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SOUND SIGNAL

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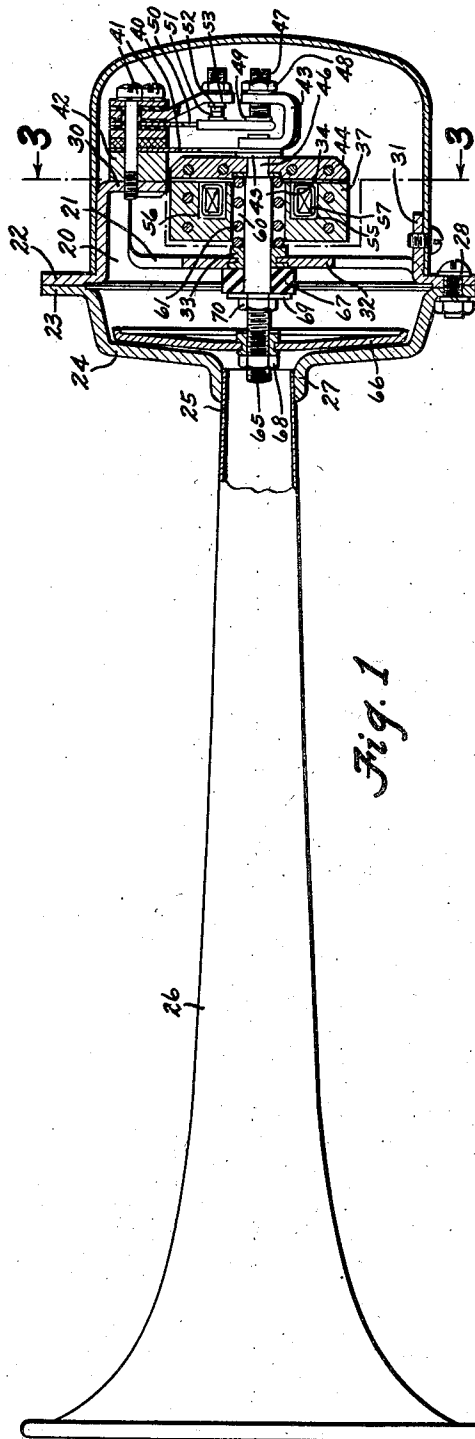


Fig. 1

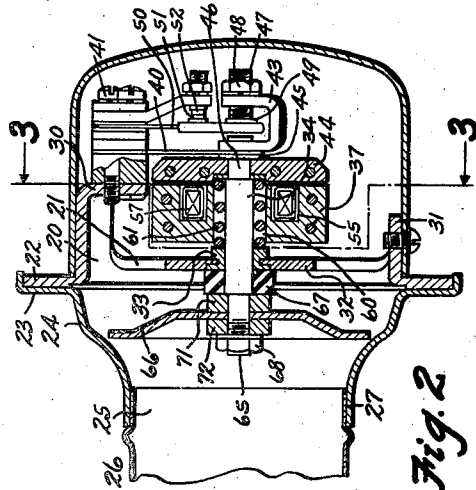


Fig. 2

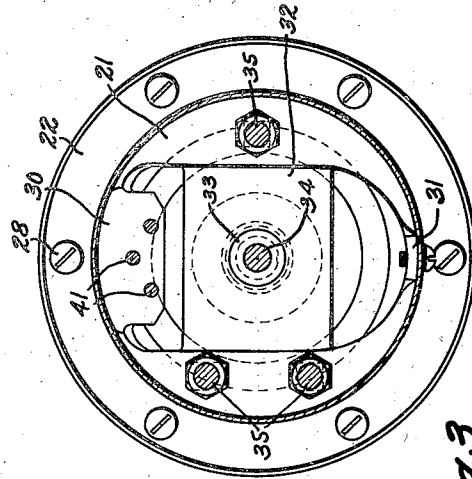


Fig. 3

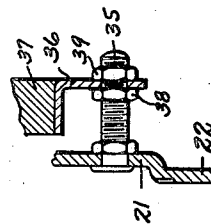


Fig. 4

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SOUND SIGNAL

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8 Claims. (Cl. 177—7)

This invention relates to sound signals and particularly to the class of signals known as diaphragmless horns.

It is an object of the instant invention to provide a sound signal of the class described which makes for better efficiency and which is capable of production at a minimum of cost. A further object is to improve vibratory motors in general and to provide a structure dependable in operation and relatively free from operating noise.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred form of the embodiment of the present invention is clearly shown.

In the drawing:

Fig. 1 is a longitudinal section in part of a sound signal embodying my invention.

Fig. 2 is a similar section of a modified form.

Fig. 3 is a section through the power plant of my improved signal device substantially as indicated by the line and arrows 3—3 of Figs. 1 and 2.

Fig. 4 is a detail view showing the method of mounting certain parts of the structure.

With particular reference to the drawing, 20 indicates a base plate which forms a main mounting platform 21 to which is secured the driving motor of the unit as will presently appear. The base 20 is flanged at 22 to form cooperative engagement with a flange 23 of a chambered collar 24, to which is fixed the mouth 25 of a projector 26 at a throat 27. The flanges 22 and 23 are secured together by bolt and nut devices 28.

The mounting platform 21 is provided with a bracket 30 substantially parallel with the mounting platform 21, the bracket being formed by punching a portion from the base 20 as illustrated in Figs. 1 and 2. A similar bracket 31 is also formed from the base 20, and is substantially diametrically disposed in relation to the bracket 30. The central portion of the base 20 or rather the platform 21 is allowed to remain to form a cross partition 32 at the center of which is secured an insert 33 forming a bearing for an armature rod 34. In another form, the cross member or bridge 32 may be formed from a separate piece and later inserted in the central opening of the base 20, and secured by welding or other means. The mounting platform 21 has provision, by threaded studs 35 for supporting an angle bracket 36 of a field frame 37. The studs 35 are secured to the platform 21 and provide spacing nuts 38 which may be run in and

out on studs 35 to determine the relative separation of the bracket 36 from the platform 21. Clamping nuts 39 are also provided for securing the bracket 36 in the adjusted relation with respect to the studs 35 and consequently the field frame 37 relative to the platform 21.

A yielding armature support is secured to the bracket 30 and comprises a leaf spring 40 anchored to the bracket by screws 41 passing there-through and a spacer 42. To the free end of the spring 40 is secured a stirrup 43 which has rigid connection with the armature rod 34 and supports the armature 44 in cooperative relation with the field frame 36 and spaced from the spring 40 by a washer 45. This is made possible by providing the armature shaft 34 with a reduced portion 46 that passes through the armature 44, washer 45, spring 40 and stirrup 43 against which the end of the rod is riveted. The stirrup 43 carries an adjusting screw 47 and a lock nut 48, which screw normally engages a bumper block 49 carried by a movable contact spring 50 insulatingly supported upon the bracket 30 by the screws 41. The contact carrier 50 provides a contact 51 in cooperative relation with a contact 52 carried by a rigid bracket 53. The bracket 53 is insulatingly supported upon the bracket 30 and in nonconducting relation with the contact carrier 50 by the screws 41.

The field frame 37 is made up of a plurality of E-shaped laminations which provide the channels 55 and 56 forming a recess for the field winding 57 as illustrated. The central portion of the field frame is provided with a relatively large bore 60 so as to be coaxial of the insert 33 when mounted upon the platform 21. This provides an annular recess about the armature 44 forming a receptacle for an armature spring 61 disposed to encircle the armature shaft 34 and normally engage the insert 33 and the armature 44, and tends to urge the armature away from the field frame. The contacts 51 and 52 are appropriately connected with a switch and source of current through the winding 57, and it is obvious that energization of the coil 57 will attract the armature 44 until the circuit is broken through the contacts 51 and 52, whereupon the spring 61 will retract the armature to the normal position allowing the contacts 51 and 52 to be closed and the cycle of movement repeated. This movement will thereby cause a reciprocation of the rod 34 within the bearing 33 and with it all associated structure to which it may be secured.

The armature rod 34 is of sufficient length to extend beyond the insert 33 into the tone chamber defined by the collar 24, and provides a threaded extension 65 upon which is mounted a tone disk 66. The armature rod 34 also carries a cushion member 67, preferably of live rubber which acts to cushion the rebound stroke of the armature assembly. In one form of the device, that illustrated in Fig. 1, the tone disk 66 conforms to a piston like structure adjustably mounted upon the threaded extension 65 of the armature rod 34 in close coactive relation with the head of the collar 24 and is secured thereto by a clamping nut 68. The cushion member 67 is secured upon the main portion of the rod 34 and disposed against a washer 69 held in position by a nut 70.

In another form of the invention, that illustrated in Fig. 2, the disk 66 is received upon the threaded portion 65 of the rod 34 and is rigidly secured against a shoulder thereof and between a pair of clamping washers 71 and 72 by a clamping nut 68. In this instance the washer 71 also forms a backing for the cushion member 67. In either event the cushion member 67 is disposed about the armature rod 34 against a rigid stop member, as the washer 69 or 71, and is of such thickness as to engage the partition member 32 and insert 33 upon the retracting movement of the armature rod 34. Upon actuation of the driving motor the energized portion of the cycle of movement will cause the armature 44 to strike or substantially strike the field frame 37, and upon opening of the circuit through the contact points the spring 61 will retract the armature and separate it from the field frame 37 until the cushioning member 67 comes into contact with the cross member 32 whereupon the shock of the retracting movement will be softened.

The operation is essentially the same in both forms of the device, but that form illustrated in Fig. 1, produces a slightly different effect upon the disk 66. In that instance the disk acts merely as a piston to force the air or fluid content of the collar 24 through the mouth of the projector 26. The head of the collar 24 and the plate 66 are so proportioned that their juxtaposed surfaces are substantially parallel in arrangement and so close together that movement of the plate 66 toward the head of the collar will drive the fluid content from between the head and disk with great velocity. This results in a final stopping of the air column through the projector by the disk closing the mouth of the projector.

In this instance the disk 66 adds nothing to the tonal value of the horn by reason of its vibrations, for the forward or energized stroke of the disk is damped by reason of the high compression of the fluid content between it and the head of the collar, or by reason of its engagement with the collar, or by both, and the retracting or de-energized stroke is sufficiently cushioned by the member 67 that the disk 66 is not set into audible vibration. Therefore, the tone product of the instrument disclosed in Fig. 1 is due essentially to the rapid stopping of the fluid current through the projector, and to the striking of the disk against the head of the tone chamber.

In the form shown in Fig. 2, the tone product in addition to the above is dependent upon the vibrations contributed by the disk 66, for in this form the sudden stopping of the disk 66 in its

movement toward the mouth of the projector 26 by reason of the armature 44 striking the field frame 37 will suddenly arrest the central portion of the disk 66 while the peripheral portion thereof continues in its movement toward the mouth of the projector. This movement of the armature rod and disk is bound to set the disk into vibration, since the inertia of the assembly acts somewhat as a hammer to strike the disk in the nature of a bell, causing it to vibrate at its own fundamental period. Here there is no striking of the disc and collar and no damping by reason of the highly compressed fluid content between the disc and head, thus allowing the vibrations of the disc to be impressed upon the vibrations of the air column within its projector. By selecting a disk 66 of the proper vibrating frequency the tone produced by it and the stopping of the air column through the projector will produce a very effective warning signal.

It is well to note here that the adjustment of the elements in the two forms is somewhat different. In the form illustrated in Fig. 1, the elements 24, 66, 44 and 37 are so adjusted that the disc 66 when set into motion will just engage the head of the collar 24. The armature 44 may, or may not, strike the field frame 37, but if it is adjusted so as to strike, the adjustment should be so fine as to eliminate or reduce to a minimum the noise of contact. In the form illustrated in Fig. 2, adjustment is made to present a greater gap between the elements 24 and 66 than between the elements 44 and 37, for here it is desired to eliminate muffling or damping of the disc vibrations.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In a signal device having a base; a magnet motor including an armature and a rod, said rod being movable in and guided through said base; and signal generating element supported for actuation by said rod; the combination with said base and rod of spring means for thrusting said armature to a return position; and elastic means disposed between the signal generating means and base and engageable with the base only at the end of the return stroke of the armature to check the return movement of said armature and protect the signal generating element against shock caused by said spring means.

2. In a signal device having a base; a magnet motor including an armature and a rod; with signal generating element supported by said rod; and means including a part of the base for guiding the rod, and wherein the motor is operable to move the armature and signal generating element in one direction; the combination with said armature and rod of spring means for thrusting said armature and element in the opposite direction; and elastic means located on the rod and engageable with the base to absorb the shock of the movement of the armature and signal generating element when thrust to the return position by the spring means.

3. In an electrical device having a signal generating element, a magnetic motor for actuating the element, and a base for supporting the motor and element in a definite relation, the combination with said base and element of, a return spring opposing the force of motor actuation and

adapted to thrust the signal generating element to a normal rest position, and a cushion member operable at substantially the end of the thrust movement to suddenly and silently arrest further return movement of the signal generating element, whereby the amplitude of motor actuation is shortened and the frequency of operation is increased.

4. In an electrical device having a signal generating element, a magnet motor for actuating the element in one direction, and a base for supporting the motor and element in a definite relation, the combination with said element and base of, a spring engaging the base and operating upon a movable part of the motor to return the signal generating element to a rest position periodically in the course of motor operation, and a cushion member characterized by properties of rapid build-up of compression, disposed against the elements and adapted to be engaged by the base near the extreme of return movement so that the signal generating element will be suddenly and silently arrested.

5. In an electrical device of the vibratory type, having a base plate, a magnet motor including a field frame and an armature assembly mounted on the base, and means provided by the base for guiding the armature assembly, the combination with said armature assembly, of a spring aligned with the guiding means and acting upon the armature assembly to return it to a rest position, and means capable of rapidly building up compression carried by the armature assembly, and adapted to be engaged by the base near the end of the return stroke, so that the amplitude of the armature assembly may be shortened, and the frequency of vibration materially increased.

6. In a magnet motor of the class wherein a field frame is fixed to a support and intermittently

acts upon a reciprocable armature assembly guided for lineal movement by the support, the combination with said armature assembly, of a helical spring yieldably resisting movement of the assembly by the field frame, and effective between the intermittent acts of the field frame to reverse the movement of the assembly, and a cushion member carried by the armature assembly and engageable with the support near the end of reverse movement for silently and suddenly arresting the return motion of the assembly.

7. In a magnet motor of the class wherein a field frame is fixed to a support and acts intermittently upon an armature assembly to move it in one direction through guide means provided by the support, the combination with said support and armature assembly of a helical spring seating on the support and engaging the armature assembly and effective between the intermittent acts to reverse the movement of the assembly, and a live rubber buffer compressible between the assembly and support near the concluding end of the reverse movement to arrest without shock the reverse movement of the assembly.

8. In a vibration motor of the class wherein a magnet winding acts intermittently upon an armature assembly to move the same in one direction, the combination with said armature assembly, of an open helical spring yieldably resisting movement of the assembly by the winding, and effective to reverse the movement of the assembly between the intermittent acts of the winding, and a cushion member of live rubber effective near the conclusion of the reverse movement of the assembly for rapidly and silently arresting movement of the assembly, before a successive actuated movement by the winding.

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