

(No Model.)

S. J. COLLIER.

ELECTROTHERAPEUTIC APPARATUS FOR TREATING DEAFNESS.

No. 561,046.

Patented May 26, 1896.

Fig. 1.

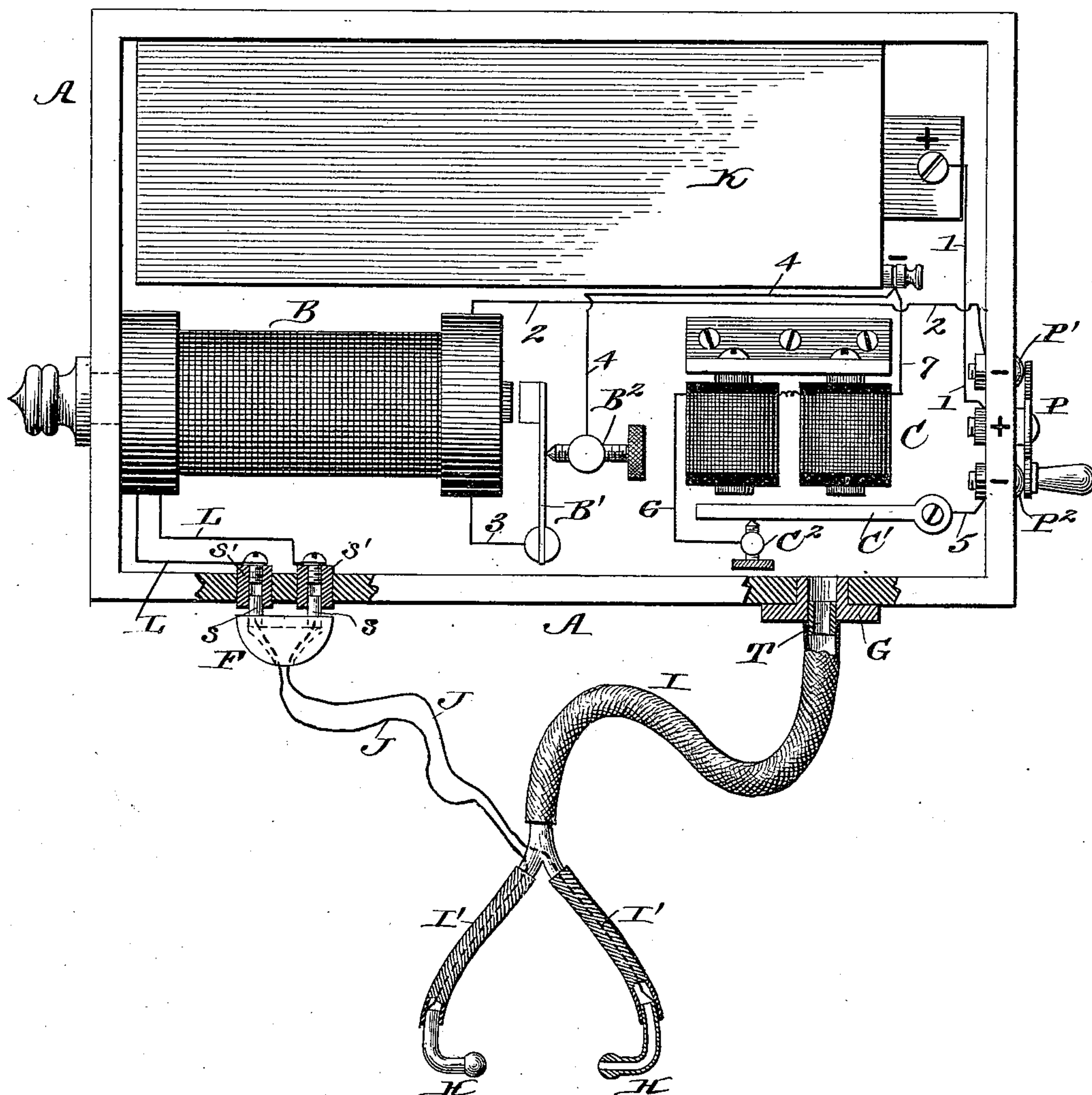
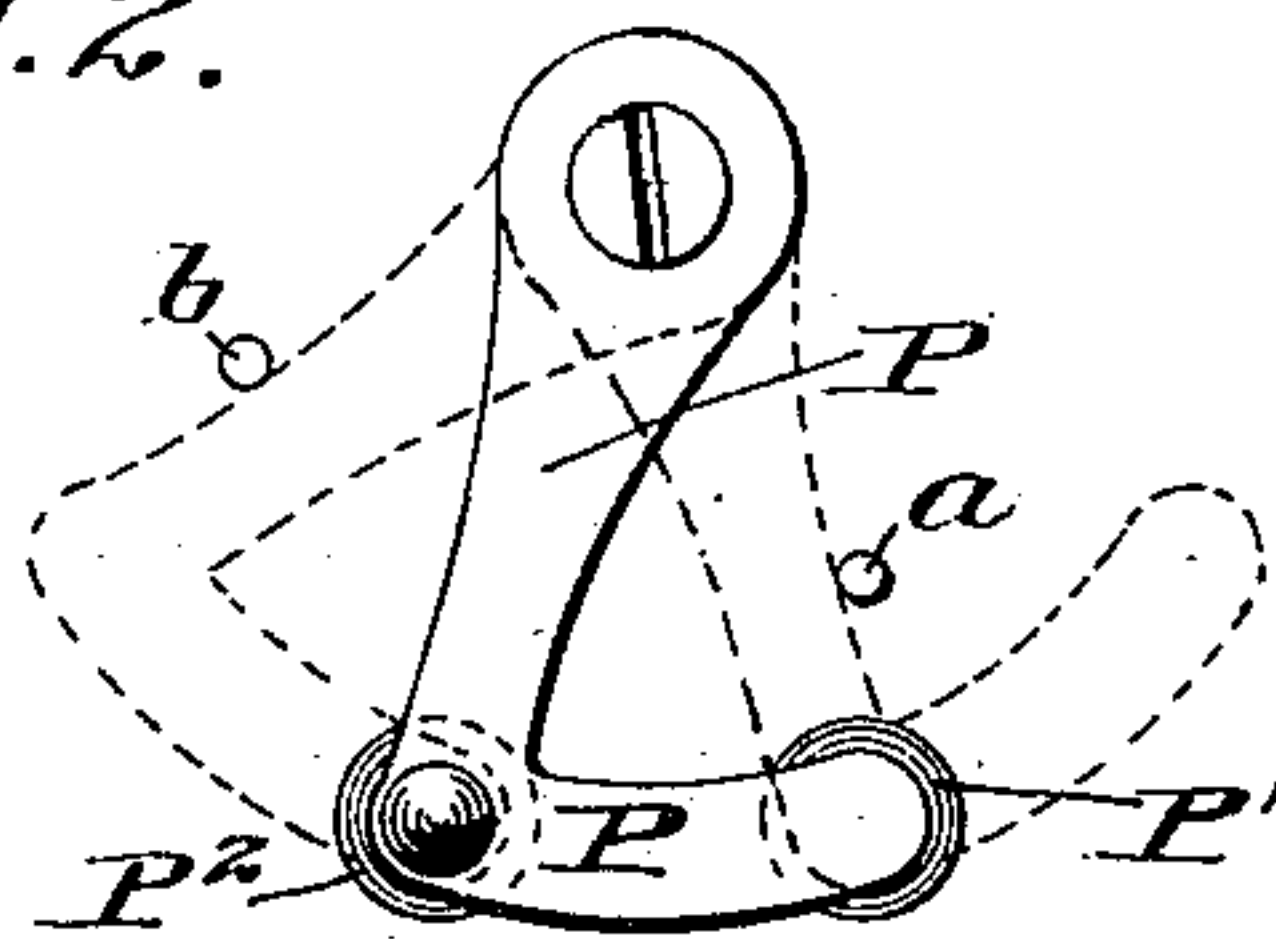


Fig. 2.

WITNESSES:

*W. S. Bloude,*  
*Edw. W. Byr,*



INVENTOR

*Samuel J. Collier.*

BY *Munn & Co.*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

SAMUEL J. COLLIER, OF CHICAGO, ILLINOIS.

## ELECTROTHERAPEUTIC APPARATUS FOR TREATING DEAFNESS.

SPECIFICATION forming part of Letters Patent No. 561,046, dated May 26, 1896.

Application filed October 22, 1895. Serial No. 566,458. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL J. COLLIER, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electrotherapeutic Apparatus for Treating Deafness, of which the following is a specification.

My invention is in the nature of an improved apparatus for treating catarrhal and nervous deafness; and it consists in the peculiar construction and arrangement of an electrically-operated apparatus designed to supply a mechanical massage to the ear-drum, muscles, and small bones of the ear, and at the same time to stimulate the nerves and muscles with a secondary current of electricity, both of said agencies being so arranged as to be made use of independently or conjointly, as may be desired.

Figure 1 is a sectional plan view of the apparatus, and Fig. 2 is a detail side view of the switch.

In the drawings, A represents the box or case, of any suitable size or shape and provided with a suitable lid or cover. Within this box is arranged a suitable battery, preferably a dry battery, as shown at K. Beside it in the box are an induction-coil B and a pair of sounder-magnets C. The induction-coil has for its primary wire the usual spring-armature B' and adjustable back-stop B<sup>2</sup>, forming an interrupter, and the parts of the induction-coil are connected as follows: One end of the primary wire of the induction-coil is, through wire 3, connected to spring-armature B', and thence through back-stop B<sup>2</sup> with a wire 4, leading to the negative pole of the battery. The other end of the primary wire of the induction-coil is, through wire 2, connected to an insulated contact-bearing P', fixed in the box or case and having its contact-face appearing on the outside of the box. A switch P is pivoted to the outside of the box and is made with a broad or segmental end, and said switch through wire 1 is connected to the positive pole of the battery. Another contact-bearing P<sup>2</sup> is arranged in the box on the opposite side of the switch from contact P' and is connected by wire 5 with an armature C', resting below the poles of the sounder-magnet C upon the adjustable back-

stop C<sup>2</sup>. This back-stop is connected by wire 6 with one end of the coil of sounder-magnet C, and the other end of the coil of said magnet is connected by wire 7 with the negative pole of the battery. In the front wall of the box is seated a tubular thimble G, communicating with the interior of the box immediately in front of or beneath the electromagnetic sounder, and detachably connected to a flexible tube I, connected with two bowed tubular branches I', terminating in inwardly-facing earpieces H in the nature of nozzles or nipples adapted to fit in the cavities of the ears, and having open communication through the tubular branches I' and flexible pipe I with the interior of the box, so that sound-waves from the box, produced by the rapid oscillation and impact of armature C', will be transmitted through said tubes and earpieces to the drum of the ear.

The earpieces H H are constructed as metal electrodes, and they are respectively connected, through wires J J, with the opposite ends L L of the secondary wire of the induction-coil. To permit these wires to be easily disconnected when the apparatus is out of use, they are respectively connected to insulated stems s s in a head or coupling F, which stems are adapted to be received into insulated metal sockets s' s', connected to the two wires L L. To permit the flexible tube I to be disconnected in like manner, a short coupling T detachably connects the flexible pipe I to the stationary thimble G in the box.

To make use of my invention, if it is desired to transmit through the nerves of the ear the interrupted secondary current, the switch P is (see Fig. 2) adjusted to the position shown in dotted lines on the right, with the switch resting against the stop-pin *a* and the switch resting on the contact P' only. The current from the battery then flows from the positive pole over wire 1 to switch P, thence to contact P', wire 2, primary wire of induction-coil, out wire 3 to spring-armature B', thence to back-stop B<sup>2</sup>, and over wire 4 to the negative pole of the battery, the spring-armature vibrating between the induction-coil core and the back-stop B<sup>2</sup> and rapidly interrupting the circuit and causing a corresponding interruption in the secondary wire of the coil and the



circuit through the wires L L, the earpieces H H, and the nerves, muscles, and bones of the ear.

To operate the electromagnet-sounder alone, the switch is thrown to the extreme opposite position, as shown by the dotted lines on the left of Fig. 2, with the switch resting against the stop-pin *b* and upon the one contact  $P^2$  only. The current from the battery then goes from the positive pole over wire 1 to switch P, thence to contact  $P^2$ , wire 5, armature  $C'$ , back-stop  $C^2$ , wire 6 through sounder-magnet, and out over wire 7 to the other pole of the battery. This causes the armature  $C'$  of the sounder to vibrate rapidly and forcefully between the poles of the magnet and the back-stop  $C^2$ , producing very rapid mechanical vibrations, which, with the box as a sounding-board, make a series of concussions in the air within the same that are transmitted through the hollow tube I and branches  $I' I'$  and produce a series of concussions on the ear-drum and bones of the ear, acting mechanically, for the purpose hereinafter described. If it be designed to use both the electric current and the mechanical effect of the air-concussion, the switch is put in midway position, as shown in full lines in Fig. 2, which causes it to bear upon both the contact-plates  $P'$  and  $P^2$ . The current then coming from the positive pole of the battery over wire 1 and switch P divides and goes part to contact-plates  $P'$  and through the primary wire of the induction-coil to the negative pole of the battery, and the other part goes through contact-plates  $P^2$ , through the sounder-magnet, to the negative pole of the battery, thus causing both the induction-coil and sounder-magnet to be energized and operated at the same time. The principle upon which my invention operates in relieving deafness is to cause a gentle stimulation to the nerves and muscles of the ear by the secondary current, and a mechanical massage, through sound-waves, of the membranes and muscles of the ear, giving motion to the drum and bones of the ear, which invigorates, strengthens, and restores sensitiveness and causes a disintegration and dislodgment of particles of wax, &c., and thereby effects an opening and clearance of the ear-passages.

This device I have found specially serviceable in cases of catarrhal and nervous deafness, and the device is intended to be so simple, cheap, and portable in character as to enable any one to make use of it in self-treatment. As the vibrations of the sounder are very rapid, as many as three thousand per minute, and the sound-waves are very pronounced in mechanical effect, being augmented by the box as a sounding-board, a

very positive and pronounced effect is obtained in the ear-passages, which loosens the excess of wax and mucus, the wax in the external passages falling out and the mucus flowing inward through the eustachian tubes.

I am aware that the primary galvanic current has been heretofore utilized by transmission through the ears and that sound-waves from a phonograph have at the same time been directed into the ear-passages, and I make no claim to such process or apparatus. My invention is distinguished by the fact that the same battery generates both the secondary current and operates the sound-producer, and I get a very much more positive action and useful effect at a very much less cost and without requiring any other attention from the party using it after the adjustment of the switch.

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

1. A device for treating deafness, comprising a box or case, a galvanic battery, an induction-coil, and an electromagnetic sounder, both the coil and sounder being arranged in the box and in a circuit of the same battery, a switch for sending the current to either the induction-coil or sounder, or both at the same time, tubular earpieces having a tubular connection with the interior of the box, and wires leading from the terminals of the secondary coil to the two earpieces substantially as and for the purpose described.

2. A device for treating deafness, comprising a box or case, a galvanic battery, and induction-coil with interrupting-contacts inclosed therein, the primary coil being connected to the battery, and the secondary coil to terminals in the side of the box, earpieces with conducting-wires, and a detachable coupling carrying one end of the conducting-wires and adapted to be fitted to and electrically connected with the terminals of the secondary coil in the side of the box substantially as shown and described.

3. A device for treating deafness, comprising a box or case, a galvanic battery, and electromagnet-sounder contained within the box, the said sounder being provided with interrupting-contacts and arranged in the circuit of the battery, tubular earpieces, and a connecting tube or pipe communicating with the tubular earpieces at one end and with the interior of the box at the other, substantially as and for the purpose described.

SAMUEL J. COLLIER.

Witnesses:

HARVEY L. EMBREY,  
FRED W. GREGORY.