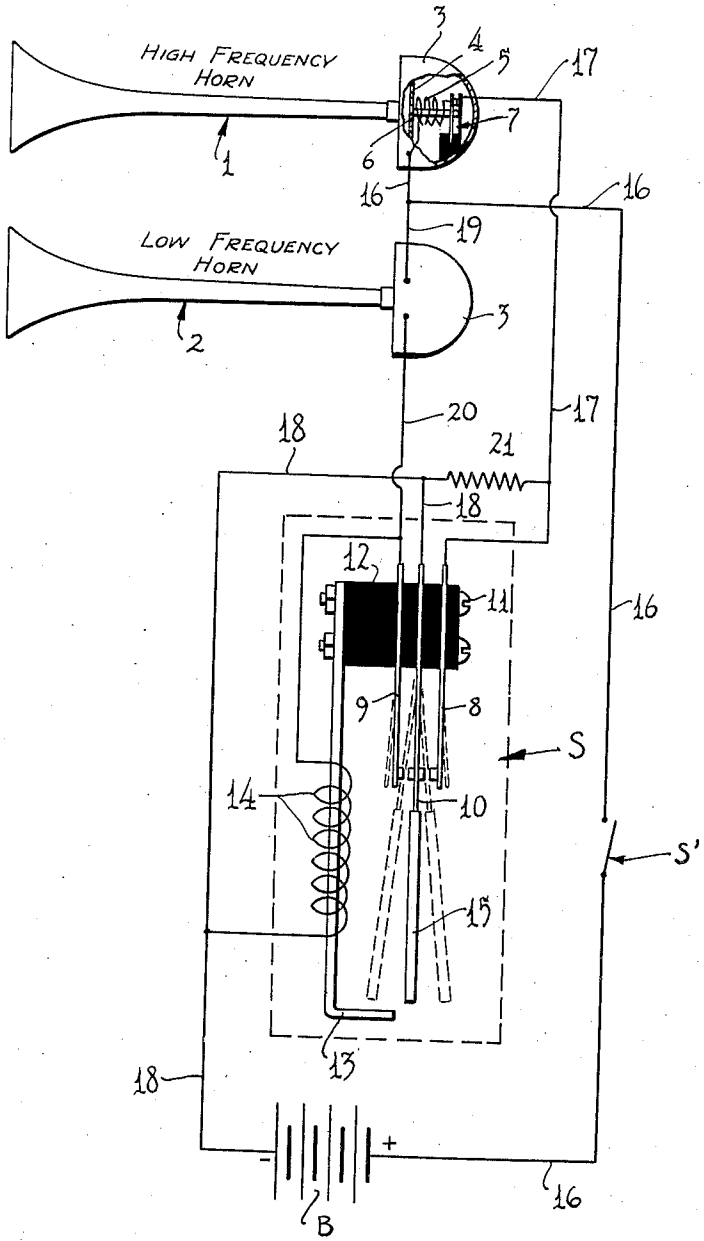
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AUDIBLE SIGNAL SYSTEM FOR VEHICLES

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AUDIBLE SIGNAL SYSTEM FOR VEHICLES

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1 Claim. (Cl. 177—7)

My present invention relates to audible signal system for vehicles and involves an audible signal device or devices commonly referred to as horns. In carrying out the invention, the conventional type of electro-magnetically operated horn is most conveniently employed and the description of the invention herein will be limited to the application thereof in conjunction with the conventional type of signalling device or horn.

In various types of vehicles, such as automobiles, for example, electrically operated horns are employed for the purpose of producing an audible warning signal to pedestrians and operators of other vehicles in the path of the vehicle. These audible signal producing devices or horns are subject to manual control of the operator, and whereas some vehicles are provided with one of these horns, other vehicles are provided with two such horns, of similar character, but adapted to produce audible signals of different frequencies; one usually being of relatively high frequency and the other of relatively very low frequency. In the case of signalling systems involving single horns, a steady uninterrupted signal is usually produced so long as the operator's control switch be closed; and in the case of systems involving low and high frequency horns these are usually simultaneously operated continuously when the common control switch is closed, but in some instances arrangement is made in the conventional two-horn systems for selective but constant operation of the high and low frequency horns. All of these previous systems have been subject to a great deal of criticism either because their volume of sound produced was so relatively low as to be ineffective at high speeds on the highway, or because the volume was so relatively great as to startle pedestrians on city streets, either of which produced a serious hazard. The use of both high and low frequency horns to produce an audible warning signal has proved to be the most effective and the most pleasing to the ear of all previously employed systems and is rapidly replacing the single horn system. However, in this latter type the overall volume produced by the two horns operated simultaneously has proven especially obnoxious to pedestrians within close range as on city streets, and it is for this reason that selective singular or dual operation of the two horns has been resorted to.

The present invention has as an objective the provision of a signalling system which will overcome the above noted objections to the previous signalling systems described, and provide an audible signal of such character as to be effective at relatively long range and under high speed conditions on the highway, but which at the same time will be pleasing to the ear and will not startle pedestrians at close range.

In adapting the invention to single-horn systems, means are provided for rapidly modulating the volume of the tone emitted from the horn so that effectively the same is divided up into a series of closely spaced operating intervals. In some instances this is accomplished by alternately rendering the signal device or horn alternately operative and completely inoperative in rapid succession, whereas in other instances the effect is accomplished by merely alternately raising and lowering the power input of the horn-operating circuit or circuits within the power operating range of the horn so that the horn is continuously operated but at rapidly varying volume. Usually this modification of the current flow in the horn-operating circuit will result also in a varying or modulating effect on the resultant frequency of the signal which adds a musical effect.

It is desirable in some instances to modulate the circuit in the manner described at a very rapid rate well below the signalling frequency, however, and to render the horn completely or substantially inoperative at closely spaced intervals, and when this is done the time lag or delay produced by the inertia of the horn itself has hitherto been a limiting factor. The present invention, however, provides means whereby the horn operating motor may be maintained partially energized during the periods of inoperativeness of the horn to such an extent that the starting inertia of the horn will be largely overcome. This permits exceedingly rapid intermittent operation of the horn or horns.

In the two horn adaptations of the invention as herein described, the low and high frequency horns will alternately be operated in rapid succession, thereby producing a very pleasing and, in fact, musical signal of alternately high and low frequencies having great penetrating power for long range operation, but which is entirely devoid of that obnoxious quality which startles pedestrians and makes for otherwise unnecessary accidents.

The above and other highly important objectives and advantages of the invention will be made apparent from the following specification and claims, and the appended drawing.

The single figure is a diagrammatic view illus-

trating the electrical hookup of the two-horn adaptation of the invention.

In the drawing a conventional high frequency signalling device or horn is indicated as an entirety by 1, a similar horn pitched to a much lower frequency is indicated by 2, and a source of potential which may be assumed to be the vehicle's storage battery is indicated by B. Each of the horns 1 and 2 terminates in a hollow sound head 3 in which is located a diaphragm 4. The diaphragms 4 are adapted to be vibrated at the required signal frequency by an electro-magnetic actuator or motor comprising a solenoid 5 and a magnetically influenceable armature bar 6, which latter may be assumed to be carried by the diaphragm. The diaphragm 4, on the other hand, may be assumed to be mounted near its periphery in the head 3. Also mounted in the head 3 of each horn unit is a normally closed pair of switch contacts 7 that are adapted to be connected in series with the coils 5 of their respective units. These normally closed switch contacts 7 are of the spring bar type that are closed by their own yielding tension, and these are so arranged with respect to the armature bars 6 that they will be opened under retraction of the respective armature bars resulting from energization of their respective coils. As illustrated, the spring blades of the switches 7 are rigidly mounted on the insides of the heads 3 but insulated therefrom, and the most rearwardly located of said switch blades is located directly behind and in the path of travel of its associated armature bar. While both horns may be assumed to be of the same construction generally, it is understood that they are assumed to be pitched so that their diaphragms vibrate at different frequencies. As an example, it may be assumed that the high frequency horn 1 has a signal frequency of some place between four hundred and six hundred cycles per second and that the low frequency horn 2 has a signal frequency of between one hundred and two hundred cycles per second.

For effecting intermittent peak operation of each of the horns in alternate relation, I provide an automatic switch mechanism S, which is of the electro-magnetic vibrator type. This switch mechanism S includes a pair of like relatively fixed but nevertheless slightly resilient spring contact arms or blades 8 and 9, and an intermediate common spring contact blade 10. The contact blades 8, 9, and 10 are fixedly mounted through the medium of nut equipped bolts and suitable insulation 12, on one end of a magnetizable frame 13, which together with a coil serves as a stator of a switch-operating motor including also a vibratory armature bar 15. The armature bar 15 is magnetically influenceable and is mounted directly on the free end of the common contact blade 10. When the coil 14 is energized, the armature 15 is moved toward the core 13, and will close contact blade 10 with contact blade 9, and as soon as the circuit through coil 14 is broken, the armature bar equipped switch contact blade 10 will move by its own resilience to the right and close spring contact blade 10 with contact blade 8.

In practice, this alternate closing of blade 10 with blades 9 and 8 will be repeated as fast as the circuit through coil 14 is alternately completed and broken, and preferably, this will be some place between five and ten times per second.

The main circuit for the high frequency horn 1 includes a lead 16 from one side of the battery B to one end of the coil 5 of horn 1, normally closed contacts 7 of horn 1, a lead 17, contact blades 8 and 10, switch S and a lead 18 back to the battery. The main circuit for the horn 2 includes the lead 16, the lead 19, the solenoid 5 of horn 2, not shown, a lead 20, contact blades 9 and 10 of switch S and lead 18. Interposed in the common lead 16 of the two horn circuits is a switch S' which is representative of the conventionally employed horn switch of a vehicle, and which may be assumed to be located within convenient reach of the vehicle operator.

The motivating coil 14 of switch S is connected across leads 18 and 20 to provide a shunt circuit across the contact blades 9 and 10 of the circuit of horn 2. As previously indicated, coil 14 furnishes a path for flow of current through the main circuit of horn 2 when the contacts 8 and 10 are broken. The resistance factor of this coil is so selected that the power of the circuit completed therethrough will be materially reduced thereby, but will still be sufficient either to maintain the horn in a low volume operating condition, or at least to largely overcome the starting inertia thereof. In either instance, however, the delay in getting the horn into a full volume operating condition will be greatly reduced. Obviously the coil 14 performs the dual function of operating the switch S and the providing of a power reducing circuit for the horn 2 across the switch contacts 9 and 10. To provide a power-reducing shunt circuit across contacts 8 and 10 of the main circuit of horn 1, I provide a resistance 21, which is shown as connected at one end to the lead 18 and at its other end at lead 17. This resistor 21 will preferably have a resistance value approximately equalling that of the coil 14, if it be assumed that the starting inertia characteristics or main power operating requirements of the horns 1 and 2 are equal.

When the operator closes the horn switch S, the armature bar equipped spring blade 10 of switch S will oscillate back and forth alternately into engagement with blades 9 and 8 as shown by dotted lines in the drawing, which will result in alternate momentary closing of circuits of horns 1 and 2. During periods when the contacts 8 and 10 are open, the coil 5 of horn 1 will be maintained partially energized through the shunt resistor 21, and when the contact blades 9 and 10 are open, the coil 5 of horn 2 will be maintained partially energized through the shunt circuit provided by coil 14. Of course, in all instances, the frequency of vibration of the armature 15 switch S will be far below the operating frequencies of the horns 1 and 2, but with the arrangement described the horns reach their peak volumes so rapidly that the frequency of vibration of switch S may be made much higher than would be possible in the absence of the shunt circuits described without sacrifice of peak volume operation of the horns. Obviously, when the switch blades 9 and 10 are closed, the coil 14 is effectively shunted out and when blades 8 and 10 are closed, the resistance 21 is shunted out.

To provide a single horn system in which the horn motor will be fully energized and partially energized in alternate relation, so as to constantly modulate the sound volume of the horn, the horn 1, resistance 21 and switch contact 8 may be omitted.

Of course, by merely varying the resistance values of the winding 14 and resistance 21 the

horns 1 and 2 can be made to either operate at low volume or to cease operation completely, as may be desired, during periods of partial energization of their respective motors.

What I claim is:

In combination, a vehicle horn of the type involving a vibratory diaphragm and an electric motor for operating the same, a source of potential, a circuit for said horn motor which involves said source, a manual control switch serially connected in said horn circuit, and an automatic switch for alternately making and breaking the signal circuit in rapid succession but at a frequency very materially below the signal frequency of the horn, said automatic switch including cooperating contacts serially connected in the horn circuit and an electromagnetic switch actuator having its winding connected in shunt across the said automatic switch contacts, said winding being of such resistance value as to greatly reduce the volume of the horn during intervals that the said switch contacts are open.

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