

Nov. 25, 1969

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3,480,010

ELECTRONIC SNORE DEPRESSOR

Filed May 12, 1967

FIG. 1.

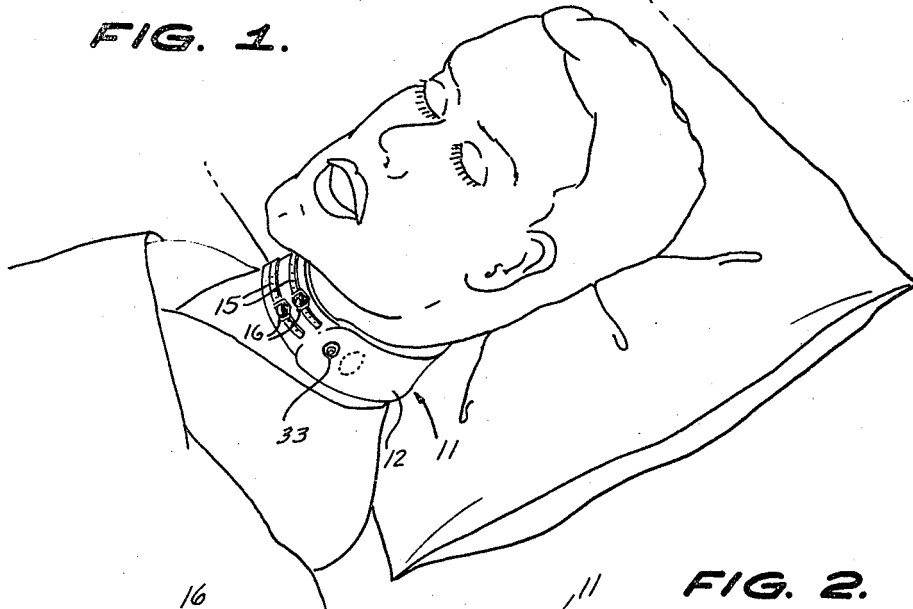


FIG. 2.

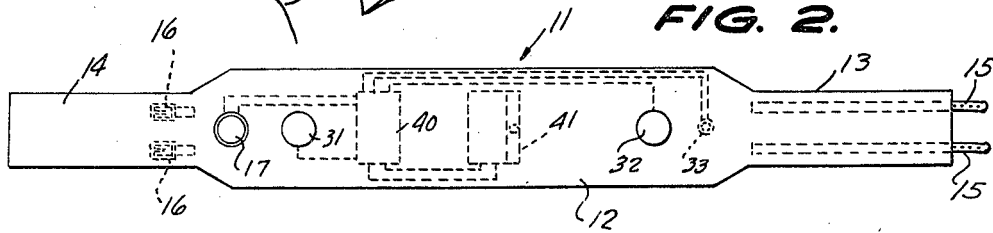


FIG. 3.

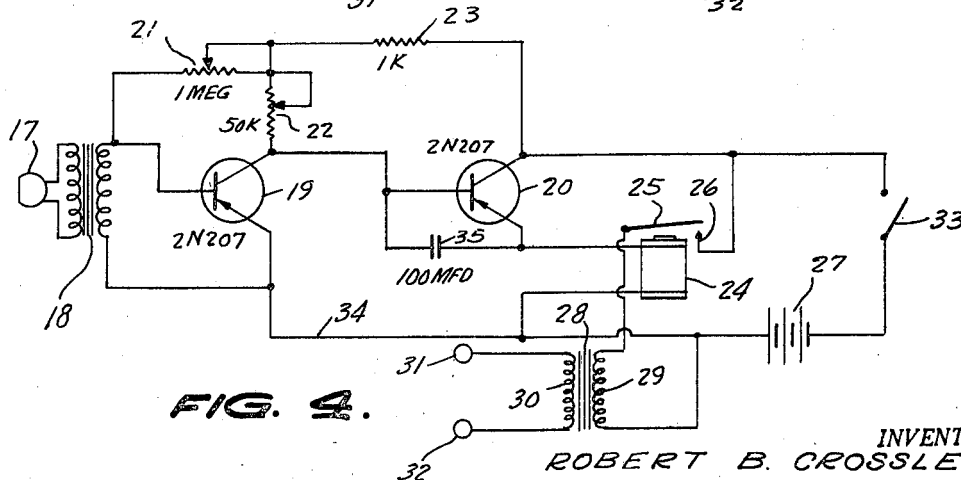


FIG. 4.

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3,480,010

ELECTRONIC SNORE DEPRESSOR

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Filed May 12, 1967, Ser. No. 638,050

Int. Cl. A61f 13/12, 5/56; A61n 1/08

U.S. Cl. 128—132

10 Claims

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ABSTRACT OF THE DISCLOSURE

An anti-snore device consisting of a neckband to be worn by a sleeper. The neckband contains a microphone, a transistor amplifier, a high voltage-producing transformer, a supply battery, a relay and a pair of spaced electrodes. The electrodes are in contact with the sleeper's skin. The microphone is connected to the input of the amplifier and the relay winding is connected to the output of the amplifier. The primary of the high voltage-producing transformer is connected in series with the relay contacts and the supply battery. The amplifier is energized from the supply battery. Snore is detected by the microphone to produce output signal waves of corresponding pitch, causing intermittent closure at this frequency of the relay contacts, thereby inducing a high voltage across the electrodes designed to shock the sleeper and to condition him against snoring.

This invention relates to anti-snore devices, and more particularly to a device for imparting an electric shock to a sleeper when he snores of sufficient magnitude to awaken him, and ultimately, to condition the sleeper against snoring.

A main object of the invention is to provide a novel and improved anti-snore device for conditioning a sleeper against snoring or for awakening the sleeper when he begins to snore, the device being relatively simple in construction, being easy to install, and providing an effective snore-inhibiting action, serving to awaken a sleeper when he begins to snore without disturbing other persons in the same area, and ultimately serving as a means for conditioning the sleeper against snoring.

A further object of the invention is to provide a relatively compact automatic anti-snore device adapted to be worn by a sleeper to apply an electric shock to the sleeper when he begins to snore, whereby either to awaken the sleeper or to condition him against further snoring, the device being inexpensive to fabricate, involving relatively simple components, being durable in construction, and being comfortable to wear.

A still further object of the invention is to provide an improved electronic anti-snore device adapted to be worn by a sleeper and provided with electrodes in contact with the sleeper's skin, with means to develop a high voltage across the electrodes immediately responsive to snoring by the sleeper, the voltage being sufficient to awaken the sleeper and to ultimately condition him against snoring, the apparatus being safe to use, being entirely self-contained so that it requires no external wiring, and employing standard components.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawing, wherein:

FIGURE 1 is a perspective view showing a person wearing an anti-snore device constructed in accordance with the present invention.

FIGURE 2 is a plan view of the anti-snore device of FIGURE 1, shown in a flat extended condition.

FIGURE 3 is a longitudinal edge view of the unrolled neckband device of FIGURE 2.

FIGURE 4 is a wiring diagram showing the electrical connections of the anti-snore device illustrated in FIGURES 1, 2 and 3.

Referring to the drawing, 11 generally designates an improved anti-snore device according to the present invention. The device 11 comprises a neckband of suitable flexible material, such as leather, flexible sheet plastic material, or the like, comprising a relatively wide main body portion 12 and respective reduced terminal end portions 13 and 14. The end portion 13 has stitched thereto a pair of flexible apertured strap elements 15, 15 which are adapted to be connected to respective conventional buckles 16, 16 provided on the opposite terminal end portion 14, whereby the terminal end portion 13 can be fastened in overlapping relationship to the terminal end portion 14 by connecting the strap elements 15, 15 to the buckles 16, 16.

The main body portion 12 is in the form of a flat sleeve in which are contained the various electrical components of the device. Thus, a conventional microphone 17 is mounted in one end portion of main body 12. Also mounted in the main body is a miniature microphone transformer 18 and a transistor amplifier consisting of transistors 19 and 20 interconnected in a conventional manner in the manner illustrated in FIGURE 4. The amplifier circuit includes a bias voltage-adjusting potentiometer 21 and an adjustable sensitivity control potentiometer 22. The bias voltage-adjusting potentiometer 21 may have a maximum resistance value of 1 megohm and the sensitivity control potentiometer 22 may have a maximum resistance value of 50,000 ohms. Connected between the common junction of potentiometer 21 and potentiometer 22 and the collector of transistor 20 is a current-limiting resistor 23, which may have a resistance value of 1,000 ohms. Connected to the output of the amplifier is a miniature sensitivity relay 24 having a pole 25 and an associated stationary contact 26.

Also mounted in the flexible sleeve portion 12 is a miniature supply battery 27 and a step-up transformer 28 having the primary winding 29 and the secondary winding 30. The transformer 28 has a relatively high turn ratio so that a substantial voltage can be induced in the secondary 30 responsive to interruptions of the current supplied to the primary winding 29. The terminals of the secondary winding 30 are connected to a pair of spaced electrodes 31 and 32 having exposed inner surface portions adapted to make contact with the wearer's neck when the neckband is worn, for example, in the manner illustrated in FIGURE 1.

Also mounted in the main body portion 12 of the neckband is a control switch 33 of the manually-operated type which is accessible to the wearer. As shown in FIGURE 4, the control switch 33 is connected in a series circuit including battery 27, the transformer primary winding 29, relay pole 25, relay contact 26 and the control switch 33. It will be also seen that the control switch 33 is connected between the negative terminal of battery 27 and the collector of the output transistor 20, and that the positive terminal of battery 27 is connected to a wire 34. The emitter of transistor 19 is connected to wire 34 and the emitter of transistor 20 is connected to wire 34 through the winding of the sensitive relay 24. The collector of the transistor 19 is connected to the base of the transistor 20 and a capacitor 35 which may have a value of 100 microfarads, is connected between the base of transistor 20 and the emitter thereof for the purpose of providing voltage and current stabilization.

The relay 24 is of the miniature type and has substantial sensitivity, being activated by a current of the order of 1.2 milliamperes.

As shown in FIGURE 4, the microphone 17 is con-

nected to the primary winding of the input transformer 18, and the secondary winding of this transformer is connected between wire 34 and the base of transistor 19. Signals delivered to transformer 18 by microphone 17 are thereby amplified in the transistors 19 and 20, the output current of the transistor 20 flowing through the winding of the relay 24.

In using the device, the neckband is secured on the user's neck in the manner illustrated in FIGURE 1, with the electrodes 31 and 32 in contact with the skin. The switch 33 is closed. When the sleeper snores, the microphone 17 receives the audio energy in the form of audible waves of a periodic character having rather sharp wave shapes generally resembling steep saw-tooth waves having a relatively low audio frequency.

The high-amplitude fundamental components of these waves are amplified by the transistors 19 and 20 and are delivered to the winding of the relay 24, which responds by closing its contacts 25 and 26 at the same rate as the received audio signals. Thus, the contacts 25 and 26 close at the frequency of the fundamental of the received waves. This intermittently energizes the primary 29 of transformer 28 with substantial current at the frequency of closure of contacts 25 and 26. The pulsations of current in primary 29 induce a relatively high voltage in the secondary 30 of the step-up transformer 28, this voltage being applied to the sleeper because of the contact of electrodes 31 and 32 with the sleeper's skin. Thus, when the sleeper snores, a mild shock is applied to his neck by the electrodes 31 and 32. This shock will either awaken or partially awaken the sleeper, with a resultant cessation of snoring. Through repeated use, the sleeper will be conditioned to expect a shock as a result of snoring, which will ultimately result in a substantial reduction or complete elimination of snoring or of other vocal sounds which would otherwise be produced by the sleeper.

It will be noted that the intensity of the shock depends directly upon the amplitude of the audio signal received by microphone 17, so that the wearer of the device will respond very quickly when his snoring is relatively loud and will reduce his intensity of snoring in order to reduce the intensity of the generated shock voltage. Thus, the device acts automatically to either inhibit loud snoring or to completely eliminate snoring altogether.

While a self-contained snore-preventing or inhibiting device has been disclosed in the drawings, it is within the contemplation or the present invention that the electrodes 31 and 32 may be applied to other parts of the user's body instead of to the skin of the user's neck. Thus, the electrodes 31 and 32 may be contained in a separate attachment which may be secured to some other part of the body and connected by flexible wires to the terminals of the high voltage-producing step-up transformer secondary 30.

The microphone 17 may be of any conventional type of relatively small size, for example, may be a conventional crystal microphone button. The battery 27 is a conventional miniature 6-volt battery or other miniature battery of suitable voltage.

As shown in FIGURE 2, the microphone 17 is exposed at the inner side of the widened neckband portion 12, as are the shock electrodes 31 and 32. The operating element of the control switch 33 is exposed at the outer side of the neckband, as shown in FIGURE 1. The amplifier may be contained in a unitary sealed assembly, shown in dotted view at 40, FIGURE 2, and the remaining electrical components of the apparatus may be contained in another housing or compartment 41. It will be understood that the elements 40 and 41 are relatively flat and are of small size, and are easily accommodated within the flat sleeve-like main portion 12 of the flexible neckband.

While illustrated and described herein as an anti-snore device, the apparatus above-described may also be employed, with necessary changes in external configura-

tion and size, as a device to inhibit dogs from excessive barking. Thus, it can be secured to the neck of a dog in a manner similar to that in which the device is fastened to the neck of a sleeper, so that it can pick up the sounds produced by the animal and thereby generate shock voltage which will automatically tend to discourage the dog from barking.

While a specific embodiment of an improved anti-snore device has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. An anti-snore device comprising a flexible neckband, means to secure the neckband around a person's neck, sound-responsive means on the neckband, means to convert snore sound signals received by said sound-responsive means into corresponding audio-frequency periodic electrical waves, means to generate a relatively high voltage responsive to the reception of said electrical waves, spaced electrode means connected to the output of said high-voltage-generating means, and means to hold said spaced electrode means in contact with the person's skin.

2. The anti-snore device of claim 1, and wherein said sound-responsive means comprises a sound transducer mounted on the neckband.

3. The anti-snore device of claim 2, and wherein said sound transducer comprises a microphone mounted on and facing inwardly of the neckband.

4. The anti-snore device of claim 2, and wherein the converting means is mounted in the neckband.

5. The anti-snore device of claim 4, and wherein the converting means comprises an amplifier, a sensitive relay connected to the output of the amplifier and having a pair of contacts, a high-voltage transformer, a source of current, and circuit means connecting said source of current to the input of the high-voltage transformer through said pair of contacts.

6. The anti-snore device of claim 5, and wherein said high-voltage transformer is provided with a primary winding forming its input circuit and a secondary winding forming its output circuit.

7. The anti-snore device of claim 6, and wherein said spaced electrode means comprise a pair of electrodes mounted on the neckband and facing inwardly thereof to make contact with the wearer's skin.

8. The anti-snore device of claim 7, and wherein said circuit means includes a control switch mounted on the neckband and having a control element exposed at the outer side of the neckband.

9. The anti-snore device of claim 1, and wherein the neckband is in the form of a flexible flat member, with the sound-responsive means, the converting means and the electrode means mounted on said flexible member, and with the sound-responsive means and the electrode means exposed at the inner surface of the flexible flat member.

10. The anti-snore device of claim 9, and wherein said sound-responsive means comprises a microphone, and said means to convert sound signals into electrical energy comprises a transistorized amplifier driven by said microphone and a high-voltage generator driven by said amplifier.

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U.S. Cl. X.R.

128-418, 419