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E. E. WICKERSHAM

2,128,722

LOUDSPEAKER CONSTRUCTION

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FIG. 1.

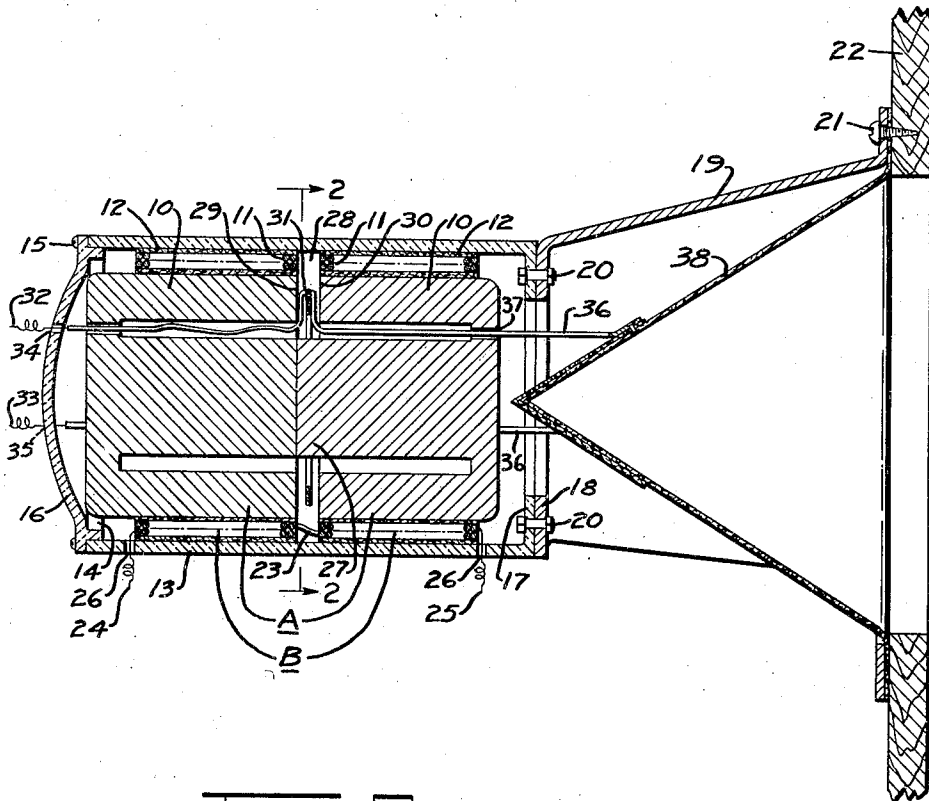


FIG. 2.

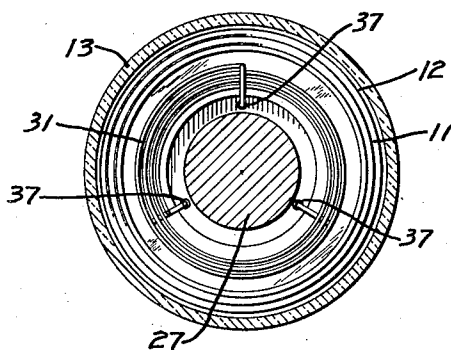
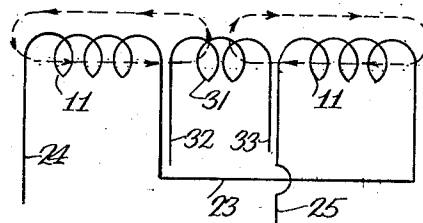


FIG. 3.



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UNITED STATES PATENT OFFICE

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LOUDSPEAKER CONSTRUCTION

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Application October 29, 1934, Serial No. 750,511

4 Claims. (Cl. 179—115.5)

This application is a continuation in part, as to all matters common to the two, of my pending application entitled: Electric transformer and core construction, Serial No. 663,298, filed March 29, 1933.

My invention relates to the construction of and to the character and kind of material I choose to use in the magnetic units of loudspeakers and other similar devices.

Objects

An object of this invention is to construct the core member or members of the magnetic units of loudspeakers and similar devices of magnetite or what is commonly known as black sand.

Another object is to produce a practically closed magnetic circuit in the magnetic core units of loudspeakers and sound reproducers of a non-corrosive finely divided metal which may be "formed", or poured dry into a coil housing to form a magnetic unit, which is easily and cheaply constructed.

Another object is to provide a core member for loudspeakers and similar devices of a metallic material which is naturally in a finely divided state.

Another object is to produce a magnetic circuit of finely divided non-corrosive metal in its natural state, having high magnetic properties and whose contact resistance between its various metal particles is high enough to reduce to a minimum any eddy currents which may be induced therein.

Another object is to produce a loudspeaker, transducer, or other similar devices, whose magnetic components are composed of magnetite, or of that material which is commonly known as black sand that will reproduce signals truly over the entire audible scale.

Another object is to produce a magnetic unit for loudspeakers or transducers and kindred devices, having a moulded core composed of magnetite.

Another object is to provide a core member for a loudspeaker or transducer of magnetite, comprising a plurality of parts having its pole portions positioned intermediate its ends.

Another object is to provide a core member for loudspeakers and kindred instruments, having the pole pieces thereof intermediate its ends, whereby one of the pole pieces may be placed adjacent one side of the cone or diaphragm and the other of said pole pieces placed adjacent the other side of the cone or diaphragm member of the speaker.

Other objects will appear hereinafter.

I attain these objects by use of the construction illustrated in the accompanying drawing, in which:

Fig. 1 is a longitudinal section through my loudspeaker or transducer.

Fig. 2 is a transverse section on line 2—2 of Fig. 1.

Fig. 3 is a schematic view showing the direction of coil winding and the magnetic field produced thereby.

One form in which my invention may appear, is illustrated in Fig. 1 in which core members are of the moulded type, and the metallic portion thereof being magnetite, or what is commonly called black sand.

This material is naturally granular, is non-corrosive, has a relatively high resistance, and is generally highly adaptable for use in the making of cores for magnetic units.

Due to the nature of this material, it may be mixed with a binder, poured into a form and by allowing the binder to dry or harden, the core will become rigid and self-supporting and readily handled.

If it is not desired to make the core rigid, the magnetite may be poured dry into a suitable container or housing and thus form a core for a magnetic unit.

One of the effects of the presence of magnetite in the flux path of a coil through which current is flowing, is: that for the same number of turns in a coil, its inductance is increased and, consequently, a coil having a core of magnetite will require a lesser number of turns for the same inductance and thus reduce the ohmic resistance, which is advantageous.

In addition to these above advantages which are due to the several characteristics of magnetite, a core composed of this material and used in radio signal sound reproducers will not be greatly affected by hysteresis, and, therefore, a more nearly perfect reproduction of the sound may be had.

Description

Referring to Fig. 1: the core member A comprises parts 10—10 which are preferably composed of magnetite, around which are wound coil members 11—11, positioned inside of insulating members 12—12. Core A is mounted inside of housing 13, and is removable through opening 14 upon the removal of screws 15 and closure 16. Housing 13 has formed on one end thereof a flange portion 17 which is attached to a companion member 18, and on supporting bracket

19 by screw means 20; said supporting bracket 19 being attached by screws 21 to sounding board 22.

Sections 11—11 of coil B preferably are wound so that when they have their inner ends 23 attached together their fields axially of the coils are opposed. Consequently, the radial flux at the mating or adjacent ends of the coils will be aiding so as to produce a strong radial flux in the air gap 28. The outer ends 24—25 of the coils are brought outwardly of the enclosure 13 through suitable openings 26—26 for connection to a source of power not shown.

It will be noted that one of the sections 10 of core A has a protrusion 27 formed thereon which acts as a spacer between the sections 10—10 to form an annular groove 28 between faces 29—30 of sections 10—10 which constitute the pole pieces of core A.

Coil 31 is floatingly mounted in groove 28 and has its free ends 32—33 extending outwardly of closure 13 through openings 34—35, and are adapted to be connected to a voice current supply (not shown).

Coil 31 has secured thereto a plurality of rod members 36 extending outwardly of core A through openings 37 therein and are attached in driving relation to disc or cone 38 as shown.

Operation

The loudspeakers herein disclosed are intended to work upon the electro-dynamic principle, which is well known in the art.

Briefly: these units employ a magnetic field which is preferably supplied by a field coil when excited by a direct current.

The field coil's core is, in this case, supplied with an air gap formed between the faces of the pole pieces.

A movable coil adapted to be excited by an alternating or pulsating current is floatingly mounted in said air gap in the flux path of said field coil, and drives the cone or disc to which it is attached when said respective coils are excited by the passage of the proper electric current therethrough.

In the operation of a loudspeaker employing my invention, the field core is practically immune from the effects of eddy currents in the core, caused by the reaction of the magnetic alternating field set up by the energizing current

of the movable, or voice coil, thus reducing to a minimum any distortional effects in reproduction arising from this source.

Therefore, I claim:

1. An electro-magnetic unit for a transducer, having a field coil and a substantially cylindrical core therefor, an encircling groove lying generally in a plane radial with respect to the core axis and having spaced radial walls formed in said core and forming axially spaced pole pieces of like polarity, a voice coil between said poles out of contact with said core, and a driven element attached to said coil, said voice coil being free to float between said pole pieces except insofar as it is partially restrained by said driven element.

2. An electro-magnetic unit for a transducer, having a field coil and a core therefor, an annular groove formed in said core and having spaced walls lying in planes substantially normal to the magnetic field axis, a movable coil positioned in said groove between said walls and encircling a portion of said core defined by a core surface other than either of said spaced walls, and means suspending said movable coil in the position specified for movements in the direction of the magnetic field axis.

3. In a transducer having a two part field coil, a voice coil, and a core for said field coil, an encircling groove in said core member intermediate its ends in which the voice coil is suspended out of contact with said core, and one part of said two part coil being positioned on one side of said groove and the other of said coil parts being positioned on the opposite side of the groove.

4. An electro-magnetic unit for a transducer comprising a field coil, a core therefor including an uninterrupted central core portion and an outer core portion formed with a groove encircling said uninterrupted central portion, said groove having opposed walls lying in planes substantially normal to the axis of the central core portion, a flat voice coil positioned in said groove between said opposed walls and encircling said uninterrupted central core portion but out of contact therewith, and means suspending said voice coil in said groove for movements therein out of contact with said core.

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