

A. C. LIPPINCOTT.
 WARNING DEVICE.
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1,093,058.

Patented Apr. 14, 1914.

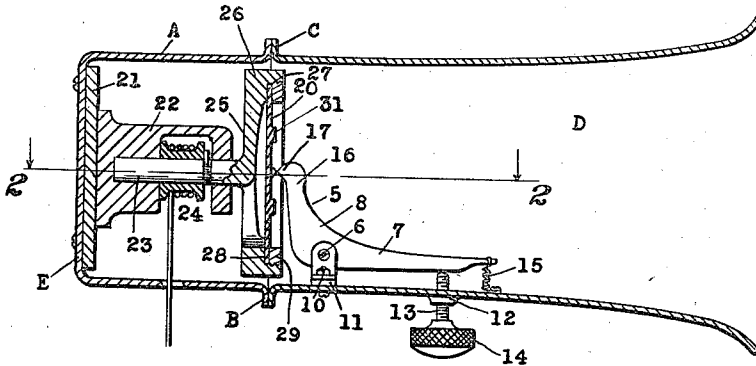


Fig. 1.

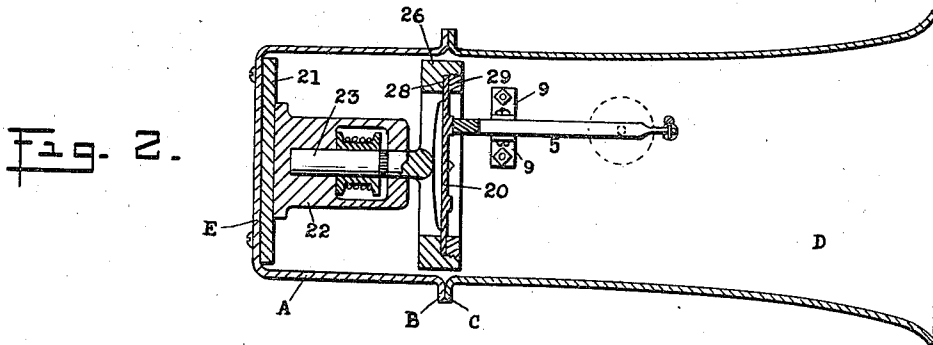


Fig. 2.

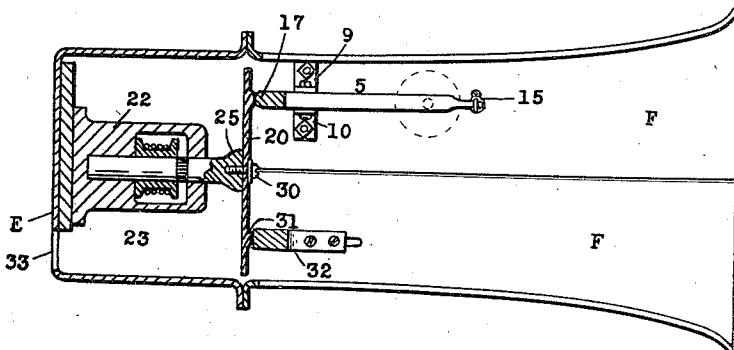


Fig. 3.

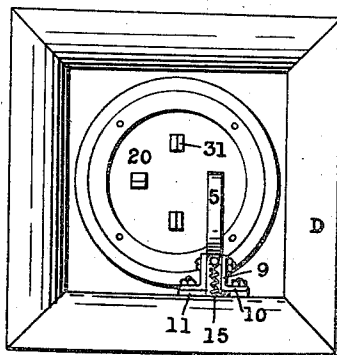


Fig. 4.

WITNESSES

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WARNING DEVICE.

1,093,058.

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To all whom it may concern:

Be it known that I, ALPHEUS C. LIPPINCOTT, a citizen of the United States, whose residence and post-office address is No. 193 North Maple avenue, in the city of East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Warning Devices, of which the following is a specification.

10 My invention relates to a warning device or automobile horn of the character in which a thin metal diaphragm is vibrated to produce a loud, intense, high-pitched sound of great carrying power. In devices of 15 this character now known it has been usual to mount the diaphragm in fixed position relative to the containing casing and to vibrate the diaphragm by pulling, pushing or striking the same at the center with a series of rapid blows by means of a hammering member, usually in the form of a rotating cam or disk having projections or cam faces thereon. These devices possess 20 many apparent defects among which it might be noted that the clamping of the light diaphragm directly to the containing casing has the effect of reacting to damping or deadening the vibrations of the disk; and with these devices it is necessary to continually actuate a heavy hammering or striking member and to overcome the friction incidental to movement of these members. 25

It is among the objects of my invention to eliminate or minimize the above suggested objections; and to produce a horn having a distinctive attention-impelling intonation of its own at short range and a less harsh note at a longer range.

It is a primary object of the invention to 30 produce a device of the above indicated character which is simple in construction of relatively few parts, and in which the parts are arranged and assembled to produce a neat compact horn, which is designed 45 so that the parts may be readily dismantled and replaced.

It is another object of the invention to utilize as much of the necessary elements of the conventional shaped horn as possible to 50 constitute an additional source of sound waves and it is a further object to produce a horn, having a high efficiency, that is in which a maximum intensity and duration of sound is produced from a given actuating force. 55 Various other objects will be apparent from the following description and claims.

Briefly I attain the above outlined objects by rotating the disk itself and causing a relatively stationary finger to engage with wear-pieces concentrically spaced about the 60 face of the disk.

Instead of the simple bodily movement of the center of the disk characterizing similar devices hereinbefore identified, with my horn I strike the diaphragm so that the 65 point of greatest displacement is eccentric relative to the geometric center of the diaphragm; then the diaphragm is struck with a second blow displaced from the point of impact of the first blow and so on around 70 the face of the diaphragm, each section of the diaphragm adjacent a wear-piece being sprung so as to take a partly forced and partly free swing, in other words the disk is set vibrating not with the uni-lateral 75 movement now known, but with a series of pulsating sections each of which produces, what may be called an over tone and possibly extra vibrations and all of which combine to produce a raucous composite note 80 of great intensity and startling effect at close range and at the same time a note having at least some suggestion of musical timbre at long range. In one modification of my device the vibrating sectors combine 85 to vibrate the center of the diaphragm to the bodily swing of this member as a unit, thereby to produce in addition to the composite high-pitch note above described an additional superimposed long distant note 90 which may be called a fundamental note.

For the purpose of disclosing a physical embodiment of my invention such as will enable others skilled in the art to which it appertains to make and to use the same, reference is had to the accompanying drawings which illustrate the preferred form of the invention, but it is to be understood that the invention is not to be limited to the exact details of construction shown and described as it is obvious that various modifications thereof will occur to persons 100 skilled in the art.

In said drawings Figure 1 is a longitudinally transverse sectional view taken axially 105 through a preferred embodiment of my invention; Fig. 2 is a similar view taken on a plane of the line 2—2 of Fig. 1 and looking in the direction indicated by the arrows; Fig. 3 is a view similar to Fig. 2, but showing a slightly modified form for mounting 110 the diaphragm and showing a split ampli-

fier, and Fig. 4 is an end view looking at the device shown in Figs. 1 and 2 from the open end of the horn proper or amplifier.

5 Described more in detail, I have shown a suitable casing A adapted to contain the actuating mechanism which casing is preferably of a light metal adapted to be stamped into the cup-shape herein shown, the forward open end of which is formed into an
10 outturned ledge B adapted to contact with a correspondingly outturned ledge C outlining the rear open end of the resonant amplifier or horn D and while the casing A and amplifier D are herein shown to be of two parts
15 fastened together, it is obvious that these members may be of one piece or the sides may be of one piece with a separately mounted back E. The amplifier D particularly should be of a light vibratory metal as this member is intended in this disclosure to constitute a source of sound waves in addition to its usual functions as an amplifier or sound director and as shown in Fig. 3
25 may be split longitudinally to form vibrating reeds F. For convenience of construction the amplifier is herein shown to be rectangular in cross-section, but this amplifier may be the conventional frusto-conical or
30 flared end tube now characterizing devices of this character it merely being necessary that the construction be that best suited as an amplifier or container for the resonating air column and as a sound producing member, independent of the vibratory functions of the usual disk.

Suitably mounted in fixed position relative to the horn as a whole is a finger or wear-piece engaging member 5 which in
40 Figs. 1 and 2 is shown to be in the form of a bell crank lever mounted directly upon the casing or amplifier D and it is pivotally or rockably mounted on the pin 6, which pin passes through the long arm 7 of the lever a short distance from its crotch 8. The pin
45 6 is shown to be supported from a bracket 9 which bracket is formed in this disclosure by a pair of spaced apart angle members 10 suitably affixed to the amplifier D and
50 should it be desired to prevent the transmission of sound from the lever 5 to the amplifier D through its pivotal connection, a cushion 11 is shown to be interposed between the bracket 9 and the adjacent face of the
55 amplifier D. The long arm 7 extends parallel or substantially parallel to the adjacent side of the amplifier D and at some point remote from the pivot 6 engages the amplifier D to transmit shocks to the same
60 as hereinafter more fully described. This engagement may be adjustable and for this purpose, I have shown, threaded through a boss 12 affixed to and reinforcing the thin metal of the amplifier at this point, screw
65 13 the outer end of which is capped by a

milled head 14. The long arm 7 is maintained in engagement with the inner end of the screw 13, by some means preferably resilient, such as the tension spring 15 shown to connect the free end of the arm 7 with the
70 adjacent side of the amplifier D and acting to firmly seat the arm 7 on the screw 13. The other arm 16 of the lever extends substantially at right angles to and displaced from the axis of the amplifier D and terminates in a wear-piece-engaging-head or nose
75 17 projecting laterally from the arm 16. This nose may be in the form of a ridge or cone as shown in Figs. 1 and 2 or it may be in the form of a rounded head or button as shown in Fig. 3, it being preferable to have
80 this engaging member with a bevel side to engage with a correspondingly shaped wear-piece carried by the diaphragm hereinafter more fully described.

85 With a stationary or rather relatively stationary head 17 it is among the objects of this invention to mount a vibrating diaphragm and to wipe one or preferably a plurality of diaphragm contacting wear-
90 pieces across the stationary head 17 thereby to set the diaphragm in vibration. For convenience of construction these wear-pieces are mounted directly upon the diaphragm and the diaphragm itself bodily moved and
95 this construction gives rise to other and incidental functions. Taking advantage of the ease of operation of rotating members, I preferably mount the vibrating diaphragm or metal disk 20 for rotation relative to the
100 stationary head 17. This diaphragm is suitably mounted for rotation either by clasp- ing the edge as shown in Figs. 1 and 2 or by affixing the same centrally to a driving member. In the devices herein shown there
105 is affixed to the rear wall E of the casing a relatively heavy carrying plate 21 from which is supported a frame 22 projecting into the casing A journaled within which frame and mounted for free rotation is a
110 shaft 23 in this illustration shown to coincide substantially with the axis of the amplifier D. This shaft may be actuated by any suitable means 24 controlled from a position convenient to the operator, but this
115 actuating means constitutes no part of this invention and may be any of the manually actuated or electrically driven devices now common with horns of this character.

120 The forward end of the shaft 23 is enlarged to form a head 25 which in Figs. 1 and 2 is shown to take the form of a spider, the arms of which extend outward laterally from the shaft, and is formed into an outer annular ring 26 internally screw threaded as
125 shown at 27. The ring 26 has a shoulder 28 spaced some distance from the spider 25 so as to permit free swinging of the diaphragm 20 in a direction transverse to its normal plane when at rest. The diaphragm is held 130

in position on the shoulder 25 by an annular externally screw threaded ring 29 engaging the threads 27 and adjustably clamping the diaphragm adjacent its outer edge, but it is obvious that the diaphragm may be clamped adjacent its outer edge by any other suitable form of connection as for instance, the diaphragm may be directly affixed to the arms of the spider 25.

In the modification shown in Fig. 3, the diaphragm 20, has its center affixed to the head 25 by a suitable means such as the screw 30. Concentrically disposed about the face of the diaphragm 20 is a plurality of wear-pieces or projections 31, which projections move in a fixed path, in this case shown to be circular, and are brought successively into contact with the head 17. The points of contact are so arranged that as one wipes over the other a portion of the diaphragm of which the wear-piece is the center will be given a partly forced and partly free vibration, or rather a swing or push away from the head 17. The projections on the vibrating diaphragm are so spaced that on the return swing of this portion of the diaphragm, the projections will be out of contact with the head 17, thereby permitting free swinging of the diaphragm across its normal position. The continued movement of the diaphragm will bring the next succeeding wear-piece 31 into actuating engagement with the head 17 causing the diaphragm to vibrate with a different center of greatest displacement displaced from the preceding center of greatest displacement and so on about the disk, rapidly imposing upon the same and at different points eccentric therewith, a vibrating movement producing the tone hereinbefore described.

The tone as produced by a horn constructed in accordance with the disclosures in Figs. 1 and 2 is somewhat modified from the tone produced by the free edge diaphragm shown in Fig. 3, as in one case the greatest amplitude is at the center and in the other at or adjacent the edge. It is obvious that a device of the character above outlined contains a minimum number of component parts and may be economically and cheaply constructed; further the two parts which are most likely to wear—that is, the wear-pieces 31 and levers 5—may be replaced or even a new diaphragm may be readily inserted in position. Further it is noted that practically the entire casing outside of the heavy plate 21 may be made a sound producing source for not only is the column of air contained within the amplifier set in vibration, but also the column of air contained within the casing A, and with obvious mechanical changes in construction applicant can open the rear wall E of his casing, as shown at 33 and can so proportion the air columns within the amplifier D and

casing A relative to the natural period of vibration of the diaphragm 20, that the direction of sound can simultaneously be directed forward or rearward. Further the large surface of the amplifier D or amplifier and casing A together is utilized as a vibrating member to produce sound waves and it is obvious that instead of the one head 17 a plurality of such heads may be disposed about the amplifier in the path of movement of the projections or wear-pieces 31 or the amplifier itself may be split longitudinally as shown in Fig. 3 with a lever 5 mounted upon each section to form in effect a reed instrument, in addition to the usual disk instrument.

As shown at 32 finger 5 may be clamped rigidly or in adjusted position on any suitable support even independent of the containing casing where the device is constructed with just the diaphragm 20 as the sounding body or it may be affixed to the casing, amplifier or reed strips F where it is desired to use the casing or a part thereof as a sounding body.

It is apparent that as the disk diaphragm, or its carriage, does not extend to the wall of the casing, it is possible for the sound waves generated by the rearward swing of the diaphragm to be reflected from the rear wall of the casing, or other reflecting surface, and the parts are so arranged that the reflected sound waves may be synchronized with the waves generated at the front swing of the diaphragm to produce an intensified sound.

Provided the means in the following claims be followed it is obvious that the skilled mechanic may make various changes in the construction of the mechanism herein described without departing from the spirit of the invention.

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

1. In a horn, a movable diaphragm having a center free to vibrate and having projections thereon spaced from the center and movable with the diaphragm over a fixed path, and a projection-engaging member disposed in the path of movement of said projections and adapted to engage the same to set the center of the diaphragm into vibration.

2. A horn, having an amplifier, in combination with a rotating diaphragm capable of vibrating, a wear-piece carried by said diaphragm, and a wear-piece-engaging member mounted in fixed position on said amplifier and having a part disposed in the path of movement of said wear-piece, and adapted to transmit vibrations to said amplifier.

3. In a horn, a rotating shaft, a vibrating diaphragm fixed adjacent its periphery

to said shaft, said diaphragm having a wear-piece projecting therefrom, and a relatively stationary finger disposed in the path of movement of said wear-piece.

5 4. In a horn, the combination with a moving and vibrating diaphragm having a wear-piece projecting therefrom, of a lever having a part adapted to be disposed in the path of travel of said wear-piece, and means for
10 adjusting the position of said lever relative to said path.

5. In a horn, a vibrating amplifier, in combination with a movable and vibrating diaphragm having a wear-piece thereon, and
15 a lever having one arm adapted to be positioned in operative relation to said wear-piece and the other arm in operative engagement with said amplifier to vibrate the same.

6. A combined diaphragm and reed horn,
20 comprising a resonator formed of vibrating strips, a contacting finger carried by each strip, and a rotating diaphragm for said resonator, said diaphragm having a
25 projection thereon adapted to contact with said fingers to vibrate said strips and said diaphragm.

7. In a horn, the combination with a moving and vibrating diaphragm having a wear-piece projecting therefrom, of a lever having
30 a part adapted to be disposed in the path of travel of said wear-piece.

8. In a horn the combination with a rotating shaft and a diaphragm affixed to said shaft, of relatively stationary means adapt-

ed to be engaged by said diaphragm to vibrate the same.

9. A horn, having a resonant casing, a diaphragm rotatably mounted in said casing and having its edge spaced therefrom to form an opening therebetween for the
40 passage of sound waves and means for vibrating said diaphragm.

10. In a horn, a mechanism containing casing, including a back for one end of said casing, and an amplifier forming a continuation
45 of the other end of said casing, a shaft supported from said back, means for rotating said shaft, a diaphragm carried by said shaft and means in operative engagement
50 with said diaphragm to vibrate the same.

11. A horn comprising a supporting member, a rotating member carried thereby, a vibrating diaphragm clamped to said rotating member, and a stationary member operatively engaging said diaphragm to vibrate
55 the same.

12. A device of the class described comprising a diaphragm rotatable about an axis at the center thereof and supported adjacent its edge and means engaged by said diaphragm to set the same in vibration.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALPHEUS C. LIPPINCOTT.

Witnesses:

HOWARD P. KING,
WARREN S. ORTON.