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VARIABLE SOUND LEVEL BUZZER HAVING RESISTANCE CONTROLLED WINDING

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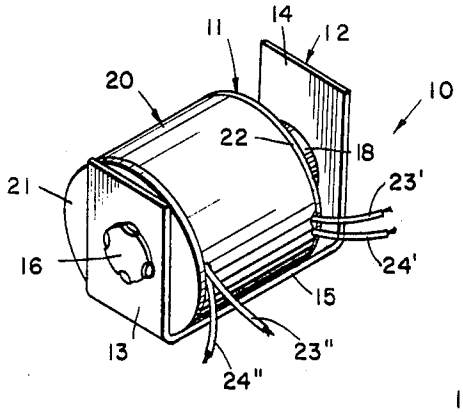


FIG 1

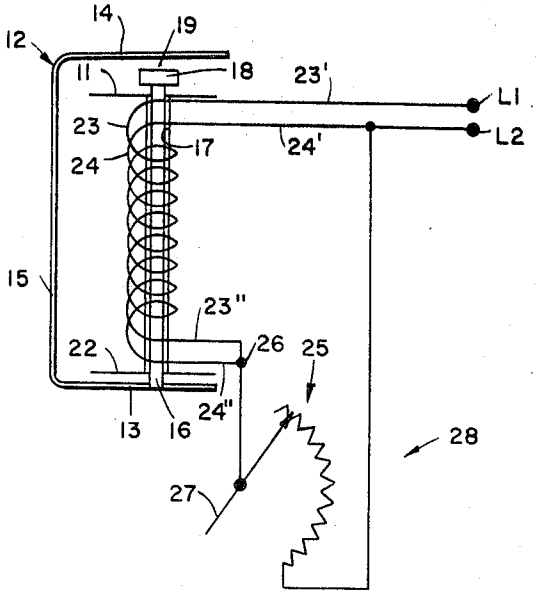


FIG. 2

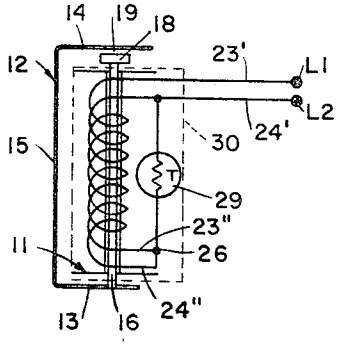


FIG. 3

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U.S. Cl. 340—388 8 Claims

ABSTRACT OF THE DISCLOSURE

A bifilar winding is wound around a coil bobbin through which a pole piece is extended. A resistive element controls the voltage in one of the coils of the bifilar windings such that a magnetic flux is generated in the pole piece to attract an armature associated with the coil bobbin and pole piece.

Variable sound level buzzers, prior to this invention, for the most part utilized a set screw in conjunction with a pole piece to vary the sound level. A hole was tapped through a pole piece and a threaded screw, with one end attached to an operating lever, was inserted into it. The other end of the screw closed or widened the armature air gap through the engaged thread. Such closing and widening of the air gap controlled the buzzer sound level. There were certain mechanical disadvantages in this arrangement, among which were, variations in the torque, over life, etc.

The present invention is concerned with an entirely different approach to varying the sound level of buzzers and has as one of its objects the provision of a variable sound level buzzer wherein the sound level is controlled by electromagnetic means.

Another object of the invention is the provision of a variable sound level buzzer wherein a bifilar wound coil and bobbin is used to control the sound level.

Another object of the invention is the provision of a variable sound level buzzer wherein a resistive element with a contact slider attached to a control arm is used.

Still another object of the invention is the provision of a variable sound level buzzer wherein the resistive element is used to control the magnetic flux generated by the bifilar coils at a pole piece head to attract the armature.

Yet another object of the invention is the provision of a variable sound level buzzer wherein a time delayed signal is provided.

Still another object of the invention is the provision of a variable sound level buzzer having a thermistor connected across the bifilar windings to achieve a time delayed signal.

With the above and other objects in view, which will appears as the description proceeds, this invention resides in a novel variable sound level buzzer substantially as described herein and more particulary defined by the appended claims, it being understood that such changes in the precise embodiment of the invention here disclosed may be made as come within the scope of the claims.

In the drawings:

FIGURE 1 is a perspective view of the novel buzzer showing the bifilar winding;

FIGURE 2 is a schematic showing the wiring in relation to the resistance control element in conjunction with the armature and the pole piece; and

FIGURE 3 is a schematic of another embodiment of the buzzer showing the use of the thermistor for the time delayed signal.

Generally speaking, the objects of the invention are

accomplished by providing a variable sound level buzzer wherein the sound level is controlled by electromagnetic means. A resistive element serves to control the magnetic flux that is generated in the buzzer pole piece, so as to attract the armature through the pole piece. More particularly, a variable buzzer assembly having an armature and a pole piece with a special wound coil and bobbin, and a resistance element with a contact slider attached to a control arm is provided. When the resistance element is open, the voltage across each section of the bifilar winding is equal, but of opposite phase, so that no magnetic flux is gentrated at the pole piece head to attract the armature. As the resistance of one winding is decreased, the voltage of the windings no longer oppose each other, magnetic flux is generated in the pole piece, the armature is attracted to the pole piece, and the sound level is increased from zero to a maximum level.

In another embodiment, a thermal resistance element, such as a thermistor, is connected across one of the windings for incorporating a time delayed signal in the buzzer.

Referring now to FIGURES 1 and 2, numeral **10** indicates the variable sound level buzzer of the present invention. A coil bobbin **11** is disposed within a U-shaped armature **12** having sides **13** and **14** and bottom portion **15**. A pole piece **16** extends through a bore **17** of the bobbin. Included as part of the pole piece is a head portion **18** through which the side **14** of the armature is vibrated, side **14** thus serving as the vibrating leaf of the armature. It is noted that there is an air gap **19** between the head of the pole piece and side **14** of the armature.

The coil bobbin **11** contains a bifilar winding **20** disposed between retaining rims **21** and **22**. The bifilar winding includes induction coils **23** and **24** each having start and finishes **23'** and **23''**, **24'** and **24''** respectively. As shown, variable resistance element **25** is connected in series with the coils across the start **24'** of coil **24** and the junction **26** of the coils at their finish. As shown, a suitable voltage is applied across lines L_1 and L_2.

The simplicity of operation of the buzzer lies in the bifilar winding and the resistive control element **25**. When the resistance element **25** is open, as shown in FIGURE 2, the current will flow through the coils, the voltage across each coil being equal but of opposite phase. Thus, no magnetic flux will be generated at the head **18** of the pole piece to attract the armature and cause it to vibrate. As the resistance is decreased through the manual setting of control arm **27**, current begins to flow through the resistance circuit **28** such that the opposing voltage in coil **24** is decreased. Thus, magnetic flux is generated in the pole piece from zero to a maximum level resulting in a "whisper soft" to a maximum loudness in the buzzer. Such maximum level is determined by customer demand.

Referring to FIGURE 3, there is shown another embodiment of the invention wherein a time delayed signal is achieved. In household appliance use, for example, a one-minute signal of the buzzer at the work end cycle is often objectionable, but is the minimum time the timer clock cam can provide. To overcome this objection, the present buzzer provides a thermal sensitive resistance element, such as a thermistor **29**, connected in series across coil **24** in place of variable resistor **25**. Preferably the thermistor is encapsulated within the bobbin by some suitable means such as tape **30**. The thermistor will have a certain resistance at room temperature, for example, 7000 ohms. The opposite phase voltage across it will heat the thermistor and lower its resistance to 2000 ohms, for example, in a given time—45 seconds, for example. At this condition, the buzzer will then signal.

From the foregoing description it will be apparent to those skilled in the art that this invention provides a

new and useful variable level sound buzzer. Accordingly, it is contemplated that the scope of the invention is to be determined from the claims appended hereto.

What is claimed is:

1. In a variable sound level buzzer having a coil bobbin disposed within an armature and having a pole piece for controlling the vibration of said armature, a bifilar winding wound on said bobbin to form said coil, a source of voltage applied to each of the coils of said winding such that when current is passed through said coils the magnetic flux induced by said coils oppose each other, a variable resistance element in series with said coil windings whereby the current in one of said coils can be varied from zero to a maximum such that the magnetic flux generated by the other of said coils can be made to attract said armature through said pole piece.

2. A variable sound level buzzer according to claim 1, in which said variable resistance element is manually controlled.

3. A variable sound level buzzer according to claim 1, in which said resistance element is thermally controlled.

4. A variable sound level buzzer according to claim 1, in which said resistance element is a thermistor.

5. A variable sound level buzzer comprising a U-shaped armature, a coil bobbin disposed within said armature, a pole piece extending through a bore of said bobbin, said pole piece being mounted on one side of said U-shaped armature, there being an air gap between the other end of said pole piece and the other side of said armature, a bifilar winding wound on said bobbin to form said coil, a source of voltage applied to each of the coils of said winding such that when current is passed through said coils the magnetic flux induced by said coils oppose each other, a variable resistance element in series with said coil windings whereby the current in one of said coils can be varied from zero to a maximum such that the magnetic flux generated by the other of said coils can be made to attract said armature through said pole piece.

6. A variable sound level buzzer according to claim 5, in which said variable resistance element is manually controlled.

7. A variable sound level buzzer according to claim 5, in which said variable resistance element is a thermistor.

8. A variable sound level buzzer comprising a U-shaped armature, a coil bobbin disposed within said bobbin, a pole piece extending through a bore of said bobbin, said pole piece being mounted at one side of said U-shaped armature, there being an air gap between the other end of said pole piece and the other side of said armature, a bifilar winding wound on said bobbin to form said coil, a source of voltage applied to each of the coils of said winding such that when current is passed through said coils the magnetic flux induced by said coils oppose each other, a thermistor in series with said coil windings whereby the current in one of said coils can be varied from zero to a maximum such that the magnetic flux generated by the other of said coils can be made to attract said armature through said pole piece, said thermistor being encapsulated within said bobbin.

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