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G. W. BURCHETT

1,867,350

ARTIFICIAL LARYNX

Filed Jan. 8, 1930

FIG. 1

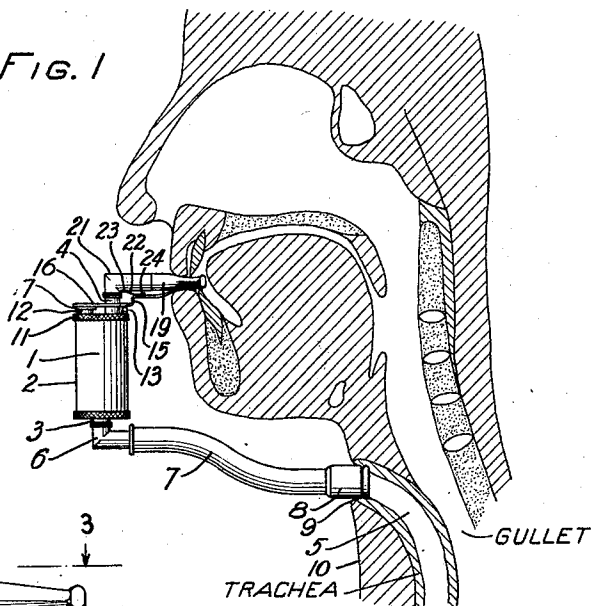


FIG. 2

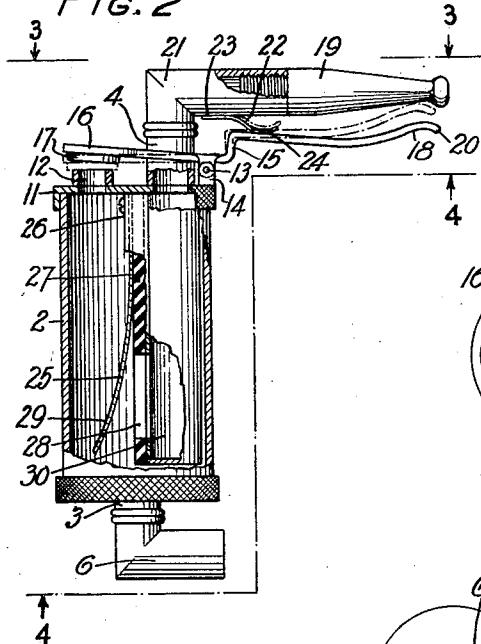


FIG. 3

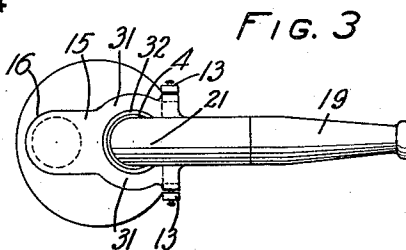
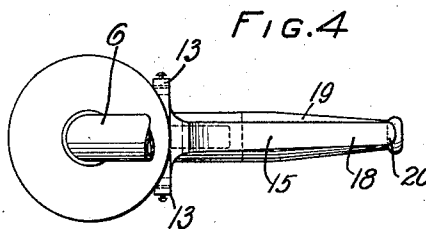


FIG. 4



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## UNITED STATES PATENT OFFICE

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## ARTIFICIAL LARYNX

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This invention relates to artificial laryng-  
ges and more particularly to an improve-  
ment therein by which a user of an artificial  
larynx may operate the instrument either as  
a breather device or a tone producer.

It is an object of this invention to make  
possible the operation of an artificial larynx  
alternately as a breather device or a tone  
producer without the user of the instrument  
having to use his hands.

Features of this invention reside in a valve  
member which in one position allows a per-  
son to breathe through the instrument and  
in another position serves to make air ex-  
haled through the instrument operate a vi-  
bratory element, and in a lever control ar-  
rangement therefor by which operation of  
the valve is controlled by pressure of the  
jaws of the user.

In the accompanying drawing

Fig. 1 is a side elevation partly in section  
of an artificial larynx including the im-  
provement and a portion of the head and  
upper throat and neck portions of a user of  
the instrument;

Fig. 2 is a side elevation partly in section  
of the improved instrument showing in full  
lines, the open position of the valve member  
and in dotted lines the valve member in closed  
position; and

Figs. 3 and 4 are top and bottom plan  
views, respectively of the improved artificial  
larynx.

In cases where the larynx has become in-  
fected with cancer or some other malignant  
disease, it is now the practice to remove the  
larynx by a surgical operation and terminate  
the trachea or wind pipe in an opening in  
the front of the base portion of the neck. Re-  
moval of the larynx deprives the person so  
operated upon of the power of speech for  
under normal conditions air forced from the  
lungs through the trachea passes through the  
larynx and sets up therein vibrations of the  
vocal cords which produce sound. The  
sound generated in the larynx passes upward  
into the mouth and nasal cavities where by  
various changes in the shape of these areas  
by movement of the mouth and tongue, the  
sound is modulated into speech. With the

larynx removed no tone or sound having a  
frequency which may be modulated into in-  
telligible speech can be produced and with  
the trachea terminated in an exterior open-  
ing in the neck no sound generated can be  
passed upward through the regular throat  
channels into the mouth and nasal cavities.

To restore the power of speech to a person  
from whom the larynx has been removed, an  
artificial larynx or tone producing instru-  
ment has been devised in which by air exhal-  
ations from the trachea or a suitable artificial  
air current producer, a tone may be produced  
which may be modulated into speech. An  
outlet of this tone producing instrument is  
usually placed in the mouth of a user to get  
the tone produced in the instrument into the  
mouth and nasal cavities for effective modu-  
lation.

In tone producing instruments of this kind  
which are commonly called artificial laryn-  
ges, it has been the practice to provide in the  
wall of the instrument casing a breather port  
through which the user of the instrument  
may breathe if he has the instrument con-  
nected with the trachea, without having to  
remove the instrument from the mouth. This  
breather port ordinarily is an aperture in  
the casing wall and is closed by a finger  
of the user when the instrument is being used  
as a tone producer. Operation of the instru-  
ment in this manner necessitates at least the  
use of one hand and to eliminate the necessity  
of this hand operation of an instrument of  
this kind is an object of this invention.

To accomplish this object a valve member  
which may be opened and closed under con-  
trol of the jaw movements of a user has been  
provided. This improved instrument may be  
held in the mouth during talking and breath-  
ing operations and a user may alternately talk  
and breath with the instrument in his mouth  
in much the same manner as a person will  
alternately talk and smoke while holding a  
smoking pipe between the teeth.

To further describe this invention ref-  
erence will now be made to the accompany-  
ing drawing in which 1 is an artificial larynx  
having a casing 2 an inlet connection 3 and  
an outlet connection 4. The inlet connec-

tion 3 may be brought into connection with the trachea or wind pipe 5 by means of a suitable air passage having for instance an elbow fitting 6, a flexible or suitably bent tube 7 and a trachea connection 8 which engages the outlet 9 of the trachea or wind pipe 5 located in the neck 10 of a user of the instrument.

In a top plate or cap 11 in which is located the outlet connection 4 a breather port 12 has been provided through which air may pass to and from the lungs of the user through the artificial larynx 1, the connecting members 3, 6, 7 and 8 and the trachea or wind pipe 5.

Fulcrumed at 13 on an extension portion 14 of the top plate or cap 11 is a valve lever 15 having on one end 16 a pad or disc 17 which may be of rubber or felt or like material or of comparatively soft metal and which when brought down by the valve lever 15 to seat on the breather port 12 will substantially close the breather port 12 to the passage of air.

The valve lever 15 is extended upward and rearwardly from the fulcrum point 13 in a series of alternate bends and substantially straight portions until it reaches a point 18 which is in fairly close proximity to a mouthpiece 19 and thereafter extends along for a comparatively short distance in a plane substantially parallel with the plane of the mouthpiece 19 and terminates in a lip or bent down portion 20.

The mouthpiece 19 may be of bakelite or hard rubber or any suitable material for gripping between the teeth of a user and attached by any practicable means such for instance as an elbow fitting 21 to the outlet 4 of the artificial larynx.

The valve lever 15 preferably is normally maintained in either a port closing or port opening position and may be so maintained in either of these positions in any practicable manner. One way in which this may be done is shown in the drawing wherein a leaf spring 22 secured at one end 23 to the under side of the elbow 21 has its free end 24 bearing against an upper portion of the valve lever 15. In the structure shown the leaf spring 22 normally urges the one end of the valve lever 15 away from the mouthpiece 19 and raises the pad bearing end 16 of the valve lever and the pad 17 away from the breather port 12.

The artificial larynx 1 as so described may be held in the mouth of the user as shown in Fig. 1 and the breather port 12 closed as shown by the user gripping between his teeth the mouthpiece 19 and the adjacent end portion of the valve lever 15. In this position the breather port 12 being closed by the pad 17, air forced upward from the trachea 5 through the trachea connection 8, the tube 7, fitting 6, inlet connection 3 and so into the

casing 2 of the artificial larynx will because of not being able to pass through the breather port 12 cause vibration of a sound producing element within the casing 2 of the artificial larynx 1 and pass through the outlet 4. The sound producing element has been shown in this instance merely for purpose of illustration, as a reed 25 secured at one end 26 to a wall or partition 27 within the casing 2. An aperture 28 is provided in the wall 27 and the free end 29 of the reed 25 is located across this aperture. With the breather port 12 closed air currents forced into the casing 2 through the inlet connection 3 and passing through the tone channel 30 and through the outlet connection 4, create under the free end 29 of the reed 25 a low pressure area. The free end 29 of the reed 25 is moved against its own spring tension into this low pressure area until sufficient spring tension has been generated within the reed to throw the free end 29 back to its normal position. The alternate movements of the free end of the reed 25 into and out of the low pressure area sets up air vibrations which produce a tone in the tone channel 30 and this tone passes through the outlet connection 4, elbow 21 and mouthpiece 19 into the mouth and nasal cavities where it is modulated and formed into speech.

Now when a user of this artificial larynx desires to breathe through the instrument he may release his jaw pressure on the mouthpiece 19 and valve lever 15 sufficiently to allow the spring 22 to move the mouth end 20 of the valve lever 15 away from the mouthpiece 19 which will result in the pad supporting end 16 of the lever and the pad 17 being moved away from the breather port 12. Air may then be passed to and from the lungs through the breather port 12, casing 2, inlet connection 3, elbow 6, tube 7, trachea connection 8 and trachea 5 as has been explained.

The valve lever 15 has been shown in Fig. 3 as having an enlarged portion at 31 and an aperture 32 therein to accommodate the outlet connection 4. It is quite obvious, however, that one side of the enlarged portion 31 may be removed without destroying the effectiveness of the valve lever or that the valve lever 15 may be made in various other forms. It should also be recognized that various other changes and modifications may be made in the structure shown, such for instance as providing a helical spring at the fulcrum point 13 of the valve lever 15 instead of the leaf spring 22 or that any other resilient or compression means may be employed to maintain the valve lever in normal position and that normally the breather port 12 may be kept closed by the spring operated lever and the lever so arranged that gripping of the mouthpiece and valve lever will open instead of close the port 12, without departing from

the spirit and scope of this invention as defined in the following claims.

What is claimed is:

1. In an artificial larynx having an inlet  
5 connection, an outlet connection and a tone  
producing element, a breather valve and control means therefor, through the operation of  
which the artificial larynx may be used as  
either a breather or a tone producer, said control  
10 means supported by the outlet connection and operable by jaw movements of the  
user.

2. An artificial larynx comprising a casing  
having therein a tone producing element operated by passage of air through the casing,  
15 an air inlet port and an air outlet port, a  
mouthpiece by which the artificial larynx  
may be supported by the mouth of a user, a  
valve by operation of which the artificial  
20 larynx may be used as either a breather device or a tone producer, said valve operable  
by jaw movements of the user and comprising  
an aperture in the casing and a valve  
lever to open and close said aperture, said  
25 valve lever having a portion extending in a  
plane substantially parallel with the mouthpiece and entering the mouth of the user.

In witness whereof, I hereunto subscribe  
my name this 3rd day of January, 1930.

30 GEORGE W. BURCHETT.

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