June 7, 1938. G. I. LEWIS 2,120,028

SOUND PRODUCING DEVICE

Filed March 2, 1936

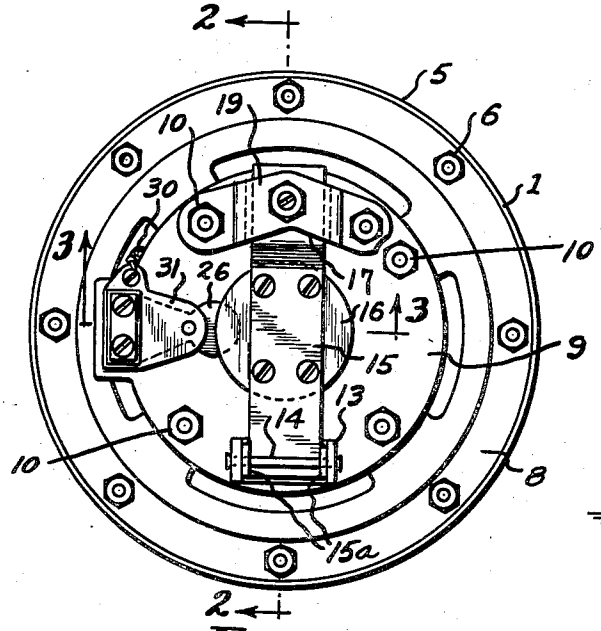


FIG. 1.

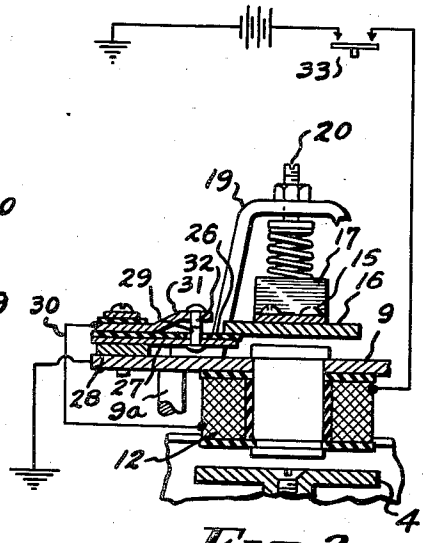


FIG. 3.

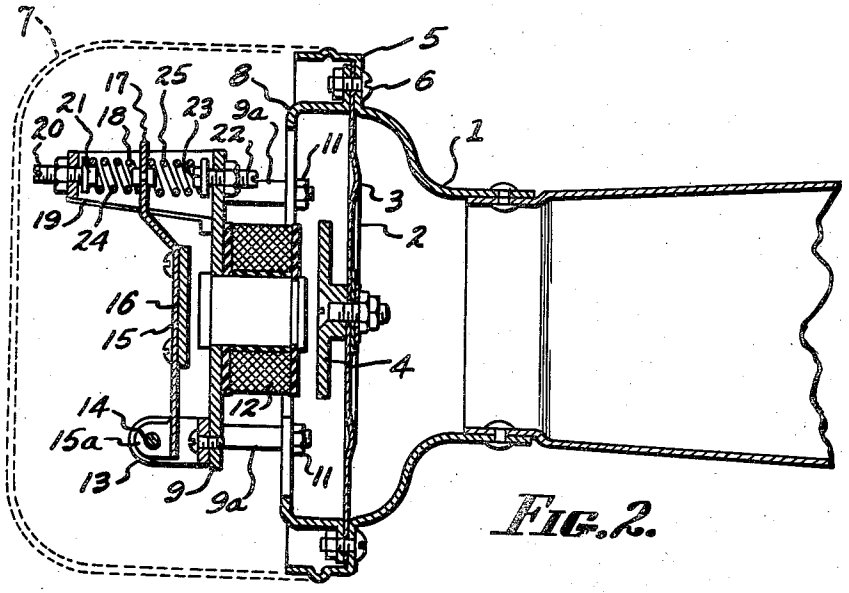


FIG. 2.

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Patented June 7, 1938 2,120,028

UNITED STATES PATENT OFFICE

2,120,028

SOUND PRODUCING DEVICE

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Application March 2, 1936, Serial No. 66,641

5 Claims. (Cl. 177—7)

My invention relates to devices for use particularly in sound producing units, warning signals such as are used in automobiles which are electrically operated from a direct current source, and for any other purpose to which they may be adaptable. It has as its object the provision of a device which will make a bellowing sound, preferably beginning and ending at a lower pitch than the intermediate sound or other variations of sound or resonant tones to which the device is adaptable. Another object is to provide for use of armatures at both ends of the core of a simple coil, one of which armatures acts as an interrupter, and the other of which armatures is secured to a diaphragm. In this way the diaphragm is relieved of any duty in acting as an interrupter. A result of this arrangement is that with proper input into the coil, the diaphragm can be caused to lag behind the interrupter and thus make a mooing sound, without the use of a separate motive means.

In the structural arrangement of my device, I have provided for a simple device to construct and adjust. Other advantages inherent in the structure which I will describe and which is to be taken as an example only of a device according to my invention, will be brought out as the description proceeds. The novelty in the device will be set forth in the claims that follow.

In the drawing:—

Fig. 1 is a plan view of the device of my sound creating member.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

As I have already noted the details of structure in the particular device illustrated are not necessary to my device but can be modified on a range as desired in accordance with the principles involved and which will be described.

Generally indicated at 1 is a horn, and at 2 a diaphragm, in this instance formed of metal, which may be slightly dished at 3, and has mounted centrally thereof an armature disk 4. In the particular showing the horn is provided with a flange 5 on which the diaphragm is mounted by means of small bolts 6, and the casing 7 housing the sound creating devices snaps on over the outer lip of the flange 5.

Secured also on the flange 5 is a mounting plate 8, the same bolts serving to mount the diaphragm being employed for this purpose. Mounted on spaced sleeves 9a on the mounting plate is a plate 9 of non-magnetic metal, such as brass, or of which the central portion at least is of non-magnetic metal, bolts 10 being used to pass down through the plate and the sleeves, and through the mounting plate, where they are secured by nuts 11.

A magnet coil is provided as indicated at 12 consisting of a coil of wire wound on a spool and having a central metal core of magnetic metal (soft iron). The one end of the core lies when the coil is mounted, in magnetic relation to the armature disk 4. The spacing is provided by means of the sleeves on which the non-magnetic plate 9 is mounted. The other end of the core is inserted through a central hole in the plate 9 and its edges peened over to hold it in place. As indicated the bottom plate of the spool engages in a groove above the other end of the core, and this peening operation holds the coil tightly to the bottom of the brass plate 9.

A trunnion piece 13 is mounted on the plate 9, and supports a pivot pin 14. An armature plate 15, having an armature disk 16 thereon, has ears 15a, which are engaged by the pin, thus pivoting the armature plate. The other end of the armature plate is bent upwardly and then parallel with the main body thereof as at 17, and may have a small spool 18 arranged in the part 17. A bracket 19, mounted on the brass plate supports an adjustment screw 20, which has a button plate 21 on its inner end. A like screw and button plate 22, 23, is mounted in the brass plate 9. Springs 24, 25, are engaged by the button plates and also engage over the spool 18 on both sides of the end of the armature plate.

This arrangement permits of an adjustment of the amount of spring tension on the armature plate, tending to hold it in adjusted position also, i. e., the adjustment of the armature plate adjusts its position with reference to a circuit breaker device and adjusts its spring tension, in whatever adjusted position it may be placed.

The circuit breaker consists in the illustrated example of a piece of dielectric material 26 on the under side of which is a conductive plate 27, grounded to the horn mounting as indicated at 28. This metal plate carries a contact point or post 29 which projects up through the dielectric plate. Mounted on top of the dielectric plate and connected to a lead in conductor 30 from the coil winding, is a conductive metal plate 31 which carries a companion contact point or post 32. The plate 27 is preferably of spring metal and is engaged by the one edge of the armature disk 16. The circuit is established in the device by closing a switch as indicated at 33, which causes current to flow through the magnet coil thence to the circuit breaker and thence to ground.

The operation of the device is as follows:— when the switch is closed, the armature 16 will be attracted by the magnet core, which will break the circuit, whereupon the spring devices will return the armature to position where the circuit will be closed through the contact points. This will be repeated with the result of also causing the armature on the diaphragm to vibrate, building up rapidly in amplitude and also in period, thus creating sound which is projected by the horn.

With proper adjustment the armature on the diaphragm will not move sufficiently to create its highest sound immediately with the result of a rising pitch. The adjustment in spring tension and placing of the armature 16 will bring about this relation. A preferred vibration of the armature 16, and hence of the circuit breaker will be about to the middle of the audible range. The lower armature will then build up from a low sound to a middle range sound, and when the current is turned off of the device will drop off in vibratory period, creating a bellowing sound similar to the mooing of a cow.

The device can be adjusted for other effects, and should not be driven with high voltage, the usual storage battery of a motor vehicle serving to give the results noted.

Incident to an arrangement where a magnet core is used to interrupt a circuit at one end and move a sounder diaphragm at another is the possibility of providing for a desired natural period of vibration for the diaphragm by mechanically loading it, and at the same time leaving the interrupter free to be adjusted as desired.

It will be obvious that other ways of following the principle of my invention will suggest themselves to those skilled in the art, and as has been stated, I have described but one embodiment of my invention, and its features of novelty are to be set forth in my claims.

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

1. A sound producing device comprising an electromagnet, a diaphragm organization actuated upon by said magnet, an interrupter independent of the diaphragm organization interrupting the current fed to said magnet, the diaphragm organization being of less natural periodicity than the periodicity of the interrupter, whereby the frequency of vibration of the diaphragm organization varies during the initial application of the current to the magnet.

2. A sound producing device comprising an electromagnet, means for supplying said magnet with interrupted current of a given frequency, a diaphragm organization vibrated by said electromagnet, said diaphragm organization having a natural periodicity less than the periodicity of the interrupted current, whereby the frequency of vibration of the diaphragm organization varies during the initial application of the current to the magnet.

3. A sound producing device comprising a circuit breaker tuned to a given frequency, an electromagnet having its winding connected to a source of electricity interrupted by said circuit breaker, a diaphragm having an armature adjacent to and spaced away from said magnet, said armature being of such a weight that the diaphragm has a less natural periodicity than the periodicity of the circuit breaker, whereby the diaphragm produces a sound with a changing pitch when the source of electricity is initially applied.

4. A sound producing device comprising an electromagnet having two exposed poles, an interrupter tuned to a given frequency operated by one pole, a diaphragm organization having a natural periodicity less than the periodicity of the interrupter, said diaphragm organization located adjacent to and out of contact with the other pole, and connections whereby a direct current through the electromagnet is interrupted by the interrupter.

5. A motor vehicle horn or the like comprising a diaphragm, a relatively heavy armature plate thereon, a magnetic core having a winding around it, said core exposed adjacent said armature and out of contact therewith at all times, another relatively light armature arranged adjacent the other end of the core, the natural periodicity of the diaphragm and armature being less than the periodicity of the relatively light armature, and circuit interrupting contacts operatively connected to the relatively light armature and in circuit with the winding of the magnetic core.

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