C. E. WILLIAMS.

HEARING AID.

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1,219,411. Patented Mar. 13, 1917.

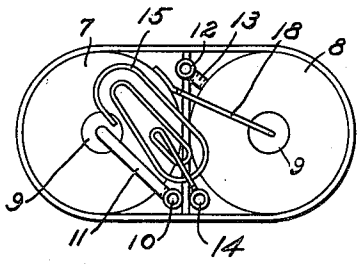

Fig. 1.

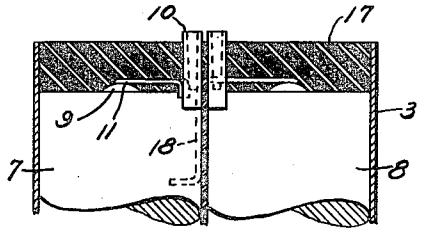

Fig. 2.

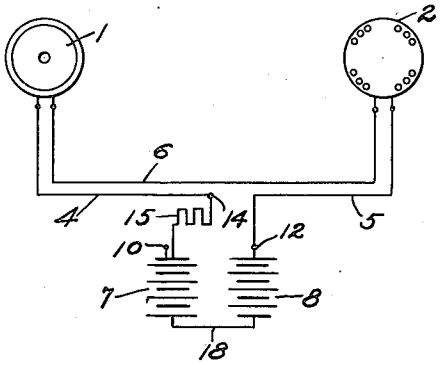

Fig. 4.

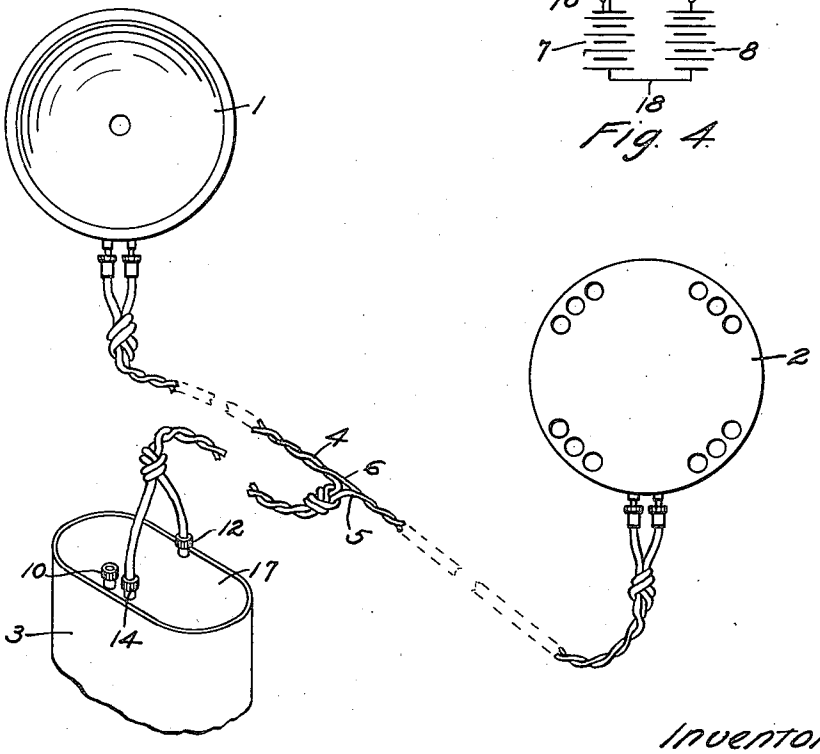

Fig. 3.

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UNITED STATES PATENT OFFICE.

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HEARING AID.

1,219,411. Specification of Letters Patent. Patented Mar. 13, 1917.

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To all whom it may concern:

Be it known that I, CHARLES E. WILLIAMS, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented an Improvement in Hearing Aids, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is an apparatus to aid the hearing of deaf persons and is particularly intended as a portable telephone, having a novel form of battery. In my development of apparatus for aiding the hearing of deaf or partly deaf persons, I have found that one of the greatest objections and difficulties has been that the batteries supplied do not last long enough. In electrical hearing devices intended to be carried on the person of the user it is, of course, necessary that such apparatus shall be as light, compact, portable, and yet efficient as it is possible to make same. This is especially true in those instruments which are intended to be worn under the clothing of the user, and it is to this type of hearing aids that my present invention is particularly applicable and of greatest importance. In such instruments, with the battery concealed under the wearer's clothing, it has heretofore been impossible to use any other than a low voltage battery which ran out quickly, did not operate as satisfactorily as a high voltage battery, and, of course, did not give as much power as a high voltage battery for the same length of time. However, a low voltage battery was necessary as a rheostat could not be used under the clothing, and a high voltage battery was dangerous since the cords connecting the battery, transmitter, and receiver being under the clothing and against different parts of the wearer's body, were, therefore, apt to become wet through perspiration, and would shortcircuit through the body, burning both cord and wearer.

Even were it feasible to utilize a rheostat under the clothing, their use is primarily to change the volume of sound by cutting the current low, and would still leave the danger of similar injury to the user through the cord from the battery to the rheostat becoming wet through perspiration. It is an important feature of my present invention to enable a high voltage battery to be used, even under the clothing without a rheostat, and without danger of injury to the user, and which will, therefore, secure all the advantages of long life to the battery, better working of the transmitter and receiver, rendering the tone of the instrument more sensitive and pleasing, and by greatly prolonging the service hours of the battery, thereby reduces the cost and the annoyance to the user.

I have discovered that by using a high voltage battery of the standard dry cell type, and by utilizing an extra terminal which is connected by means of a high resistance wire cut in between the extra terminal and one pole of the battery, thus producing a reduced current to any desired extent, I provide an apparatus which enables all the advantages of the high voltage battery to be utilized and yet eliminates the danger of injury to the person of the wearer, through the body becoming burned by the cords leading from the battery. In wearing this apparatus under the clothing, (ladies', for example,) it is customary to have the battery affixed to the garter adjacent the lower end of the corset, so that a considerable length of cord from battery to transmitter at the front of the corset and to the receiver at the ear, is exposed to the body. The importance, therefore, of eliminating the danger of injury to the wearer will be appreciated. A high voltage battery gives a long service life and in addition makes the device more sensitive to sound pulsations, changes the tone of the instrument, reduces the pulsation of the ear piece diaphragm, and eliminates the harsh, unpleasant noises apt to be produced by a low voltage instrument.

I may embody the invention in a variety of ways, but I prefer to use two dry cell batteries, inclosing the same in an encircling receptacle which extends above the metal cap or contact piece in each battery, and using an extra terminal with a high resist-

ance wire from the pole of one battery to this extra terminal, and sealing this extra resistance wire, all terminals, and the poles of both batteries with sealing wax, or the like, in the top portion of the receptacle extending above the batteries. Thus having the entire apparatus self-contained, compact, and ready for use.

Referring to the drawings illustrating a preferred embodiment of the invention.

Figure 1 is a plan view of the battery and container with the sealing wax omitted;

Fig. 2 is a cross sectional view of the upper portion of the battery, showing the sealing wax in place;

Fig. 3 is a perspective view of the battery, transmitter, receiver, and connections; and

Fig. 4 is a diagrammatic view of the wiring.

In the commercial form of the apparatus embodied in my invention, I prefer to use a transmitter with the diaphragm at the back of the instrument and imperforate front, of the type shown in my prior Patent No. 911,101, and also may prefer to use a transmitter like that of my Patent No. 945,429, but it will be understood that I may utilize any suitable instruments desired.

The apparatus comprises a transmitter 1, receiver 2, battery and container 3, and the corded connections 4, 5, and 6, from battery to transmitter, battery to receiver, and receiver to transmitter, respectively. The battery within the container 3 comprises two dry cells, consisting in the zinc tubes 7 and 8, carbon centers 9, and the metal caps thereon. A terminal 10 for the cell 7 is connected with the cap 9 by the metal strip 11, and the terminal 12 for the cell 8 connected therewith by the metal strip 13 in a well-known manner. In addition to the two terminals 10 and 12 which are necessary in order to test the strength of the battery and which will produce the full capacity of the battery, I provide an additional terminal 14 and a high resistance cord 15 connecting the same with the cap 9 of the cell 7.

I have found that in a high voltage battery with a cell producing 15 amperes, when a third terminal is used and the resistance wire 15 cut in sufficient to reduce the current to one ampere, that the hearing instruments work very satisfactorily, being more sensitive and as loud as before cutting down, do not "froth", and entirely eliminates the danger of injury to the wearer by burning the body or cord.

I also prefer to inclose or seal both the cells, caps, and metal parts, excepting the terminal sockets, which latter receive the wires, by sealing wax 17, or the like. The container 3 extends slightly above the height of the cells, as shown in Fig. 2, and the sealing wax 17 is applied level with the top of the container 3, inclosing the connections 11, 13, 15 and 18, and also the carbon caps 9, serving, furthermore, to hold the extra terminal 14, if desired. It will be understood that the resistance wire 15 may be varied as desired, to fit any particular needs of the wearer, or of the instrument. In order to maintain the polarity constant, it is customary and desirable to form one socket for one of the connecting cords smaller than the other, so as to always have the same cords fit the same sockets, and therefore I prefer to form the socket 12 as the smaller, and the sockets 10 and 14 as the larger, so that the connecting cords may be used as illustrated in Fig. 3, being shiftable from the socket 10 to 14 of the same cell when desired to get the full capacity of the battery, or the reduced power.

The advantage and importance of my invention as an aid to hearing will, I believe, be readily appreciated by all those interested in this art. I believe it to be a distinct novelty to utilize a high voltage battery as an aid to hearing, having more than two terminals, *i. e.* utilizing one extra terminal, and all connections from said terminals to the battery cells being concealed and self-contained, and I believe it to be a distinct novelty in the art of portable telephones to aid hearing, to enable a high voltage battery to be employed without danger of injury to the person, and therefore I wish to claim these features broadly.

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

1. Apparatus of the kind described, constituting a hearing aid adapted to utilize a high voltage battery, consisting in a portable telephone transmitter and a receiver, a container inclosing a portable high voltage battery including a plurality of cells, a pair of terminals outside said container and means to reduce the high voltage battery by having an extra resistance wire between a terminal on one cell and a pole of another, connections from said exterior terminals to the receiver and transmitter whereby the current wires from the battery to the transmitter and receiver will provide a reduced voltage without danger of injury to the wearer and yet enable the hearing aid to have the tone, volume, and sensitiveness of said high voltage battery.

2. A portable dry cell battery adaptable for use in a hearing aid telephone, consisting in a container having a pair of terminals on the outside, a plurality of dry cells contained within said container, a pair of terminals on said battery within the container, an extra terminal to test the strength of the battery and a high resistance wire

cut in between the terminals and one pole of the battery, whereby a relatively high voltage battery within said container supplies a reduced current outside said container, while permitting the sensitizing of the hearing aid instruments substantially equivalent to the normal high voltage of the battery.

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

CHARLES E. WILLIAMS.

Witnesses:
M. M. MACLENNAN,
LOUISE SMITH.