

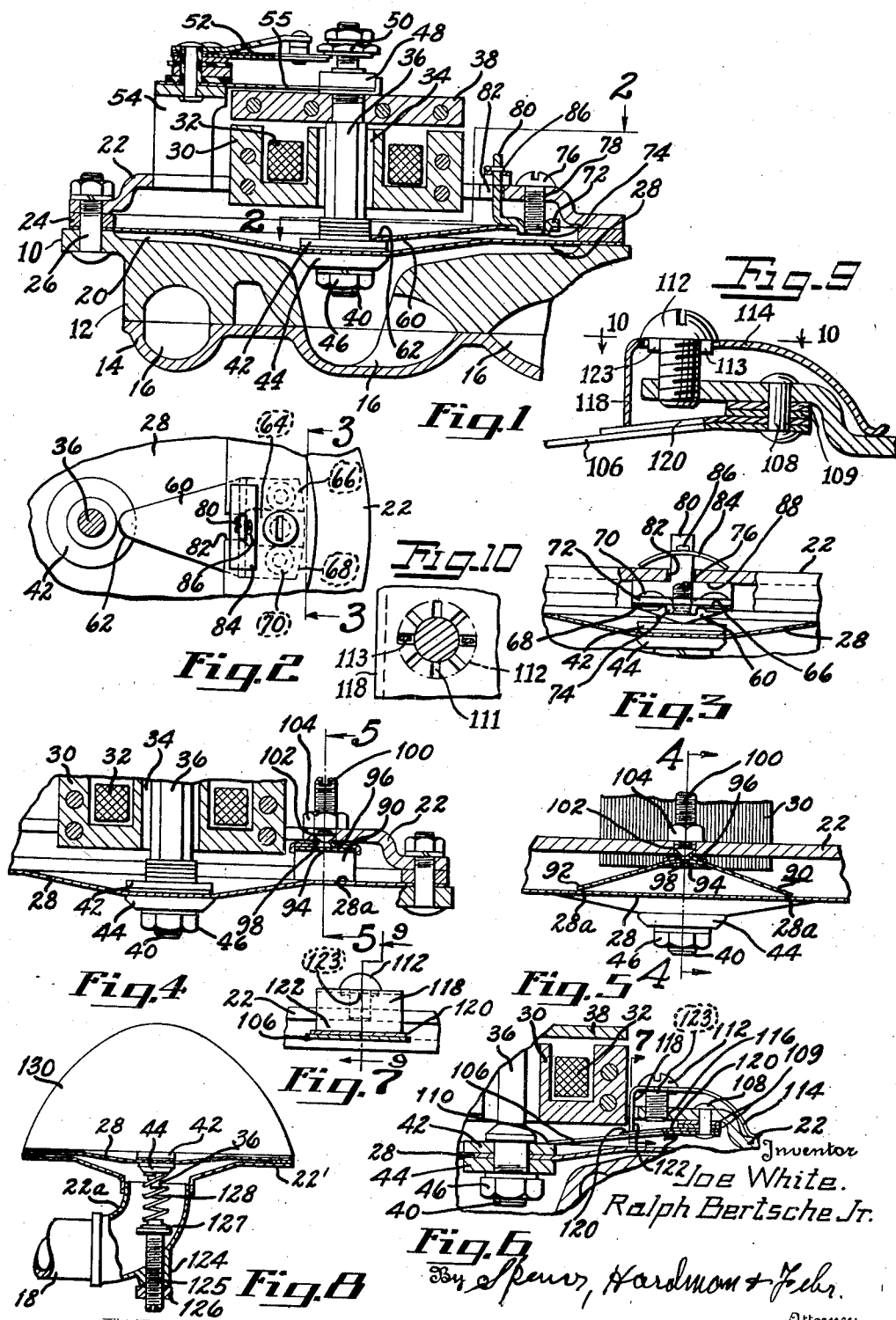
Dec. 31, 1940.

J. WHITE ET AL

2,227,289

SOUNDING SIGNAL ADJUSTMENT

Filed Jan. 21, 1937



UNITED STATES PATENT OFFICE

2,227,289

SOUNDING SIGNAL ADJUSTMENT

Joe White, Anderson, Ind., and Ralph Bertsche, Jr., Pontiac, Mich., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application January 21, 1937, Serial No. 121,468

3 Claims. (Cl. 177—7)

This invention relates to sounding signals and is particularly directed to adjusting means for the same.

It is an object of this invention to provide an adjusting means for a sounding signal whereby the frequency may be altered from the fundamental.

Another object of this invention is to provide frequency altering means for a sounding signal that will be within the control of the operator.

Another object of the invention is to provide a frequency control for sounding signals whereby each unit of a pair of horns may be satisfactorily adjusted so as to result in either a beat note or a blended note when the signal devices are sounded in unison.

A still further object is to provide means whereby the frequency of a horn power plant can be adjusted to the absolute resonant pitch of the air column.

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 embodiment of the present invention is clearly shown.

In the drawing:

Fig. 1 is a sectional view of a sounding signal device illustrating one modification of the instant invention, the motor cap or housing having been removed.

Fig. 2 is a fragmentary view in plan with parts shown in section, it being a view substantially as indicated by the line and arrows 2—2 of Fig. 1.

Fig. 3 is a fragmentary view, partly in elevation and partly in section, substantially as indicated by the line and arrows 3—3 of Fig. 2.

Fig. 4 is a sectional view similar to Fig. 1, but illustrating a modification of the frequency adjusting means, the view being that indicated by the line and arrows 4—4 of Fig. 5.

Fig. 5 is a sectional view of the same substantially as indicated by the line and arrows 5—5 of Fig. 4.

Fig. 6 is a sectional view similar to Fig. 1, illustrating a further modification of the frequency altering means.

Fig. 7 is a fragmentary transverse sectional view with parts shown in elevation, substantially as indicated by the line and arrows 7—7 of Fig. 6.

Fig. 8 is a view in elevation with parts broken away to show a still further modification in section.

Fig. 9 is a fragmentary transverse sectional view on line 9—9 of Fig. 7.

Fig. 10 is a horizontal section on line 10—10 of Figure 9.

Where sounding signal devices are used in pairs for the purpose of producing a resultant note, of either blended or a beat note type, the individual frequencies of operation of the separate devices contribute much to producing a pleasing and efficient warning signal. There need be but slight variation from the prescribed frequency of either unit to cause a dissonance of sound when the units are sounded in pairs. Even when exercising extreme care in manufacture, the devices, when completely assembled, will produce tones of slightly different pitch, as respects successive horns coming from the same production line. It has, therefore, heretofore been necessary to try these horns out in pairs, in order to obtain the desired result, as to smoothness of tone and blending effect. It has been discovered that these same horns may have their fundamental frequency altered by appropriate means, so that they can be regulated to pair off with practically any other unit of the same production line, thereby providing the desired note relation. While it has been found that there are numerous means and mechanisms that can be adopted for altering the fundamental frequency, it has also been found that the most satisfactory results can be obtained by use of means or mechanism pressing upon the oscillatable assembly of the signal device.

The foregoing objects have been accomplished by providing a yieldable member that presses upon the oscillatable assembly, such as the diaphragm, and preferably at or near the center thereof, or at that point where it is usually connected to the operating armature. Means are then provided for supporting the yieldable member and for varying its spring pressure upon the oscillatable assembly.

With particular reference to the drawing, and to the modification illustrated in Figs. 1, 2 and 3, a support 10 is provided that comprises a collar member 12 with a cap 14, which taken together are hollowed out to form an air passage 16 leading to a trumpet (not shown) the inner end of the passage 16 opening into a chamber 20. The support also includes a motor bridge 22 engaging a ring 24 that are clamped to the collar member 12 by screw devices 26, all as is the usual custom and well known to those experienced in the art. Where desirable, the bridge 22 may be so fashioned as to be clamped directly to the member 10 with the elimination of the ring 24.

A diaphragm 28 extends over the chamber 20 and is carried by the support, it being clamped

thereto at its edge between the ring 24, or bridge 22, and collar 12 by the screw device 26. Mounted on the support is a magnet frame 30 provided with the usual winding 32 and having a central passage 34 through which an armature stud 36 passes for connecting an armature 38 with the diaphragm 28. The armature stud is suitably threaded at one end 40 for receiving clamp washers 42 and 44 and a nut 46 by which connection is made to the diaphragm 28, the opposite end of the stud 36 being connected with the armature 38, and with the contact actuating mechanism in any suitable manner such as indicated at 48 and 50 respectively. A circuit breaker mechanism 52 cooperating with the device 50 is supported by a yoke 54 that is in turn fixed to the motor bridge 22 in any convenient and desired manner. An armature spring 55, has one end fixed to the yoke and the other end secured to the armature rod 36 adjacent the armature 38.

The frequency adjusting means disclosed in Figs. 1, 2 and 3, comprises a blade spring 60, the free end 62 of which is adapted to bear upon the center of the diaphragm assembly, as for instance the projecting washer 42. The remote end of this spring is bifurcated at 64 to provide a pair of parallel extending legs 66 and 68 through which rivets 70 pass and are turned over to fasten the spring to a bracket member 72, substantially as illustrated in Figs. 2 and 3. The bracket member comprises a piece of angle iron, one flange of which is attached to the spring 60 by the rivets 70, and has an intermediate extruded portion 74 threaded to receive a screw device 76 that passes through a plain hole 78 in the motor bridge 22.

The other flange of the bracket 72 is cut-away somewhat so as to leave a tongue 80 projecting through a slot 82 in the motor bridge, on which tongue it receives a take-up device in the nature of a bowed spring 84, apertured to pass over the tongue 80, where it is held in flexed relation by means of a pin 86 passing through a hole in the end of the tongue 80. The free ends of the spring 84 engage the upper surface of the motor bridge and thereby draw the bracket member 72 against the underside of the bridge, such that the shoulders 88 left in forming the tongue 80 form a fulcrum engagement against the underside of the bridge member, substantially as indicated in Fig. 3. This construction is such that the pressure applied to the spring for loading the oscillatable assembly is distributed along a line extending across the spring, rather than applied thereto at a single point, thereby reducing the chances of spring breakage, and enabling more efficient and more lasting control of spring adjustment.

The foregoing structure is such that in a quiet condition the oscillatable assembly, or that assembly comprising the diaphragm, the armature stud, the armature and the circuit breaker operating device, will be in a condition of passive tension, in which all of the yieldable forces embodied in the spring tension of the dished diaphragm 28 and the armature supporting spring 55 are in a state of equilibrium. When the oscillatable assembly is actuated due to the periodic energization of the magnet 32 the diaphragm will be rapidly oscillated toward and from the collar member at a definite frequency, there resulting an audible signal emanating from the trumpet 18, whether the sound product be the result of audible vibrations set up within the diaphragm, or whether the sound product be the result purely of the vibrating air column incident to the oscillatable movement of the diaphragm.

This tone product, purely for the convenience of reference, is called the basic frequency where it is the result of the operating device unattended by any modifying means such as the frequency altering means. However, this basic frequency may not be the best for efficiency, or may not meet the requirements of the producer, especially when he wishes to pair the horn off with another. It is this condition that gives rise to the need for some altering means by which the frequency of the motor and oscillatable assembly can be adjusted to absolute resonant pitch of the air column.

The frequency altering means hereinbefore described, and specifically illustrated in Figs. 1 to 3 inclusive, when applied to the structure as illustrated disturbs the equilibrium of the oscillatable assembly and moves it ever so slightly to one side of its quiet position. In so doing the spring 60, adjustably supported at one end from the motor bridge 22, has one end thereof bearing upon the center of the diaphragm assembly as indicated at 62. Operation of the mechanism under these conditions will result in a sound signal emanating from the trumpet 18 that is of a different pitch than that of the basic frequency, or that sound product produced by the operation of the device uninfluenced by the frequency adjuster. As the frequency adjusting means are altered by means of the screw stud 76 to alter the force with which the spring 60 presses upon the oscillatable assembly, the frequency of vibration of the diaphragm will be changed, which will result in changing the pitch of the sound product emanating from the trumpet 18.

In the frequency adjusting means thus far described, adjustment of the screw 76 causes the bracket 72 to rock upon the motor bridge 22 along the fulcrum provided by the shoulders 88 and the underside of the motor bridge. When the screw 76 is run in, the bracket 72, as viewed in Fig. 1, will be rocked on its fulcrum in a counterclockwise direction which increases the spring pressure upon the center of the diaphragm assembly. When the spring 76 is rotated in the opposite direction, so as to allow the bracket to rotate in a clockwise direction, the spring pressure upon the diaphragm assembly will be less, this resulting in a lowering of the frequency from that which may have theretofore obtained.

Generally the same facts obtain as respects the other modifications. In the modification illustrated in Figs. 4 and 5, the adjustable spring tension is applied to the diaphragm at places 28a, intermediate the point of attachment to the armature stud 36, and the point of support around the periphery of the diaphragm. Specifically, the spring means comprises a bowed member 90, the free ends 92 of which bear upon the diaphragm, and the central bight 94 of which is provided with a saddle or clip 96 extruded at 98 to provide a seat to engage the sharpened end of a screw stud 100, the stud being threaded through the motor bridge 22 at 102, and held in adjusted relation by a clamp nut 104. When the screw stud 100 is run in toward the spring 90 the spring pressure upon the diaphragm 28 is increased, which as described above raises the pitch of the ultimate sound product. Here, too, the force applied to the spring for increasing the pressure on the oscillatable assembly is distributed by means of the saddle 96 that extends across the spring.

In the modification illustrated in Figs. 6 and 7, a spring blade 106 is secured to the motor bridge 22 by rivets 108 and has its free end pressing upon

the center of the diaphragm assembly as indicated at 110. Spacers 109 may be inserted between the fixed end of the spring 106 and the bridge 22 if it is so desired. An adjusting screw 112 passing through a bowed spring 114 constituting a take-up device and pressure member, is threaded through the motor bridge 22 at 116. The spring 114 has an end portion 118 that engages a pad 120 lying over the spring, after the portion 118 extends downward between the magnet frame 30 and the bridge 22. The spring portion 118 has a square end 122 that contacts the end of the pad 120 and thus increases the area of pressure upon the spring 106. Adjustment of the screw 112 varies the flexing of the spring 106 and thereby regulates the force of the spring pressing upon the diaphragm assembly. The underside of the screw head and the spring 114 have provisions to restrain relative rotation by accident and constitutes a locking means that tends to hold the screw 112 in the adjusted position. These provisions are generally indicated at 123 in Fig. 9. The locking means consists of the lugs 113 on the underside of the head of screw 112, which engage in slots 111 cut in the spring 114 around the opening for screw 112.

In the modification illustrated in Fig. 8, the collar member 22' is joined to the trumpet 18 by means of an elbow 22a, on which is provided a threaded boss 124 substantially centrally disposed over the center of the diaphragm assembly. A threaded stud 125, threaded within the boss 124 and fitted with a lock nut 126, provides an adjustable abutment 127 to seat a helical spring 128 whose opposite end embraces the end of the threaded stud 36 and thereby exerts adjustable spring pressure upon the center of the diaphragm assembly. In this particular instance the diaphragm actuating mechanism is enclosed by the usual cover 130.

We claim:

1. In a sounding signal device wherein a magnet motor is supported by a base plate, and includes a circuit breaker yieldably engaging an oscillatable assembly, and operates to oscillate the assembly for setting an air column into vibration, the combination with said base plate, of means other than the circuit breaker for altering the frequency of assembly oscillation, which frequency

altering means comprises a flexible member anchored to the base plate, a strut engaging the flexible member remote from its anchorage, and a screw device carried by the base plate for adjustably forcing the strut into engagement with the flexible member, whereby the flexible member may be flexed to exert spring pressure upon the diaphragm assembly.

2. In a sounding signal device wherein a magnet motor is supported by a base plate, and includes a circuit breaker yieldably engaging an oscillatable assembly, and operates to oscillate the assembly for setting an air column into vibration, the combination with said base plate, of means other than the circuit breaker for altering the frequency of assembly oscillation, which frequency altering means comprises a flexible member anchored to the base plate, a strut engaging the flexible member remote from its anchorage, and a screw device carried by the base plate for adjustably forcing the strut into engagement with the flexible member, whereby the flexible member may be flexed to exert spring pressure upon the diaphragm assembly, said strut comprising a bowed spring having a right angle extension contacting a pressure pad over the flexible member and a resilient arm formed to engage the base plate.

3. In a sounding signal device wherein a magnet motor is supported by a base plate, and includes a circuit breaker yieldably engaging an oscillatable assembly, and operates to oscillate the assembly for setting an air column into vibration, the combination with said base plate, of means other than the circuit breaker for altering the frequency of assembly oscillation, said means comprising a leaf spring independent of the circuit breaker, secured at an end to the base plate, and having a normally free end forcibly engaging the central region of the oscillatable assembly, a pressure member mounted on the opposite side of said base plate, and having a portion extending through the plate to forcibly engage the spring, and means for regulating the force with which the pressure member engages the spring, said pressure member having a yieldable portion adapted to be flexed by said means.

JOE WHITE.

RALPH BERTSCHE, Jr.