferable mode of developing the pulsatory currents is a local circuit including an interrupter and the primary of an induction coil, the secondary of which is connected with the line terminals.

The invention involves various features of novelty which will be hereinafter more fully described, and which will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a vertical sectional view of an apparatus or station outfit embodying the several features of my invention. Fig. 2 is a vertical sectional view on a plane at right angles to that shown in Fig. 1, showing the apparatus in position for calling a distant station. Fig. 3 is a front elevation. Fig. 4 is a detail view of a mechanical interrupter forming part of the calling apparatus. Fig. 5 is a horizontal sectional view of a station apparatus. Fig. 6 is a bottom plan of the electrode support for the calling battery, and Fig. 7 is a diagrammatic view showing the equipment for two connected stations.

The apparatus is mounted in a suitable case or box upon a base board which may be adapted either to rest upon a desk or other horizontal surface, or be mounted upon or attached to the walls of a room. In the drawings the latter form is illustrated, 1 representing the base board or support upon which is secured a wooden box provided with a hinged door 2.

Within the box is a resonator or sound-intensifier 3, consisting of a trumpet-shaped tube connected with an opening through the box at the top, and having its lower opening carried through the side or door of the box so as to stand in a position opposite the diaphragm of a magneto telephone 4.

The permanent magnet of the telephone will preferably be formed as a handle, as indicated, and be provided with a curved extremity adapted to rest in a hook-shaped support 5 secured to the door of the box. This provision has the important advantage of rendering it impossible for the operator to restore the telephone without putting it in position to co-operate with the resonator.

Within the box is a battery jar 6 which will preferably be provided with a contracted flanged mouth for convenience of removal when a fresh solution is required and to prevent splashing of the solution. The jar will preferably be filled to about the height indicated in Figs. 1 and 2 with an exciting and depolarizing solution. Zinc and carbon electrodes are preferably used, so arranged that they may be dipped in and withdrawn from the battery when a call is to be made.

Any suitable arrangement by which the electrodes may be temporarily immersed in the liquid of the cell may be employed.

A convenient and compact construction is illustrated in the drawings, and comprises a sliding rod 7 which may be formed of wood provided with a controlling knob. The lower end of the rod is attached by a screw-thread to a sliding wooden bar 8, the edges of which move in grooves in the sides of the box or guides fastened thereto.

The electrodes are mounted in metallic holders 9, 10, see particularly Fig. 6, secured to the under side of the wooden block. These holders are provided with sockets in which are permanently fixed the electrodes which may be conveniently cylindrical in form. In the organization illustrated, two carbon and two zinc electrodes are used, arranged to confront one another. The electrode holders 9, 10 are provided with projecting edges, as shown in Fig. 6, which rest upon the free ends of springs 11, 12 anchored in the corners of the box and traversing grooves formed in the upper edge of wooden blocks 13, 14 which may be conveniently employed to fasten the springs in place. These springs cross each other transversely as indicated in Figs. 1, 2, 5 and 7, a construction which permits of the employment of a comparatively long spring in a small box. The springs may be placed at different horizontal levels so as to prevent contact, or any other suitable arrangement may be employed to keep them out of contact.

The springs are bent at an obtuse angle at their free extremities, as indicated in Fig. 5. The free end of spring 12 rests against a coiled spring 15, which is connected with the primary of an induction coil 16, the other end of said primary being connected with the other spring 11. The bent ends of both springs come in engagement with the under side of the ends of the metallic electrode holders 9, 10. It will thus be seen that by depressing the knob or handle on the rod 7 that the electrodes may be immersed in the liquid against the tension of the supporting springs, and simultaneously with such immersion the free end of spring 12 will ride over the spirals of the coiled spring 15, creating a series of interruptions in the local circuit including the primary of the induction coil and the battery. Normally, of course, this local circuit will be open, because the electrodes will be held away from the liquid by the resiliency of the springs. When depressed, however, the wiper formed by the free end of spring 12 sweeps successively over the spiral projections on spring 15, creating a series of interruptions in the local circuit.

The circuit connections are clearly indicated in Fig. 7. The free ends of the springs 11, 12 engage in the normal position stops 17, 18 which limit their upward movement. Stop 18 is electrically connected with one side of the secondary of the induction coil, the other side of which is connected with spring 11. The terminals of the secondary of the induction coil are connected with the line terminals, a magneto telephone 19 being interposed in one side.

Any convenient form of lightning arrester 20 may be employed and may be mounted on the top of the box. The plates of this lightning arrester form the line terminals. The lightning arrester is provided with a plug 21 which normally stands in a socket formed in the frame, but which may be used to bridge the plates of the lightning arrester and protect the apparatus during storms. It will thus be seen that when the electrodes are depressed the spring 11 leaves contact 18, thereby opening the normal short circuit, *a*, 18, 11, *b*, *c* around the secondary of the induction coil, and the mechanical interrupter formed by the coiled spring and the wiper is brought into action simultaneously with the immersion of the battery electrodes. This creates a series of intermittent or pulsatory currents in the primary of the induction coil 16 and the high tension impulses developed in the secondary are transmitted to line.

As shown in Fig. 7 the station to the right is calling. It will be seen that the primary circuit is closed, the normal short circuit around the secondary is opened, and the wiper is in the act of interrupting the primary circuit. The pulsatory currents developed pass over line and enter the station on the left, passing over the short circuit around the secondary of the induction coil 16 (by way of *a*, 18, 12, 11 *b*, *c*) through the telephone 19 which is of course hanging in operative relation to the resonator; a call is thus sent. The operator at the station on the left may reply to the call by depressing his battery electrodes and both operators by removing their telephones may hold conversation. During conversation the electrodes stand in their normal positions so that the magneto currents do not traverse the secondary of the induction coil, which would weaken transmission, but follow the short circuit already described. Any suitable liquid may be employed for the generator, though I prefer to use a saturated solution of bichromate of soda in water and sulphuric acid, mixed in the proportions of about fifteen to one. Such a solution has the great advantage of offering a very low internal resistance and thus increasing the amperage of the local current and developing strong induced impulses with a comparatively small induction coil.

When the battery solution or electrodes require renewal either may be readily removed from the apparatus by opening the door and sliding out the parts. The plate which supports the electrodes may be disconnected from the rod 7 by unscrewing the latter, and thereby lifting the plate, which, as hereinbefore stated, simply rests by gravity upon its supporting springs. It may be brought into alignment with a curved slot 20 and removed from the case. Such a removal will of course be necessary only at long intervals, as the battery is used for calling only and is momentarily in service at times when the calls are to be made.

The flexible cord is connected, as indicated in Fig. 3, with the terminals of the magnet spool. The other terminals of the cord may pass through the sides of the box and be properly connected in circuit.

While I have described a simple provision

for cutting out the secondary of the induction coil trom the talking circuit, any other way of accomplishing the same result might be adopted without departing from the broader features of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A telephonic station outfit comprising a generator, means for creating pulsatory electric currents at the line terminals, a call receiving instrument responsive to the pulsatory currents connected to the line terminals, and a resonator normally in operative relation to the call instrument but disconnected therefrom when the telephone is in use.

2. A telephone station apparatus comprising a telephone normally connected to the line terminals, a resonator normally close to the telephone, but disconnected therefrom when the telephone is in use, an induction coil for developing impulses on line, and an interrupter in a local circuit including the primary of the induction coil, whereby the telephone may be utilized for calling a station.

3. A station apparatus for a telephone system comprising a call receiving instrument, an induction coil for transmitting impulses, a local circuit including the primary of the induction coil, and a dip battery and a mechanical current interrupter operated simultaneously with the immersion of the electrodes, whereby when the battery electrodes are immersed a pulsatory induced current goes to line and actuates the calling instrument at the distant station.

4. In a call transmitting apparatus the combination of a dip battery, a mechanical interrupter and connections for actuating the interrupter simultaneously with the immersion of the electrodes, whereby the line may be charged with a plurality of current impulses during each immersion.

5. In a call transmitting apparatus the combination of a dip battery and a mechanical interrupter for charging the line with pulsatory currents, said interrupter being actuated simultaneously with the immersion of the battery electrodes, and comprising a series of conducting projections connected with one terminal of the generator, and a wiper connected with the other terminal adapted to be brought successively in elastic engagement with the projections.

6. In a call transmitting apparatus the combination of a dip battery, a box inclosing the same, the electrodes being supported on crossed springs extending from the corners to admit of a long range of movement, a handle for dipping the electrodes, and a mechanical interrupter.

7. A telephone call apparatus comprising a telephone, a resonator having its receiving orifice mounted near the normal support for the telephone, said resonator having its receiving orifice fixed in a position to confront the opening of the telephone when the latter rests on its support.

8. A telephone call apparatus comprising a telephone provided with a fixed attachment to connect the same with a support, and a resonator so related to the support that when the telephone is upon the support the diaphragm will be close to the resonator.

In testimony whereof I have hereunto subscribed my name this 24th day of November, A. D. 1893.

EZRA T. GILLILAND.

Witnesses:
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E. C. GRIGG.