

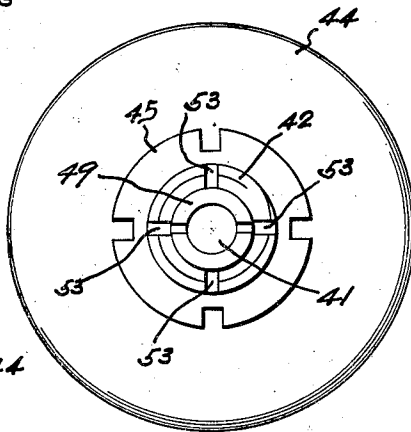
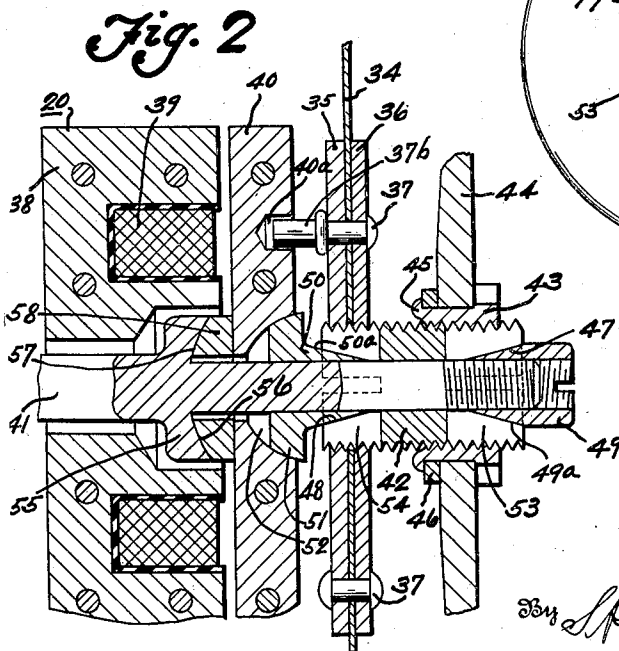
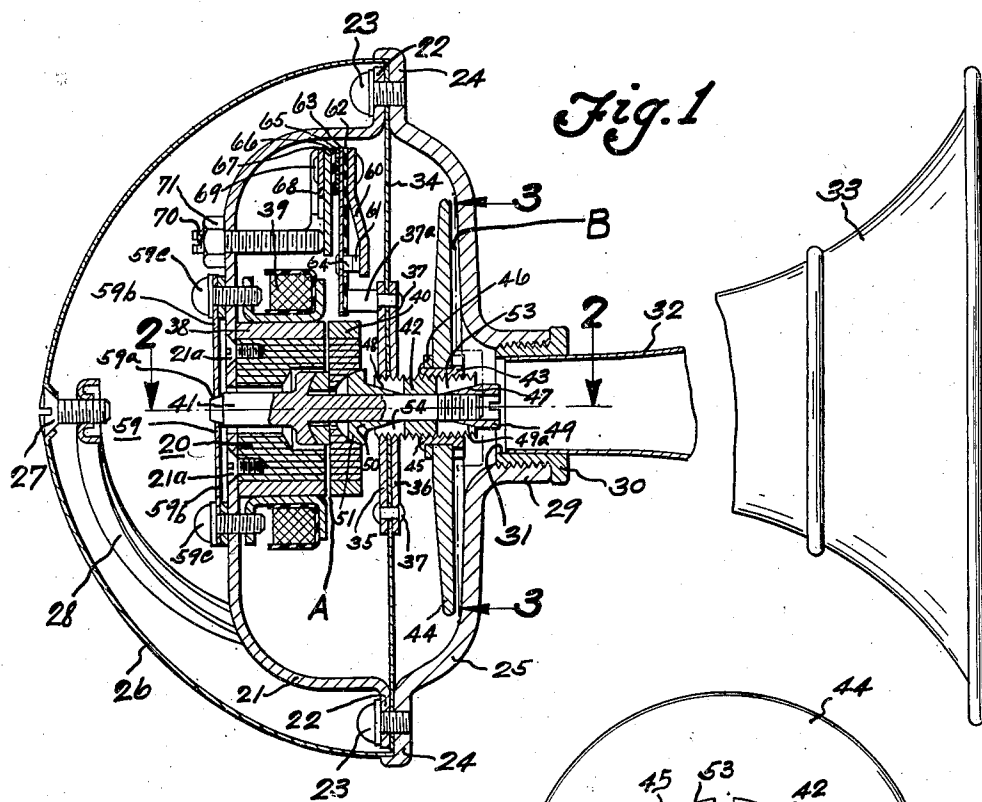
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SOUNDING SIGNAL DEVICE

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SOUNDING SIGNAL DEVICE

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This invention relates to sound signals and more particularly to horns for automotive vehicles of the type in which a movable assembly is actuated by an electromagnet energized by a suitable source of current.

One of the objects of the present invention is the production of a signal device which provides means for self-aligning or automatic adjustment of the movable parts thereof.

Another object of the invention is to simplify the construction as well as the means and mode of operation of sound signal devices, whereby they will not only be cheapened in construction, but will be more efficient in operation, capable of being easily and quickly adjusted, and less likely to get out of repair.

Another object aside from accomplishing a self-aligning of the motor and armature, is to provide simplified means for adjusting both the motor air gap, and the piston air gap, through a single agency.

A further object is to provide means whereby the air-flow gap of an air tone horn may be nicely adjusted to attain the infinitely close approach or possible light engagement of air impeller and collar that makes for clarity and purity of tone.

These objects are accomplished by forming a ball and socket mounting for the armature on its spindle, and by providing an expansible sleeve for connecting the armature to the movable assembly, which sleeve cooperates with expanding members and a clamping nut to secure the parts in adjusted relation.

With the above objects in view, the invention resides in those novel features of construction, combination and arrangement of parts, which will be hereinafter first fully described, and then be specifically pointed out in the appended claims, reference being had to the accompanying drawing, illustrating a preferred and practical but obviously not the only embodiment of my invention.

In the drawing:

Fig. 1 is a view of a sound signal embodying the present invention, partly in longitudinal section and partly in elevation.

Fig. 2 is an enlarged sectional view taken on line 2-2 of Fig. 1.

Fig. 3 is a view taken on line 3-3 of Fig. 1.

Referring to the drawing, a magnet motor 20 is mounted upon a motor housing 21 by screws 21a, and the housing 21 is attached through its peripheral flange 22 by screws 23 to flange 24 of a main housing or collar member 25. A shell 26 enclosing the magnet motor 20 is firmly secured by a

screw 27 to a stirrup 28 which is in turn secured to the peripheral flange 22 by screws not shown. Two of the screws 23 may be used to accomplish this. The main housing 25 has a reduced or necked portion 29 that is internally threaded for reception of a bushing 30 having an aperture 31 within which is attached in any suitable manner a projector body or trumpet 32 including a bell, amplifier or flared opening 33.

A diaphragm 34 is firmly secured at its periphery by screws 23 between the flanges 22 and 24 of motor housing 21 and main housing or collar 25 respectively, and at its central portion carries a pair of clamping plates 35 and 36 held by rivets 37, by which the central portion of the diaphragm is stiffened.

The magnet motor 20 comprising a field frame 38, a winding 39 and an armature 40, receives through its central portion a rod or bolt 41 that carries a sleeve 42 threadedly engaging at its one end the diaphragm 34 and clamping plates 35 and 36, and at its other end threadedly receives a bushing or sleeve 43. On the bushing there is mounted a piston or tone disc 44, that is secured by peening over the end of the bushing or sleeve 43 at 45 against a washer 46.

The sleeve 42 has internal conical surfaces 47 and 48 cooperating respectively with a nut or wedge 49 whose conical surface 49a engages the conical surface 47 of the sleeve, and with another wedge member 50 having a conical surface 50a that engages the conical surfaces 48 of the sleeve 42. The nut 49 is threadedly connected to the bolt 41 extending through the member 50 and the sleeve 42, as well as the armature 40. On the opposite side of wedge member 50 is a spherical-like projection 51 which engages or fits into a concavity 52 of like contour formed in the armature 40. The end portions of sleeve 42 are split radially at 53 and 54 respectively for providing yieldable clamps for the wedges 49 and 50.

Located on the reverse side of the armature 40 preferably integral with the rod or bolt 41 and movable in unison with the wedge member 50, there is an abutment or collar 55 that has a spherical concave surface 56 that engages a rounded surface 57 of a washer 58 disposed about the rod 41 and located between the armature 40 and the collar 55.

The movable assembly has its support completed by means of a return spring 59 centrally apertured at 59a to receive the reduced end of rod 41, the spring being anchored at its ends 59b by screws 59c driven into the housing member 21 or elsewhere. The diaphragm assembly and the

spring 59 will then afford a resilient support for the armature and rod with its appurtenances, which support is yielding and operative to return the movable assembly from the actuated position due to the magnet.

An extension 37a of one of the rivets 37 in the diaphragm clamping plates 35 and 36, provides means for an actuator for a circuit breaker mechanism now to be described.

The contact breaker assembly, as shown in Fig. 1 includes rivets upon which are mounted in the order mentioned, a fixed contact plate or bracket 60 carrying a contact 61, a nonconducting strip 62, a resilient plate 63 supporting a movable contact 64, a connector plate 65, an insulator strip 66, an adjusting plate 67 and supporting spring plate 68. By this means the contacts are properly insulated, and after these members have been assembled, the rivets are peened over as at 69, thus holding the parts in place.

The relative position of the contact breaker assembly with respect to the motor frame 21, is determined by an adjusting screw 70 that is threadedly received in the motor frame 21 so that the screw comes into engagement with the end of the adjusting plate 67 previously described and is capable of adjusting the contact assembly by twisting of the spring plate 68.

It is obvious that running the screw 70 in or out will operate to move the end of the plate 67 and with it the bracket 60, thus varying the relation between the resilient plate 63 and nonconducting strip 62 with respect to pin or actuator 37a. Once the adjustment is made by the screw 70, tightening of the nut 71 will maintain the adjustment of the assembly relative to the motor frame 21.

Another of the rivets 37 securing the clamping discs 35 and 36 to the diaphragm is provided with an extension as 37b of sufficient length to project across the space between the diaphragm assembly and the armature 40 and be received by a recess 40a in the opposing face thereof. These provisions afford locating means to insure that the armature will be maintained in proper orientation with respect to the field frame 38, irrespective of the adjusted space between the armature and diaphragm. The disclosed improvement makes for proper control of the armature alignment, the spacing of the motor air gap A, and the piston air gap B. It is more or less essential that these gaps be small, and that each be independently adjustable. One element of success in an air tone horn, of which the disclosed embodiment is one form, is the high frequency with which the movable assembly can be actuated. Hence, an air gap of small dimension at A, between the field frame and armature, makes for high frequency operation. Another element of success is the nice adjustment of the air gap at B between the piston or disc and its cooperating collar. This should be so exactly adjusted that when the movable assembly is actuated, the piston will just about engage the collar on the compression stroke, but will not strike it so firmly as to click or produce any metallic sound.

It is indeed difficult to ascertain when the unit is in operation whether or not the piston member 44 actually engages the collar member 25. If there is actual physical engagement between these members, that engagement must be so slight as to fall short of producing any metallic click or noise of operation, yet the approach of piston toward the collar must be so marked that there will be a sharp cutting off or stopping of air flow. It therefore appears, and in fact is applicant's theory

that the piston-collar relation when the impeller is at the extreme of the compression stroke, is one of infinitely close approach, or of infinitely light engagement. This view obtains as to all types of air impeller devices for stopping and vibrating air columns of sound signals, and the improvement is effective in that form where the impeller device meets the collar member in substantial surface engagement, as well as in the form illustrated where the opposed faces of the impeller and collar are slightly divergent and are in but line-like engagement at some part of the cooperating impeller and collar. In all events, when the magnetic gap and the air-flow gap are adjusted to accomplish these proposed relations, the efficiency of the sound signal device is a marked improvement over the results obtained if the adjustment is otherwise. The means disclosed for accomplishing this adjustment are particularly effective in accomplishing the desired results for by such an adjusting means it is possible to substantially eliminate all of the vibrations set up in the element 44, or at least all audible vibrations are thought to be dampened. At any event the resultant tone product is one of a vibrating air column and is one that is free of any mechanical noise.

The manipulation of the device for the alignment of the magnet motor and the adjustment of the several gaps will now be described. By loosening the conical nut 49 the parts are unclamped and the expanded portions of the sleeve 42 are permitted to contract by reason of the slots 53, whereupon the sleeve 42 may be turned relative to the diaphragm 34 or the disc 44 may be turned relative to the sleeve 42, in order to vary the distance between the diaphragm and the armature, or between the disc and the housing member 25. When the proper adjustment is made, the movable assembly is pushed down against the field frame 38 whereupon the armature 40 will oscillate or pivot on its ball and socket support, and rest flat upon the frame. The nut 49 is then tightened, forcing the slotted portions 53 and 54 outwardly, thus clamping the sleeve 42 in the adjusted position.

It may not be necessary to make all of these adjustments at a single instance. The desire or necessity for adjustment may in part, embrace only one of those set out, that is, either the armature alignment or the magnetic air gap at A, or the air flow gap at B. The armature alignment is self-correcting, in that an armature relation with the frame member that is not in correct alignment, will be automatically established through the operation of the magnet motor, since a high point of the armature will continually hammer on the frame until the armature oscillates on its ball and socket support until it lies substantially flat or parallel with the frame.

When adjusting the magnetic or A gap only, the nut 49 is loosened and then holding the disc 44, the sleeve 42 is run in or out. This varies the space between the armature and the diaphragm assembly and consequently the space between the armature and the magnet frame, since the magnet frame and the diaphragm assembly are substantially fixed parts when the movable assembly is at rest. Tightening the nut 49 will then maintain the magnetic air gap in the relation to which it is adjusted, and the air flow gap will not be changed.

To vary the air flow or B gap, the sleeve 42 is held after the nut 49 is loosened, and the disc 44 is turned relative to the sleeve which will

vary the spacing of the disc 44 with respect to the diaphragm assembly and the casing member 25, since the diaphragm assembly and the housing member 25 are relatively fixed parts when the movable assembly is at rest. This form of adjustment is particularly valuable in sounding signals of the air tone type, where it is desirable to control the oscillatable movement of the movable assembly so that the air column through the trumpet may be set into vibrations by the disc 44, without the contribution of mechanical noise from the movable structure due to hammering or clicking of the mechanical elements.

The foregoing disclosure is to be regarded as descriptive and illustrative only, and not as a restriction or limitation of the invention, for obviously, an embodiment constructed to include modification without departing from the general scope herein indicated and denoted in the appended claims could well be made.

While the 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 sounding signal, an air impeller device comprising in combination, a diaphragm, a disc and an armature, means adjustably uniting the diaphragm, disc and armature into a single oscillatable assembly and comprising in combination, a rod having a universal joint connection with the armature, a sleeve having internal conical surfaces and provided with external surfaces threaded into the diaphragm and disc, conical wedges cooperating with the conical surfaces of the sleeve to force the sleeve ends into binding engagement with the disc and diaphragm, one of said wedges being threaded upon the rod end for securing the parts in adjusted relation.

2. In a sounding signal, an air impeller device comprising in combination, a diaphragm, a disc and an armature, means adjustably uniting the diaphragm, disc and armature into a single oscillatable assembly and comprising in combination, an armature rod for supporting the armature, a sleeve having expansible end portions threaded each into the diaphragm and the disc and slidably disposed over the armature rod, a wedge device disposed against the armature and engaging within an expansible end of the sleeve, a second wedge device threaded upon the end of the armature rod and engaging the second expansible portion of the sleeve, said sleeve portion threaded within the diaphragm forming an adjustable abutment for the armature, and being capable of rotation with respect to the diaphragm so as to vary the magnetic air gap, and the second wedge providing means for securing the parts of the movable assembly in the adjusted position.

3. In a sounding signal, an air impeller device comprising in combination, a housing, a field frame carried by the housing, a diaphragm, a disc and an armature, means adjustably uniting the diaphragm, disc and armature into a single oscillatable assembly and the armature cooperating with the field frame to form a magnetic air gap and the disc cooperating with a portion of the housing to provide an air flow gap, said assembly comprising in combination, an armature rod for supporting the armature, a sleeve having expansible end portions threaded each into the diaphragm and the disc and slidably disposed over the armature rod, wedge devices car-

ried by the rod and each engaging an expansible end portion of the sleeve, said sleeve being rotatable on the rod and within both the diaphragm and disc for varying the magnetic air gap, said disc being rotatable relative to the sleeve and diaphragm for varying the extent of the air flow gap, and means including one of said wedge devices for clamping the parts of the movable assembly into rigid and secure relation.

4. In a sounding signal of the vibratory type, a motor, a projector, a movable assembly interposed between the motor and the projector and arranged to provide a magnetic air gap between one side thereof and the motor and an air flow gap between the other side thereof and the projector, means uniting the elements of the movable assembly into a composite unit and for varying the relation of the magnetic gap and the air flow gap comprising in combination, a yieldable support, an armature disposed on one side of the magnetic gap, a piston disc disposed on one side of the air flow gap, said uniting means including an armature rod, a threaded sleeve with expanding end portions threaded into the diaphragm and disc and slidable on the rod, and wedging members carried by the rod for expanding the ends of the sleeve into engagement with the diaphragm and disc respectively, one of said wedging members being disposed between the armature and diaphragm and forming a universal joint connection for the armature, the other of said wedging members being threaded upon the rod and engaging the other expanding portion of the sleeve for tightening all of the elements of the movable assembly into rigid relation.

5. In a sounding signal having a projector, a motor, and an air impeller for vibrating the air column of the projector, said impeller comprising a diaphragm, a piston disc, and an armature for actuating the diaphragm and disc, means for defining the relations of the elements of the impeller comprising, a rod supporting the armature, means for adjustably connecting the rod to the diaphragm and the disc, said means including a sleeve having expansible end portions threaded into the diaphragm and disc and being loosely carried by the rod, wedging members sliding on the rod and cooperable with the expansible portions of the sleeve, and means including one of the wedging members for forcing the sleeve into relatively nonrotative engagement with the diaphragm and disc.

6. In a sounding signal having a projector, a motor, and an air impeller for vibrating the air column of the projector, said impeller comprising a diaphragm, a piston disc, and an armature for actuating the diaphragm and disc, means for defining the relations of the elements of the impeller comprising, a rod supporting the armature, means for adjustably connecting the rod to the diaphragm and the disc, said means including a sleeve having expansible end portions threaded into the diaphragm and the disc and slidably along the rod, expanding members also carried by the rod and each engaging an end of the sleeve, and means for forcing the expanding members within the ends of the sleeve for retaining the contributing parts of the impeller in relatively fixed relation.

7. In a sounding signal having a projector, a vibration motor, means for supporting the projector and motor, and a movable assembly located between the motor and the projector and positioned to provide a magnetic air gap be-

tween the motor and the assembly and an air flow gap between the assembly and the projector, said assembly movable for vibrating the air column in the projector, the combination of means for adjusting the magnetic air gap and the air flow gap independently comprising in combination, an armature rod, an armature carried by the rod, an expansible sleeve threaded into the parts of the movable assembly and slidable on the rod, said sleeve being rotatable relative to the elements of the assembly so as to alter their spaced relation, and means for locking the sleeve in the adjusted position whereby the magnetic air gap and the air flow gap are each positively defined.

8. In a sounding signal of the vibratory type, the combination of, a motor, a movable assembly comprising, a diaphragm, an armature operable by the motor, a rod supporting the armature and connecting it to the diaphragm, means for varying the relation of the diaphragm relative to the rod, including a sleeve carried by the rod and having expansible end portions one of which is threaded into the diaphragm, and wedging members carried by the rod for expanding the end portions of the sleeve.

9. In a sounding signal of the vibratory type, the combination of, a motor, frame members mounting the motor and one of which is apertured to support a trumpet, and an air impeller device comprising, a piston disc, a diaphragm, a motor armature for actuating the diaphragm and disc, a rod supporting the armature and disc and connecting them to the diaphragm, means for varying the relation of the diaphragm and disc relative to the rod comprising, a sleeve carried by the rod and having expansible end portions threaded each into the disc and diaphragm, wedging members carried by the rod for expanding the end portions of the sleeve, one of said wedging members being threaded upon the rod to lock the diaphragm connections.

10. A sounding signal comprising in combination, a magnet motor providing a core and a cooperating armature, a projector, case members supporting the motor and the projector, an impeller device secured between the case members in cooperable relation with the projector, said impeller device including a diaphragm, a piston disc and means coupling the diaphragm and disc for actuation by the armature, said coupling means comprising a rod, an expansible sleeve on the rod having its end portions threaded into the diaphragm and disc, and means carried by the rod for expanding the sleeve into binding engagement with the diaphragm and disc.

11. A sounding signal comprising in combination, a magnet motor providing a core and a cooperating armature, a projector, case members supporting the motor and the projector, one of which members is apertured for communication with the projector, a diaphragm secured between the case members, a disc cooperable with the apertured case member for vibrating the air column in the projector, and means for actuating the disc to and from the apertured case member comprising, a rod, a sleeve carried by the rod and threaded through the diaphragm and disc, and means including parts carried by the rod for

securing the sleeve against threadable movement through the diaphragm and/or disc.

12. A sounding signal comprising in combination, a magnet motor providing a core and a cooperating armature, a projector, case members for the motor one of which is dished to form a shallow chamber opening into the projector, a diaphragm secured between the case members and cooperating with the dished member to form a compression chamber, a disc located in the compression chamber and cooperable with the dished member to stop the air column through the projector, and means for actuating the disc to and from the dished member comprising, an armature, a spindle device connecting the armature with the diaphragm and disc, and means including the spindle device for varying the spaced relation between the disc and dished case member.

13. In a sounding signal having a vibration motor, a projector providing an air column, and housing members for enclosing the motor and for supporting the projector; the combination comprising; a movable assembly supported by the housing members and actuatable by the motor, said assembly comprising, a diaphragm forming a chamber with one of the housing members opening into the projector, clamping discs centrally disposed with respect to the diaphragm and secured thereto, an armature, a rod providing a shoulder and oscillatable means for supporting the armature, an expansible sleeve carried by the rod and threaded through the clamping discs, a wedging member disposed between the armature and the end of the sleeve for expanding the sleeve end into firm engagement with the clamping discs, and means carried by the rod for forcing the wedging member into expanding engagement with the sleeve end portion.

14. A sounding signal comprising in combination, a magnet motor providing a core and a cooperating armature; a projector; case members supporting the motor and the projector; an impeller device secured between the case members in cooperable relation with the projector, said impeller device including a diaphragm, a piston disc, and a sleeve having expansible portions coupling the diaphragm and the disc for actuation by the armature; and means including the coupling means for altering the spaced relation of the impeller elements with respect to each other and the spaced relation of the piston disc and the adjacent case member.

15. A sound signal comprising in combination; a magnet motor providing a core and a cooperating armature; a projector; case members supporting the core and the projector; an impeller device secured between the case members in cooperable relation with the projector, said impeller device including a diaphragm, a piston disc and means coupling the diaphragm and disc to the armature; a resilient support on one side of the core for guiding one end of the coupling means; and means including the coupling means for changing the spaced relation of the impeller elements with respect to each other.

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