

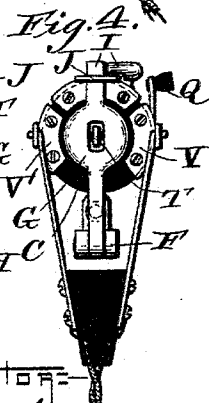
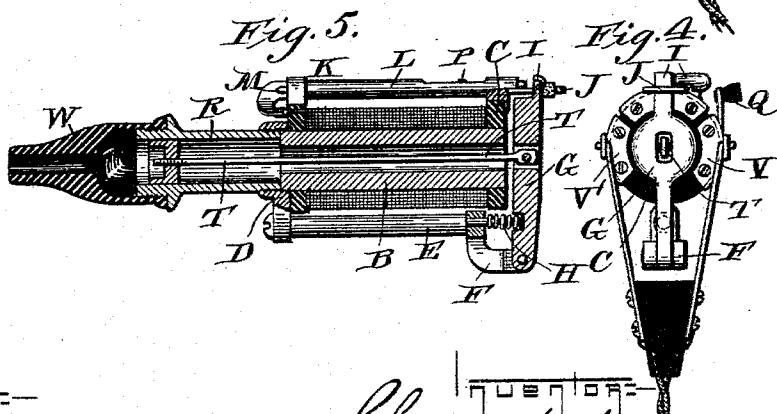
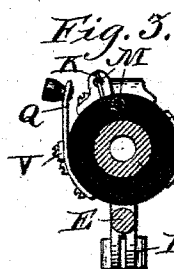
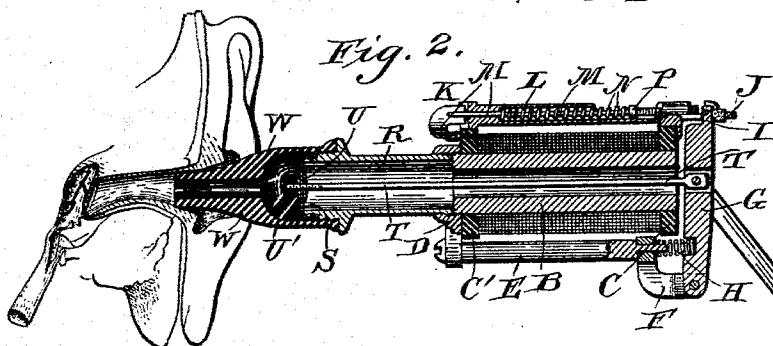
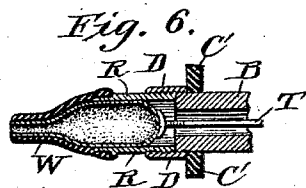
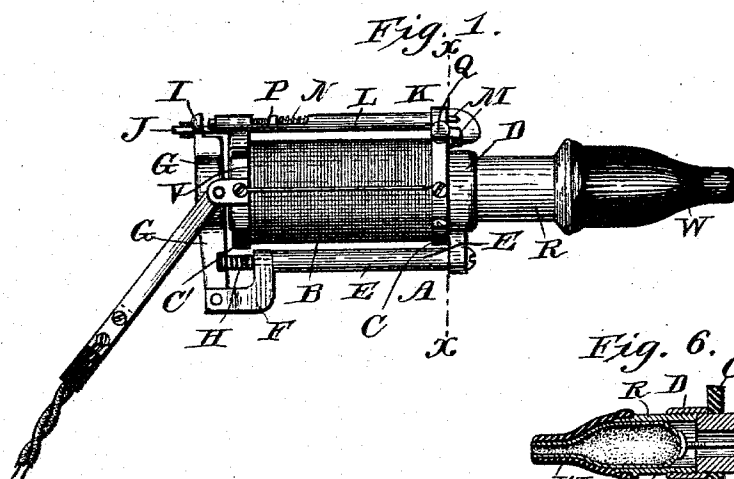
(No Model.)

C. M. JORDAN.

APPLIANCE FOR TREATING DISEASES OF THE EAR.

No. 494,958.

Patented Apr. 4, 1893.



Witnesses:-

Everance.
William M. Clave

Charles M. Jordan
by his Attys
Macon Fenwick Lawrence

UNITED STATES PATENT OFFICE.

CHARLES M. JORDAN, OF WASHINGTON, DISTRICT OF COLUMBIA.

APPLIANCE FOR TREATING DISEASES OF THE EAR.

SPECIFICATION forming part of Letters Patent No. 494,958, dated April 4, 1893.

Application filed December 22, 1892. Serial No. 456,038. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. JORDAN, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Appliances for Treating Diseases of the Ear; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in a novel mechanical appliance for alternately condensing and rarefying air in an inclosed space between the drum of a human ear and a diaphragm, piston bulb or other analogous means whereby by rapidly operating said diaphragm, piston, bulb or other analogous means, the air between the drum of the ear and said diaphragm is alternately condensed and rarefied and the drum caused to vibrate, thereby producing very beneficial and important results in the treatment of certain ear diseases, as will be hereinafter described.

In the accompanying drawings, Figure 1 is a side elevation of one form of appliance for carrying out my invention. Fig. 2 is a longitudinal section of Fig. 1 wherein a diaphragm is used as a means of alternately rarefying and condensing the air, and showing the appliance applied to the human ear. Fig. 3 is a transverse section in the line $x-x$ of Fig. 1. Fig. 4 is a rear view of the appliance, showing the same connected with an electric conducting wire. Fig. 5 is a longitudinal section through a modified form of appliance wherein a piston is employed as a means for alternately condensing and rarefying the air, and Fig. 6 is a longitudinal section through the forward end of the appliance and showing a bulb applied in the same for alternately condensing and rarefying the air.

A in the drawings represents what I term a tympano-membrano motor which may be made in either of the forms shown in Figs. 2, 5 and 6.

B represents an electro-magnet wound with insulated copper wire of a proper size to obtain the best magnetic influence from about a ten-volt current of electricity, the core of the coil being hollow.

C represents the insulating material at either end of the electro-magnet to prevent the wire slipping off the core of the magnet and to attach other parts of the instrument which need insulating one from the other.

D is a collar of soft iron secured on the end of the coil, and provided with a projection on one side to which a post E is attached. At the opposite end of this post is secured an angular bracket F in which an armature G is pivoted. A spring H is interposed between the armature and the bracket and throws the armature back from the electro-magnet B when the current is cut off. The armature has a passage through it in line with the passage through the axis of the core.

At the opposite end of the armature from its pivot it is provided with a projection I which vibrates in a guide J, which latter is attached to the insulating material. The purpose of the guide is to limit the length of the stroke of the armature G. A small buffer of rubber is placed at either end of the guide to prevent shock, and to deaden the sound of the armature striking against the guide when vibrating back and forth.

K is an interrupter for interrupting the current passing through the coils of the electro-magnet A, consisting of an outer inclosing case L, a stem or rod M, a tension spring N, and nut P in said rod to adjust the length of stem N so as to receive the proper stroke from the armature G. The lower end of the rod M makes contact with the inner end of the wire of the coil which is passed through the insulating material B' and is tipped with platinum to prevent it from corroding.

Q is a key which when pressed down completes the circuit to the electro-magnet from its source of production.

R is a piece of tubing screwed into the collar D, on the terminal end of which is placed a sheet of soft elastic material S, said elastic material being attached to the periphery of the tube in the most convenient manner to allow the body of the sheet over the end of the tube R to form a vibrating diaphragm. Through the center of the core of the electro-magnet B and tube R passes a rod T pivoted at one end to the central part of the armature F and at the other end carrying two disks U

and U', between which the diaphragm S is interposed. The pieces V and V' are the terminals of the electric circuit, and connect with the source of electricity by flexible cords. 5
 W is a tip, preferably of hard rubber, screwed to the tube R in such a manner as to allow of the free vibration of the diaphragm S, and also to make an air-tight chamber or compartment between the diaphragm S and 10 the ear-drum when placed in the meatus of an ear of a human being. The course of the current through the electro-magnet and its attachments is first through the terminal piece V, through a short wire from V to the 15 key Q, thence from the key Q, when pressed to contact to the interrupter K, to the inner end of the coil, and through the coil to the terminal piece V' and to the flexible cord.

In operating the instrument when treating 20 the ear, it is attached to the flexible cords leading to a source of electricity and the tip of the instrument placed in the meatus of the ear, tightly, so as to hermetically seal the parts from external air; and by pressing the key Q 25 the current of electricity is allowed to pass through the coil and set the armature F to vibrating and also vibrating the diaphragm S attached to the armature by the rod T. The rapid vibrating of the diaphragm causes the 30 contained air in the tip W and in the meatus of the ear, and also the ear drum at the bottom of the meatus, to vibrate in unison with the diaphragm. The ossicles or small bones of the ear, called the malleus, incus and stapes, 35 or the hammer, anvil and stirrup are intimately connected to the drumhead by means of the attachment of the hammer to the ear drum, and the bones to each other, the articulations of the small bones being, therefore, set 40 in motion by the vibration of the ear drum, and any stiffness or adhesion that may have taken place through disease I am convinced are overcome.

In the drawings I have shown my tympano- 45 membrano motor adapted to be operated by electrical current. I have adopted this means

of operating the motor because it is the most convenient and preferable, but I do not wish to limit my invention to its use, as I believe I am the first to have subjected the drum of 50 the ear to repeated actions of a mechanically operated column of confined air, which air is alternately condensed and rarefied for treating certain diseases of the ear.

In Fig. 5 I have shown a piston and in Fig. 55 6 a bulb as a means for alternately condensing and rarefying the air and I regard these as mechanical equivalents of the diaphragm shown in Fig. 2.

What I claim as my invention is— 60

1. A tympano-membrano motor comprising a laterally inclosing air chamber open at its forward end, a diaphragm at its opposite end and means for vibrating the diaphragm, where- 65 by when the instrument is applied to the ear and the diaphragm operated the air in the laterally inclosed space between the drum of the ear and the diaphragm will be alternately condensed and rarefied, substantially as described.

2. In combination with a laterally inclosing 70 air chamber open at its forward end, a hollow electro-magnet, an armature a moving member connected with the armature by a reciprocating rod, and means for operating the magnet and armature, substantially as de- 75 scribed.

3. A tympano, membrano motor comprising a hollow electro-magnet, an armature, a rod working in the hollow core of the magnet and connecting the armature and a moving mem- 80 ber, an interrupter for alternately breaking and making the circuit, a spring for returning the armature when the circuit is broken and a laterally inclosing air chamber open at its forward end, substantially as described. 85

In testimony whereof I hereunto affix my signature in presence of two witnesses.

CHARLES M. JORDAN.

Witnesses:

E. T. FENWICK,
 LUTHER L. APPLE.