Jan. 15, 1946. P. E. FISCHLER 2,392,981

TUNED AUDIO RELAY

Filed March 16, 1942

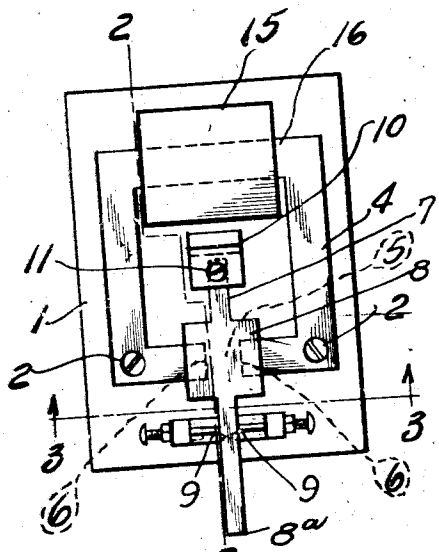

Fig. 1

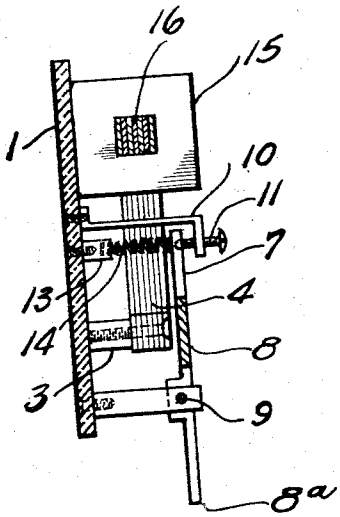

Fig. 2

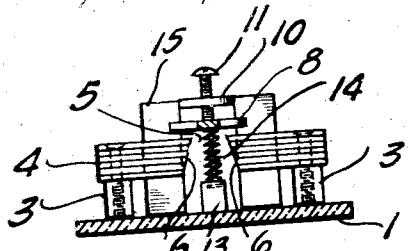

Fig. 3

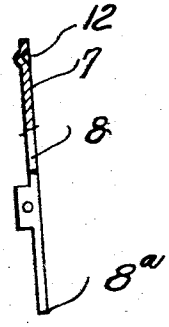

Fig. 4

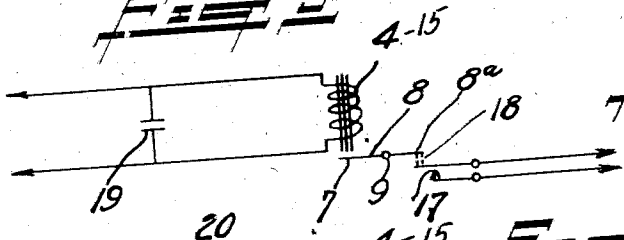

Fig. 5

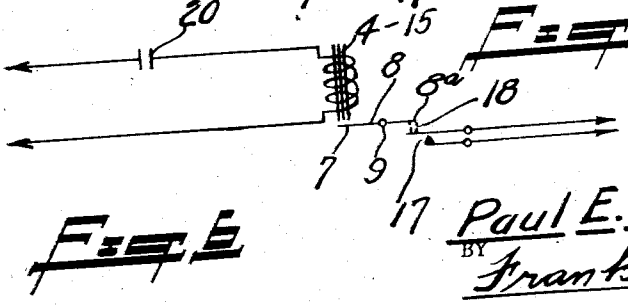

Fig. 6

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TUNED AUDIO RELAY

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Application March 16, 1942, Serial No. 434,872

1 Claim. (Cl. 175—338)

This invention relates to tuned audio relays and has for its object to provide a device of this kind comprising an A. C. relay, which may be tuned to operate at any selected audio-frequency.

A further object is to construct the relay, and particularly the core and coil thereof whereby it will have a fixed inductance value, when in a parallel resonant or series resonant circuit.

A further object is to provide a relay wherein the pivoted soft iron armature is attracted toward the core by the magnetic flux, when said flux is at its greatest intensity across the open ends of the core, which occurs at resonant frequency.

A further object is to provide an expansion spring for forcing the armature away from the core and adjusting means for the armature acting against the spring for varying the adjustment of the armature.

A further object is to form the core from laminations, and to provide a coil around the core spaced from the poles thereof and the whole having a fixed inductance value.

A further object is to control a low pressure operating switch by the rockable armature.

With the above and other objects in view the invention resides in the combination and arrangements of parts as hereinafter set forth, shown in the drawing, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing:

Fig. 1 is a view in elevation of the tuned audio relay.

Fig. 2 is a vertical transverse sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a side elevation of the armature showing the same partly in section.

Fig. 5 is a schematic view of the parallel resonant energizing circuit.

Fig. 6 is a view similar to Fig. 5, but showing a series resonant energizing circuit.

Referring now more particularly to the drawing, the numeral 1 designates the base of the device, formed from insulating or non-magnetic material, as shown, and supported on the base 1 by means of screws 2 which extend through sleeves 3 is a laminated core 4.

The core 4 is preferably rectangular shaped as shown, and is provided with a gap 5 forming spaced magnetic poles 6, between which the magnetic flux flows for attracting the inner end 7 of the rockable armature 8 in a direction toward the poles. That portion of the armature 8, above the gap 5, is enlarged as shown so there is a wide surface above the field of magnetic flux. The armature 8 is rockably mounted on adjustable pivot screws 9, and by means of said screws an accurate and delicate bearing and suspension is obtained.

Secured to the base member 1 is an outwardly extending, angular shaped bracket 10 having an adjusting screw 11 threaded therein, said screw cooperating with the recess 12 in the armature arm 7, and interposed between the inner side of the arm 7 and within a cup 13 suitably secured on the base 1, is an expansion spring 14. The screw member 11 is readily accessible and it will be obvious that by adjusting the screw 11, the arm 7 of the armature may be accurately adjusted in relation to the core gap 5 and poles 6 for obtaining a fixed position relative to the greatest magnetic flux across the magnetic gap 5, and as the magnet or core is energized by the alternating current passing through the coil 15, around the portion 16 of the laminated core, said armature will be attracted toward the poles 6 against and under the influence of the expansion spring 14. It is to be understood that the coil 15 and core 4 assembly has a fixed inductance value. This inductance, together with the capacity 19 in the parallel circuit, or 20 in the series circuit, will cause greatest flux across gap 5 between poles 6 to occur at the resonant frequency, and the tension of spring 14 is adjusted to allow the armature 8 to be attracted to the poles 6 only at resonant frequency.

As the armature 8 is attracted toward the poles 6, the outer end 8a closes a circuit at 17 through the medium of a low pressure operated switch 18. It will be noted, in Fig. 5, that a parallel circuit is shown having a condenser 19 across the relay inductance, and in Fig. 6 is shown a series circuit in which the condenser 20 is in series with the relay inductance.

The operation is as follows: When the current in coil 15 produces sufficient magnetic flux across the gap 5 from the poles 6 to overcome inertia of armature 8 and adjusted tension of spring 14, the armature is attracted to the poles 6 of the core, moving on the pivotal points 9. The opposite movement of the outer end of the armature 7 is employed to close the low pressure operating switch at 18, and as long as the device is energized at resonant frequency, the contacts 17 remain closed.

From the above it will be seen that the de-

vice provides an alternating current relay, which may be tuned or caused to operate at any selected audio-frequency. The coil 15, and the core 4, provide a fixed inductance value, shown at 4 and 15 in Fig. 5 in the parallel resonant circuit, and at 4 and 15 in the series circuit, shown in Fig. 6. The proper values of 19 and 20 with their respective inductances 4 and 15 will cause the circuits to be resonant at any desired audio frequency of the applied alternating current. As greatest magnetic flux across the open ends of core will occur at resonance, and as the tension of spring 14 may be varied by adjusting the screw 11, the armature 8 will be attracted to the poles 6 only at the resonant frequency.

The invention having been set forth what is claimed as new and useful is:

A tuned audio relay comprising a base, an alternating current electromagnet supported by and spaced from the base, said electromagnet being rectangular shaped and having a flux gap intermediate the ends of one side thereof, an alternating current coil of fixed inductance value extending around the side of said magnet opposite the flux gap and equidistant from the flux gap, a rockable armature supported by the base and having its pivotal point spaced outwardly from the end of the magnet having the flux gap, one end of said armature extending over the flux gap in spaced relation thereto and to the outer side of the magnet parallel thereto and terminating between the flux gap and the coil, an expansion spring carried by the base and extending upwardly and engaging the under side of the armature and normally forcing the same outwardly from the flux gap and an adjusting screw above the armature end and engaging the upper side of the armature and limiting the expansive action of the spring.

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