

July 26, 1960

E. W. GOSSWILLER
SOUND SIGNAL DEVICE

2,946,995

Filed July 8, 1959

2 Sheets-Sheet 1

Fig. 2

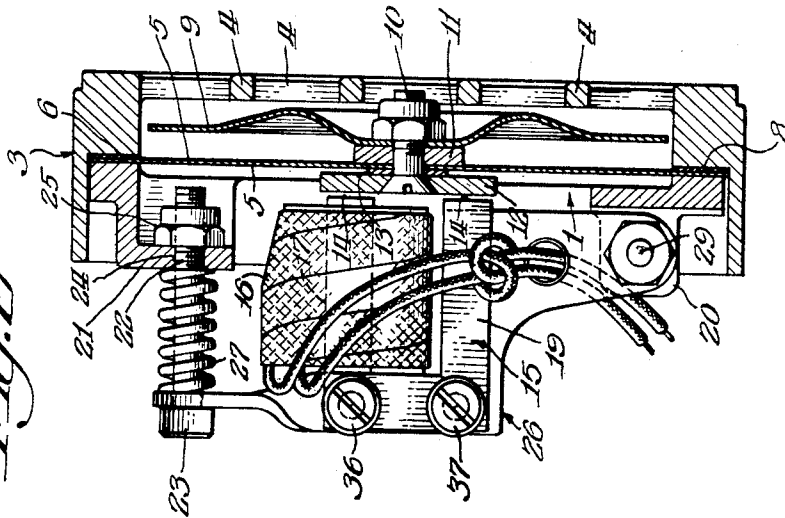
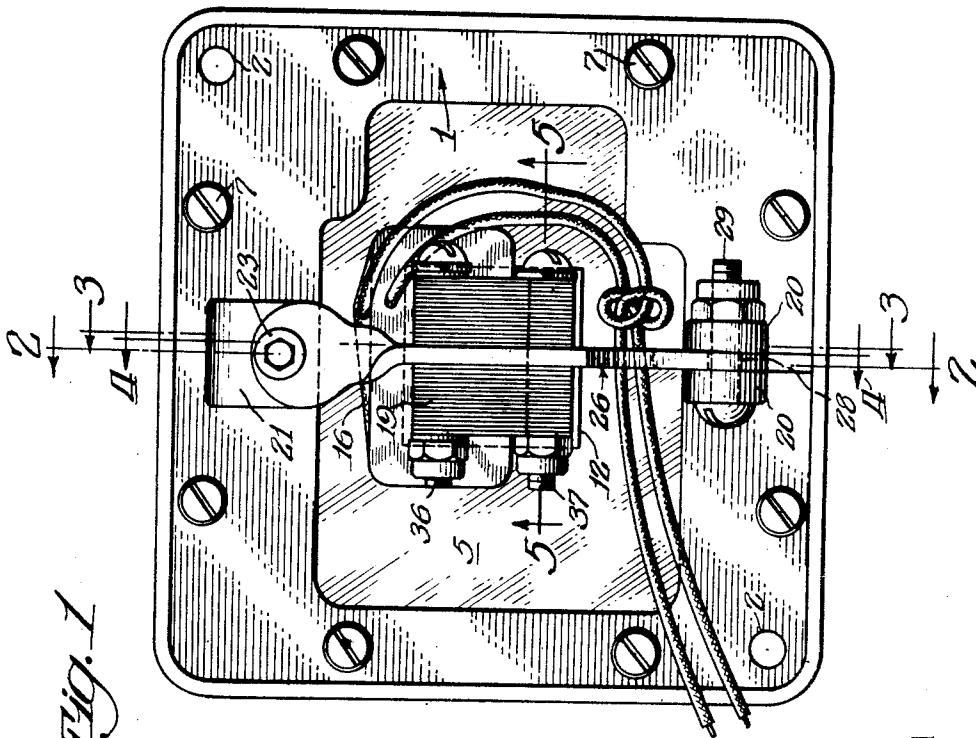


Fig. 1



Inventor:
By Earl W. Gosswiler
Gary, Desmond & Parker
attys.

July 26, 1960

E. W. GOSSWILLER
SOUND SIGNAL DEVICE

2,946,995

Filed July 8, 1959

2 Sheets-Sheet 2

Fig. 3

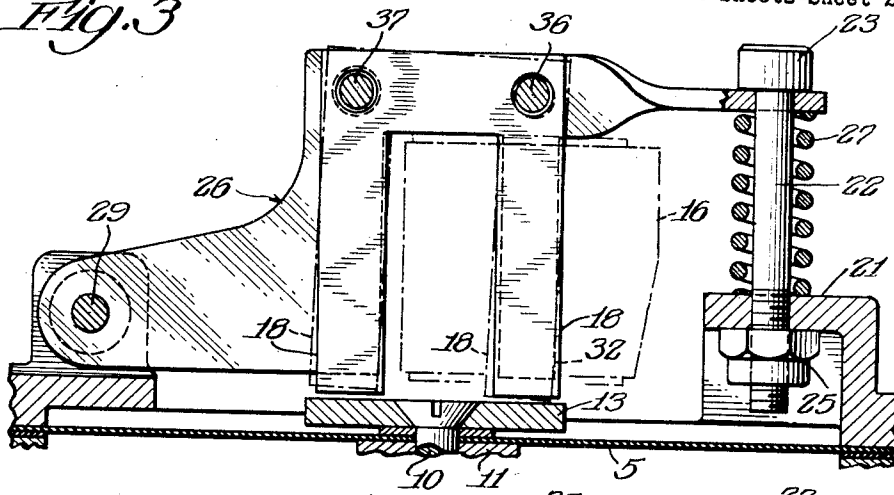


Fig. 4

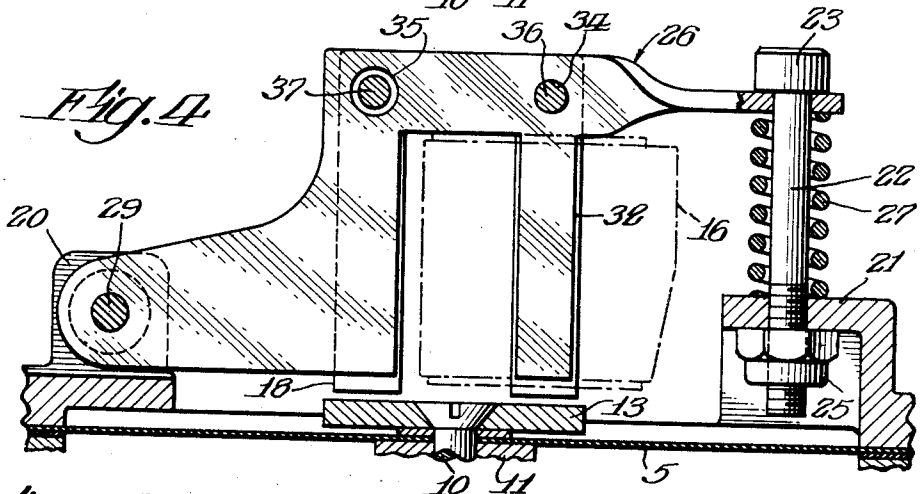


Fig. 5

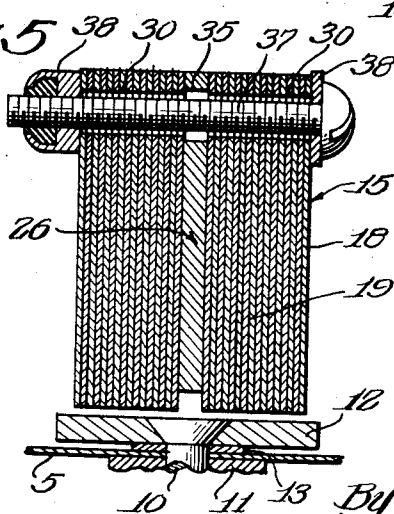
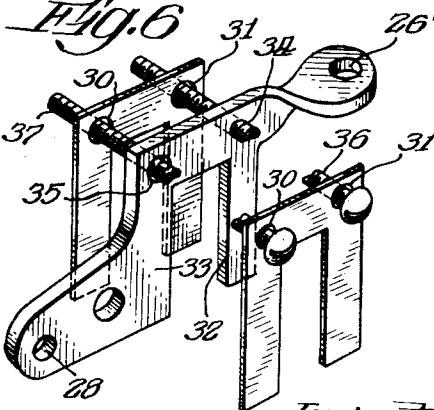


Fig. 6



Inventor
Earl W. Gossweiler
By Gary, Desmond & Parker
attys.

1

2,946,995

SOUND SIGNAL DEVICE

Earl W. Gosswiller, Chicago, Ill., assignor to Federal Sign and Signal Corporation, Chicago, Ill., a corporation of New York

Filed July 8, 1959, Ser. No. 825,766

6 Claims. (Cl. 340—388)

This invention relates to improvements in a sound signal device of the vibratory type wherein an electromagnet acts with an armature carried by a diaphragm to vibrate the diaphragm and produce a sound signal.

Sound signal devices of the vibratory type are well known. It is also well known that if, in the operation of a device of this type, the surface of the pole piece does not conform with or register parallel with the surface of the armature, inefficient operation takes place and the sound produced is of a raucous and unpleasant character.

However, to bring about this conforming relationship has proven to be most difficult in production and in most instances requires the talents of a skilled artisan. For the ordinary user who may be required to tune the signal after it may have become detuned in service, it is substantially an impossible task.

The present invention is directed to a sound signal device of the vibratory type wherein the pole piece or pole pieces are so supported relative to the armature that they can be made to readily and substantially automatically conform with the surface of the armature, the support also being such that by the simple manipulation of a screw the tone not only can be rendered pleasant and musical, but the volume can be readily changed.

Another advantage of the present invention resides in a sound signal device of the class described which for a predetermined volume and power consumption can be made smaller and more compact than has been feasible heretofore.

Other objects, advantages and features of the present invention will be apparent from the accompanying drawings and following detailed description.

In the drawings,

Fig. 1 is a top plan view of a sound signal device embodying the features of the present invention.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a similar sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is an enlarged transverse sectional view taken on line 5—5 of Fig. 1.

Fig. 6 is a detailed skeleton perspective view of the support for the pole pieces.

Referring in detail to the drawings, 1 indicates a relatively rigid rectangular frame constructed of metal which is adapted to be positioned in a casing 3. The casing 3 is also rectangular and a face of the casing is provided with cross-members 4 to form a grill. A diaphragm 5, of relatively thin metal, is also carried within the casing and its marginal edge portions are confined between a shoulder 6, formed on the interior of the casing, and the marginal portion of frame 1, the assembly being secured together by screws 7. A gasket 8 may be disposed between the marginal portion of the diaphragm 5 and the shoulder 6. The frame 1 and casing 3 are provided with screw holes 2 for the reception of screws (not

2

shown) whereby the assembly may be mounted upon a suitable support.

On the front face of diaphragm 5, that is, the face thereof facing the grill, a secondary vibrating member or amplifier disc 9 is secured by means of bolt 10 which extends through both the central portions of the diaphragm 5 and the disc 9. The disc 9 is spaced from the diaphragm by a washer 11 which is also carried by the bolt. On the opposite side of the diaphragm 5 and also carried by bolt 10 is an armature 12, said armature being spaced from the diaphragm by washer 13. The construction herein described is conventional and per se does not constitute the present invention.

The armature 12 is disposed substantially centrally of the diaphragm and completely includes the projected areas of pole pieces 14 carried by a core 15 which is associated with a solenoid coil 16 circumscribing one pole 17 of the core 15. The core 15 comprises a plurality of iron lamina 18 each of which is substantially U-shaped and when said lamina are disposed in plane-parallel relationship, the core 15 is formed having leg or pole 17 which carries coil 16 and a spaced leg or pole 19.

Frame 1 carries two spaced lugs 20 which may conveniently be formed integral with the frame. At the opposite side of the frame a boss 21, preferably formed integral with the frame, is carried. An adjusting screw 22 having a hexagonally recessed head 23 is loosely positioned through an aperture 24 in boss 21, the end portion of said screw being threaded to receive elastic stop nut 25. A bridge support 26, at one end, is provided with an aperture 26' through which the shank of screw 22 also extends. A relatively stiff coil spring 27 embraces the shank of screw 22 and is confined between the apertured end of the bridge support 26 and boss 21.

The opposite end portion of the bridge support is provided with an aperture 28, the end of the bridge support being positioned between lugs 20 and being pivotally secured to said lugs by bolt 29. Thus, the bridge support may be swung about bolt 29 as a pivot, by manipulating screw 22, spring 27 resiliently assisting or resisting such swinging action.

Each of the lamina 18 comprising core 15 is provided with an aperture 30 at the juncture of those legs of the lamina which form pole 19 with the cross-portions of the lamina. Similarly, each lamina is provided with an aperture 31 at the juncture of those legs of the lamina which form pole 17 with the cross-portion of the lamina.

The central portion of the bridge support 26 conforms substantially in shape with the lamina 18, that is, the support carries a leg 32 which conforms substantially with the legs of the lamina which form pole 17, and a portion 33 of the bridge extends downwardly and conforms substantially with the legs of the lamina which form pole 19.

The bridge support 26 is provided with an aperture 34 which, when the device is assembled, is in axial alignment with apertures 31 in the lamina. As a feature of the invention, the bridge support 26 is provided with a relatively enlarged aperture 35 which, when the device is assembled, is in substantially axial alignment with the apertures 30 in the lamina.

The core 15 is composed of a plurality of lamina which are divided into two groups, of an equal number of lamina, one of said groups being disposed on each side of said bridge support. A bolt 36 extends through the apertures 31 of the lamina of each group and also extends through aperture 34 in the bridge support, and a second bolt 37 extends through apertures 30 of the two groups of lamina and through aperture 35 in the bridge support. Elastic stop nuts 38 engage the ends of the bolts 36 and 37 and spring washers 38' are confined adjacent the heads of the screws whereby a desired degree

of resilient frictional force may be exerted to hold the lamina and intermediate bridge support in face-to-face relationship.

The arrangement is such that when the device is assembled and the core 15 is carried by the bridge support, the pole pieces 14 will be disposed adjacent the armature 12. When assembling the core and bridge support the nuts 33 are initially turned down until the lamina are tightly assembled in face-to-face relationship and then the nuts are backed off a slight degree whereby the spring washers 38 resiliently permit relative plane-parallel motion of the lamina and the included bridge support by the exertion of a substantial degree of force.

The apertures 30 and 31 are sufficiently oversize relative to the diameter of the bolts 37 and 36, respectively, so as to permit a degree of relative face-to-face movement of the lamina with respect to each other. In addition, because of the relatively large size of the aperture 35 with respect to bolt 37, a degree of rocking movement of the core 15 as a whole about bolt 36 is provided.

Thus, the lamina 18 may move in plane-parallel relationship to each other; the core as a whole independent of the bridge support may rock about bolt 36, and the entire assembly including the core and bridge support may be rocked about bolt 29 as an axis. Inasmuch as it is desirable that the end area of each lamina constituting the pole pieces 14 conform with the surface of the armature, the freedom of movement of the lamina themselves, the core as a whole and the core and the bridge with respect to each other, brings this optimum condition about.

In practice, screw 22 may be so manipulated as to bring the pole pieces into contact with the surface of the armature when the diaphragm 5 is unflexed. Of course, when the coil 16 is energized, no sound will be produced. While the coil is energized, screw 22 may be backed off to space the pole pieces from the armature. Of course, the core moves away from the armature arcuately about pivot 29. However, because of the various degrees of independent movement of the elements of the core, when the armature is magnetically drawn against the pole pieces, the components of the core, including the core itself, will become properly positioned to cause the end areas of each of the lamina to conform with the surface of the armature.

This conforming action takes place substantially automatically within a wide working range of spacing of the pole pieces from the armature. Thus, the volume of the signal may be changed by the manipulation of screw 22 and the musical quality of the tone will always be assured at desired variations in volume.

Although the bridge support 26 is shown and described as being swingably mounted upon the frame and is supported at one end on spring 27, the benefits of the invention are inherent in a bridge support which may be rigidly mounted upon the frame or adjustably mounted at both ends upon springs, such as, spring 27.

The device specifically illustrated in the drawings is intended to operate on alternating current. It is to be understood, however, by conventional circuitry the device can also be used with direct current. Other modifications of the invention which do not depart from the spirit of the invention will be apparent to anyone skilled in the art, and, hence, it is not intended that the invention be limited to the exact details shown and described except as necessitated by the appended claims.

I claim as my invention:

1. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support carried by said frame and extending across said diaphragm in spaced relationship thereto, an electromagnetic assembly carried by said bridge support, said assembly comprising a ferromagnetic core carrying an actuating coil, said core comprising a pole face at one

end which is supported by said bridge support adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with an aperture, said lamina being provided with apertures, a bolt extending through the apertures in said lamina and through the aperture in said bridge support frictionally to hold the lamina in face-to-face relationship with each other and with the bridge support, the diameter of the aperture in said bridge support being sufficiently greater than the diameter of said bolt to permit relative face-to-face movement of some of said lamina with respect to said bridge support.

2. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support carried by said frame and extending across said diaphragm in spaced relationship thereto, an electromagnetic assembly carried by said bridge support, said assembly comprising a ferromagnetic core carrying an actuating coil, said core comprising a pole face at one end which is supported by said bridge support adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with a pair of spaced apertures, said lamina being provided with correspondingly spaced apertures, a bolt extending through each bridge support aperture and the corresponding lamina apertures frictionally to hold the lamina in face-to-face relationship with each other and with said bridge support, the diameter of one of the apertures in said bridge support being sufficiently greater than the diameter of the bolt through said aperture to permit relative face-to-face movement of some of said lamina with respect to said bridge support and to permit limited rotary movement of said lamina about the bolt in the other aperture of the bridge support.

3. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support carried by said frame and extending across said diaphragm in spaced relationship thereto, an electromagnetic assembly carried by said bridge support, said assembly comprising a ferromagnetic core carrying an actuating coil, said core comprising a pole face at one end which is supported by said bridge support adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with a pair of spaced apertures, each of said laminae being provided with correspondingly spaced apertures, a bolt extending through each bridge support aperture and through the corresponding apertures in the lamina frictionally to hold the lamina in face-to-face relationship with each other and with the bridge support, the diameter of one of the apertures in said bridge support being sufficiently greater than the bolt through said enlarged aperture to permit limited rotating movement of the lamina about the bolt in the other bridge support aperture, and the diameter of the lamina apertures being sufficiently greater than the diameters of the bolts therethrough to permit limited face-to-face movement of the lamina with respect to each other.

4. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support, an electromagnetic assembly carried by said bridge support, said assembly comprising a magnetic core carrying an actuating coil, said core comprising a pole face at one end, means carried by said frame pivotally engaging one end of said bridge support, resilient means carried by said frame spaced across said diaphragm from said pivotal engaging means resiliently supporting the opposite end of said bridge support to dispose the pole face of the core at a predetermined position adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with an aperture, and said lamina being provided with aper-

5

tures, a bolt extending through the apertures in said lamina and through the aperture in said bridge support to hold said lamina in face-to-face relationship with each other and with said bridge support, the diameter of the aperture in said bridge support being sufficiently greater than the diameter of said bolt to permit relative face-to-face movement of some of said lamina with respect to said bridge support, and means carried by said frame and bridge support for moving the resiliently supported end of the bridge support about the pivotally connected end thereof.

5. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support, an electromagnetic assembly carried by said bridge support, said assembly comprising a magnetic core carrying an actuating coil, said core comprising a pole face at one end, means carried by said frame pivotally engaging one end of said bridge support, resilient means carried by said frame spaced across said diaphragm from said pivotal engaging means resiliently supporting the opposite end of said bridge support to dispose the pole face of the core at a predetermined position adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with a pair of spaced apertures, said lamina being provided with correspondingly spaced apertures, a bolt extending through each bridge support aperture and the corresponding lamina apertures to hold the lamina in face-to-face relationship with each other and with said bridge support, the diameter of one of the apertures in said bridge support being sufficiently greater than the diameter of the bolt through said aperture to permit relative face-to-

6

face movement of some of said lamina with respect to said bridge support and to permit limited rotary movement of said lamina about the bolt in the other aperture of the bridge support.

6. A sound signal device comprising, a frame, a resilient diaphragm carried on said frame for vibrating movement, said diaphragm including an armature, a bridge support, an electromagnetic assembly carried by said bridge support, said assembly comprising a magnetic core carrying an actuating coil, said core comprising a pole face at one end, means carried by said frame pivotally engaging one end of said bridge support, resilient means carried by said frame spaced across said diaphragm from said pivotal engaging means resiliently supporting the opposite end of said bridge support to dispose the pole face of the core at a predetermined position adjacent said armature, said core comprising a plurality of ferromagnetic lamina, said bridge support being provided with an aperture, and said lamina being provided with apertures, a bolt extending through the apertures in said lamina and through the aperture in said bridge support to hold said lamina in face-to-face relationship with each other and with said bridge support on each side of said bridge support whereby said bridge support is disposed substantially centrally of said lamina, the diameter of the aperture in said bridge support being sufficiently greater than the diameter of said bolt to permit face-to-face movement of some of said lamina with respect to said bridge support, and means carried by said frame and bridge support for moving the resiliently supported end of the bridge support about the pivotally connected end thereof.

No references cited.