March 26, 1935. G. I. LEWIS 1,996,010

WARNING DEVICE

Filed Aug. 28, 1933 2 Sheets-Sheet 1

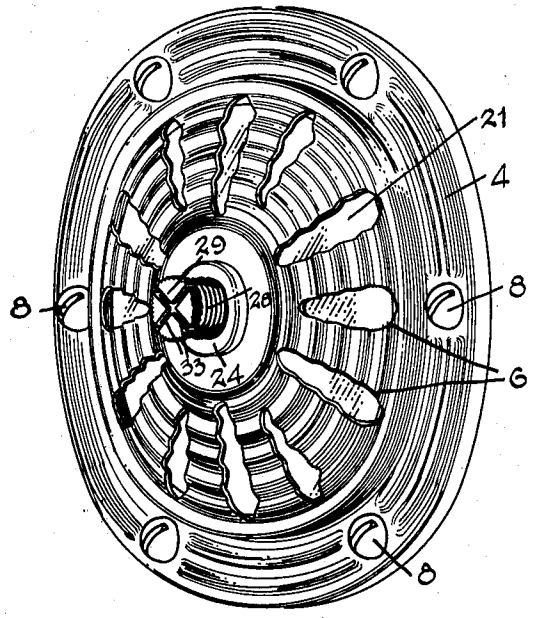


Fig 1

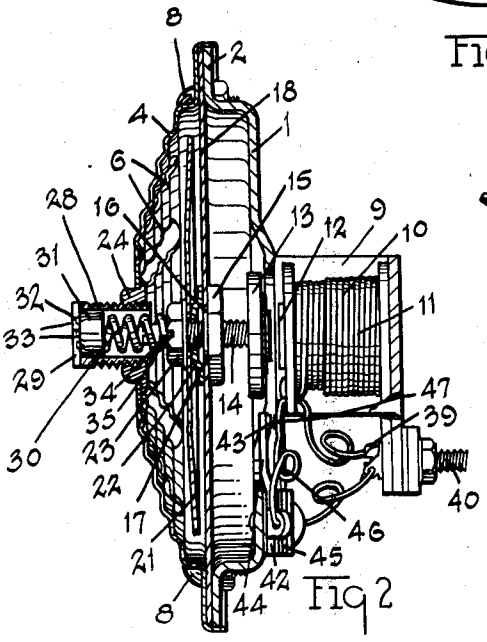


Fig 2

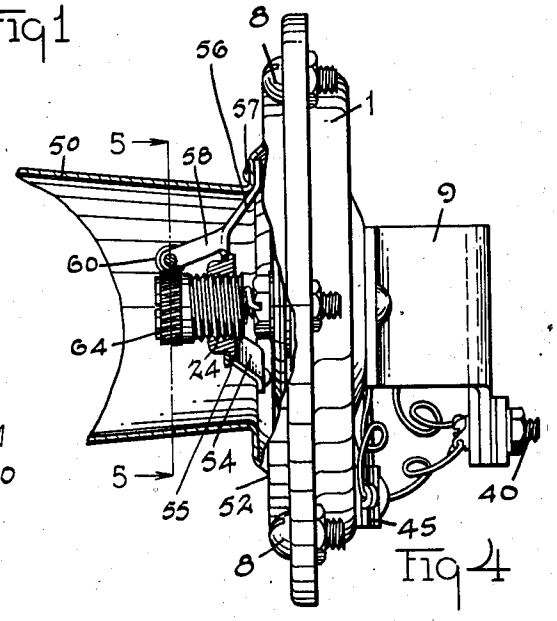


Fig 4

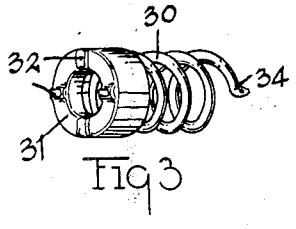


Fig 3

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WARNING DEVICE

Filed Aug. 28, 1933 2 Sheets-Sheet 2

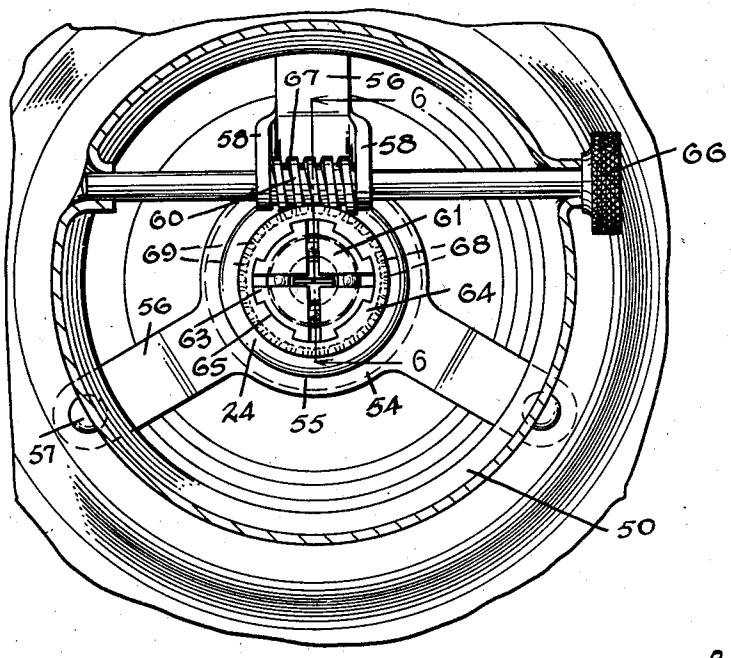


Fig 5

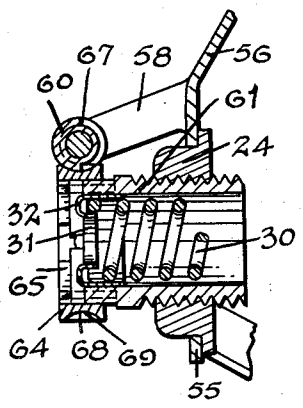


Fig 6

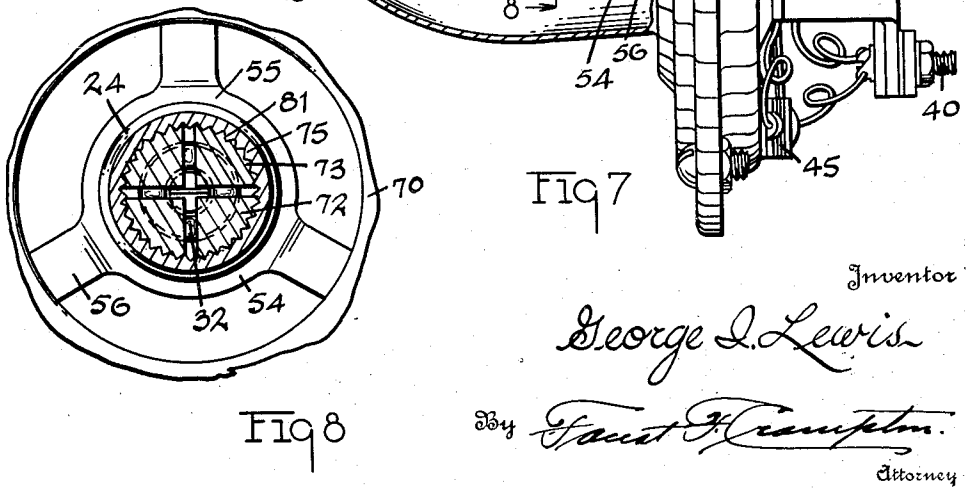


Fig 7

Fig 8

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UNITED STATES PATENT OFFICE

1,996,010

WARNING DEVICE

George I. Lewis, Cincinnati, Ohio

Application August 28, 1933, Serial No. 687,035

2 Claims. (Cl. 177—7)

My invention has for its object to provide an efficient signalling and warning device of substantial construction which may be easily assembled and made at a low cost of construction. The invention also provides a construction which may be easily adjusted to produce the desired tonic effects.

The invention particularly relates to a means whereby a fixed diaphragm and a freely vibratory body are vibrated to produce a piercing resultant tone. The invention is particularly adapted to be used as a signalling and warning device on motor vehicles. The piercing tone produced by the structure is easily distinguished over the din and noise of motor traffic.

The invention is equally usable as a signalling and warning device on motor boats and water craft.

The invention also provides a means whereby the pitch of the resultant tone may be easily adjusted. The invention consists in other features which will appear from the following description and upon examination of the drawings.

The invention may be contained in horns or signalling devices of different forms, and to illustrate a practical application of the invention, I have chosen a horn containing the invention as an example of the various structures that embody the invention and shall describe it hereinafter. The structure selected, together with two modified forms of the structure, is shown in the accompanying drawings.

Fig. 1 is a front view of the horn. Fig. 2 is a side view of the horn, showing the sound producing parts of the horn. Fig. 3 shows a cap and spring used in adjusting the pitch of the horn. Fig. 4 is a side view of a modified form of the horn construction. Fig. 5 is a view of a section on the plane of the line 5—5 indicated in Fig. 4. Fig. 6 is a view of a section on the plane of the line 6—6 indicated in Fig. 5. Fig. 7 is a side view of a modified form of the horn construction. Fig. 8 is a view of a section taken on the plane of the line 8—8 indicated in Fig. 7.

In the particular form of construction shown in Figs. 1, 2, and 3, the horn has a shell 1 which has the flanged portions 2. A cap 4 having the openings 6 fits over the flanged portions 2 of the shell 1 and is connected peripherally to the shell by means of screws 8.

A housing 9 is supported on the shell and encloses and supports a magnet 10, having a coil 11. The coil 11 has the soft iron core 12.

In spaced relation to the core 12 is a discular armature 13 supported on the threaded post 14, which is connected to the diaphragm 18 that is secured in position by the screws 8, which secure the cap to the flanged portions of the shell. The diaphragm is preferably constructed of highly carbonized steel. The diaphragm 18 is maintained in spaced relation with respect to the armature 13 by the adjustable space bolt 15, which has the raised portion 16 substantially fitting the opening 17 of the diaphragm 18.

Mounted on the threaded post 14 and connected thereby to the diaphragm 18 is the freely vibratory body, preferably discular in shape. The freely vibratory body may be formed of sheet metal having opposite plane surfaces, or it may be formed slightly thicker in the central portion than at the peripheral portions, or it may be formed of sheet metal and pressed to form a very slight concavity.

The vibratory body constitutes a tuned member capable of producing a fundamental tone of definite pitch, due to its manner of support or due to its support and shape and the character of the material used in its construction.

The tuned vibratory body 21 is maintained in spaced relation to the peripherally secured diaphragm 18 by the space member 22. The diaphragm 18, the space member 22, and the vibratory body are securely held in position with respect to each other and to their position on the threaded post 14 by the clamping action of the nut 23 against the head of the space bolt 15.

The diameter of the tuned vibratory body is preferably such that the vibratory body covers the greater part of the vibratile surface of the diaphragm 18. Preferably the diameter of the vibratory body is substantially the same as that of the inner diameter of the shell, and the edge of the vibratory body is located in close proximity and in spaced relation to the edge portion of the inner surface of the cap.

In operation the vibratory body acts in the manner of a piston on the column of air between its outer surface with respect to the diaphragm 18 and the inner surface of the cap 4. The air in front of the vibratory body is successively pushed out and released in accord with the vibrations of the diaphragm 18, and the tone produced by the vibration of the diaphragm 18 is thereby greatly amplified.

The air between the diaphragm 18 and the vibratory body 21 and the walls of the cap 4 acts as a resonator and influences and modifies the harmonics of the fundamental tones of the diaphragm and the vibratory body, as well as

transmits and reflects the vibrations between the diaphragm and the vibratory body.

The tuned vibratory body produces a tone of definite pitch and harmonic overtones which affect the resultant tone produced by actuation of the discular armature 13 by the magnet 10.

Means is also provided for adjusting the tensity of the peripherally secured diaphragm 18. Such adjustment of the tensity affects the pitch of the tone caused by the vibration of the diaphragm and consequent change in the resultant tone.

Supported by the cap 4 is the annulus 24, threaded to receive the exteriorly threaded, hollow, cylindrical screw 28. One end of a helical spring 30 is positioned in the screw 28 and engages with the end part 29 of the screw to hold the other end of the spring in pressing engagement with the nut 23. The tension of the spring 30 can be increased or decreased by rotation of the screw 28.

Rotation of the screw 28 adjusts the tension of the spring 30, which in turn adjusts the tensity of the diaphragm 18. As the tensity of the diaphragm 18 is increased by the increased tension of the spring, the rate of vibration of the diaphragm 18 is increased, and the pitch of the fundamental tone of the diaphragm is raised, thus raising the pitch of the resultant tone.

As the tensity of the diaphragm 18 is decreased by adjustment of the spring 30, the rate of vibration of the diaphragm 18 is proportionately decreased, and the pitch of the fundamental tone of the diaphragm is lowered, lowering the pitch of the resultant tone.

Means is also provided for maintaining the adjustment of the helical spring 30 as against jarring and vibrations of the shell of the horn, which would tend to cause retrogradation of the screw 28 and a lessening of the compression of the spring 30.

In order to effect maintenance of the adjustment of the spring 30, against jarring and vibration, one end of the spring 30 is provided with a thimble 31, which has ridges 32. The end part 29 of the screw 28 has slots 33 into which the ridges of the thimble fit.

The spring 30 has a portion 34 that projects from its other end. The nut 23 has transverse slots 35 which receive the projecting portion 34 of the spring 30.

When the desired pitch of the resultant tone is obtained by adjustment of the screw 28, the projecting portion 34 is confined by the slots 35 of the nut 23, and the ridges 32 of the thimble are forced into pressing and yielding engagement with the slots 33 of the end part 29 of the screw by the tension of the spring 30. Thus the cylindrical screw is held in its adjusted position notwithstanding jarring and vibration of the shell.

The housing 9 of the shell 1 is provided with a pair of binding posts 39 and 40. The binding post 39 is connected to the coil 11, and the coil 11 is connected to the plate 42, which makes connection with the fixed contacts 43 on the arm 44. The binding post 40 is connected to the plate 45, which is separated from the plate 42 by insulating material, and which makes connection with the relatively rigid vibratory arm 46. The circuit through the magnet 10 is controlled by means of the contacts 43 and 47 that are opened and closed by the movement of the diaphragm 18 and the parts connected thereto.

The vibratory arm 46 projects beyond the fixed arm 44 toward the electro-magnet 10 and between the core 12 and the discular armature 13. When the core 12 is magnetized, the discular armature 13, in the course of its movement toward the core, contacts with the arm 46 and forces it toward the core. The motion of the vibratory arm opens the contacts 43 and 47, breaking the circuit. When the core 12 is demagnetized and no longer attracts the discular armature, the vibratory arm 46 is released, the contacts 43 and 47 are closed, and the core 12 is re-energized by the coil.

If desired, a megaphone may be used in place of the cap. In this modified form of construction, shown in Figs. 4 and 5, the sound producing means is substantially the same as in the construction shown in Figs. 1, 2, and 3. Modification of the tone adjustment means, as shown in Figs. 4, 5, and 6, facilitates ready tone adjustment on constructions equipped with megaphones.

In the modified form of construction shown in Figs. 4, 5, and 6, a megaphone 50 has a flaring flange 52 secured to the shell 1 by screws 8. The annulus 24 is maintained in a vertical position by the spider 54, which consists in a collar 55 having spreading legs 56 secured to the megaphone 50 by screws 57.

One of the legs 56 has the portions 58 extending at substantially right angles to the leg and substantially parallel to each other. The portions 58 support the shaft of a worm 60. Both ends of the shaft are mounted in the walls of the megaphone.

The worm gear 64 has teeth 68 which fit between the threads 67 of the worm. Disposed between the teeth 68 of the gear are the segmental discoidal channels 69 adapted to receive the threads 67 of the worm 60. The teeth 68 of the gear come in pressing engagement with the surfaces of the gear between the threads 67 of the worm 60, and the threads of the worm ride in the segmental discoidal channels between the teeth of the gear.

By reason of the segmental discoidal channels in which the threads of the worm ride, the gear is rotated in its axis by the worm and held in the plane of the axis of the worm.

In order that the screw 61 may be moved vertically with respect to the plane of the annulus 24 without corresponding vertical movement of the worm gear 64, the screw 61 is provided with the splines 63. The worm gear 64 has splines 65 which interfit the splines 63 of the screw.

Rotation of the worm gear by rotation of the worm causes rotation of the screw 61 due to the interfitting of the splines of the gear and of the threaded screw. Rotation of the threaded screw causes vertical movement of the screw with respect to the annulus 24 and vertical displacement of the splines 63 with respect to the splines 65 of the gear 64, or modifying the interfitting relation of the splines 63 and 65.

Inasmuch as vertical movement of the screw 61 is obtained by rotation of the gear without corresponding vertical movement of the gear and without modification of the interfitting relation of the splines of the screw and the gear, the tension of the spring 30 can be adjusted by rotation of the worm 60.

The worm 60 is rotated by the knurled screw head 66 mounted on one end of the worm shaft, which extends through the surface of the wall of the megaphone and is easily available for adjustment.

If desired, an L-shaped megaphone may be used in place of the cap in the construction shown in Figs. 1, 2, and 3. In this modified form of con-

struction, shown in Figs. 7 and 8, the sound producing means is substantially the same as in the construction shown in Figs. 1, 2, and 3. The tone adjustment means is modified to facilitate easy tone adjustment.

In the modified form of construction shown in Figs. 7 and 8, a megaphone 70 is bent to position the mouth of the megaphone at substantially right angles to the base of the megaphone. The megaphone 70 has a flaring flange 52 secured to the shell 1 by screws 8. The annulus 24 is supported by the spider 54.

The hollow, threaded screw 71 has a head 72 which has the peripheral serrations 73. The cap 75 has the serrations 81 on its inner surface and is positioned on the head 72 of the screw 71 so that the serrations 81 and 73 interfit. The cap 75 supports one end of a rigid shaft 76 which extends axially with respect to the hollow cylindrical screw. A bearing member 78 on the wall of the megaphone supports the other end of the shaft 76, which protrudes beyond the wall and is surmounted by the slotted member 79 maintained on the shaft by the screw 80.

Rotation of the operating member 79 rotates the shaft 76 and the cap 75. Due to its enmeshment with the cap 75, the head 72 is rotated simultaneously, regulating the tension of the spring 30, which adjusts the tensity of the diaphragm 18.

I claim:

1. An adjusting means for a warning device comprising a bridge member rigidly mounted and having a centrally threaded portion, a threaded thimble adjustable movable in the said threaded portion and having a plurality of radially extending slots, a friction member located within the thimble and having rounded protuberances yieldingly engaging in the said slots and frictionally resisting rotation of the thimble, a vibratory member, means for magnetically attracting and releasing the vibratory member to produce vibrations in the vibratory member, a slotted member connected to the said vibratory member, a spiral spring fixedly connected to the said friction member at one end, the spring having a turned end for engaging the said slot of the slotted member for yieldingly resisting the vibrations of the said vibratory member and maintaining the friction member in position.

2. An adjusting means for warning device comprising a bridge member rigidly mounted and having a centrally threaded portion, a threaded thimble adjustably movable in the said threaded portion and having a plurality of radially extending slots, a friction member located within the thimble and having rounded protuberances yieldingly engaging in the said slots, a vibratory member, means for magnetically attracting and releasing the vibratory member to produce vibrations in the vibratory member, a slotted member connected to the said vibratory member, a spiral spring fixedly connected to the said friction member at one end, the spring having a turned end for engaging the said slot of the slotted member for yieldingly resisting the vibrations of the said vibratory member, a shell surrounding the said thimble, and means projecting through the wall of said shell for rotating the said thimble.

GEORGE I. LEWIS.