April 10, 1928. 1,665,740

Z. JEFFRIES

MAGNETIC SOUND REPRODUCING DEVICE

Filed Oct. 6, 1924

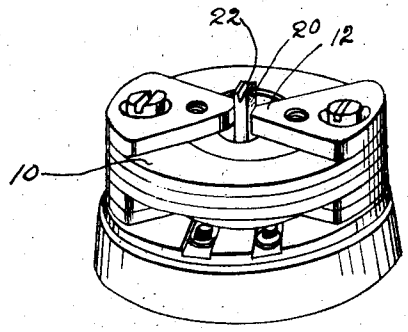


FIG. 1.

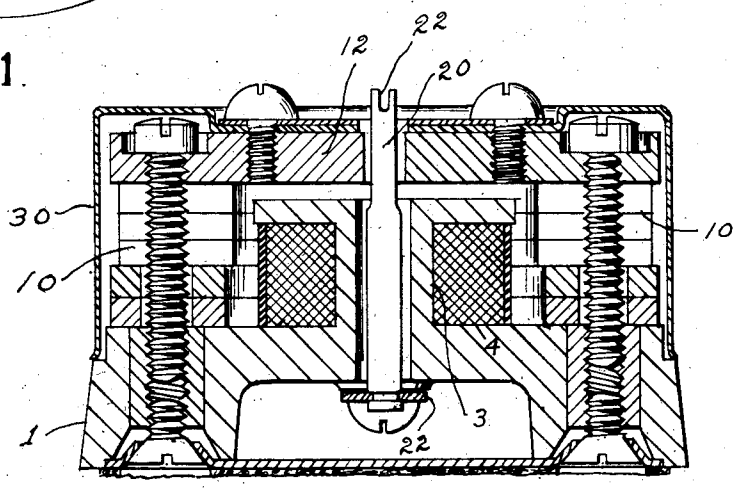


FIG. 2

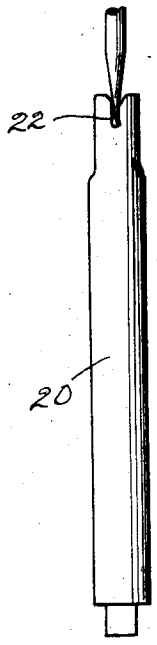


FIG 4

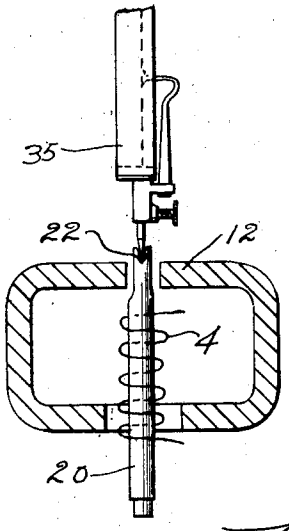


FIG. 3

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UNITED STATES PATENT OFFICE.

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MAGNETIC SOUND-REPRODUCING DEVICE.

Application filed October 6, 1924. Serial No. 742,078.

This invention relates to loud speakers for radio signals, telephones, voice amplifiers and the like.

In such devices, there is usually used a vibrating member responsive to a magnetic field generated by the variable current created, for example, by the amplifying apparatus of a radio receiving set. The vibrating member is usually a soft iron armature.

I have discovered that a very much more effective reproduction may be accomplished by the use of an armature, as such a vibrating member, which will become more magnetic in a given weak magnetic field than soft iron or silicon iron. That is to say, by the use of a certain alloy which reaches saturation in a much lower or less intensified magnetic field than soft iron or silicon iron, I have been able to secure a much higher degree of responsiveness than is possible with the material usually used. After experimenting with such alloys, I have found an alloy of iron and nickel which when used as such a vibrating armature is more responsive to variations in a magnetic field.

In the accompanying drawings, I have illustrated a use of such a vibrating member for loud speaker purposes to which the following description relates. The essential characteristics of this invention are summarized in the appended claims.

In the drawings, Fig. 1 is a perspective view of a magnetic device employing a vibrating member; Fig. 2 is a vertical transverse section through the same; Fig. 3 is a diagrammatic view illustrating the combination of a permanent magnet and the vibrating member actuated by the magnetism of a coil to which the variable current is supplied and shown connected with a sound reproducing means; Fig. 4 is an enlarged view of such a vibrating reed.

The particular loud speaker device shown in the drawing is one used for vibrating the stylus needle of a phonograph. It is more fully shown, described, and claimed in the patent of Carl E. Pearson, George Smith and Frank J. Kaehni, No. 1,603,400, issued October 19th, 1926.

Briefly, it consists of a suitable base 1 of bakelite or similar non-conducting and non-magnetic material from which rises a spool-like projection 3, carrying a magnetic coil 4. Mounted on the base, is a particular form of permanent magnet having a body of punched metal members, the poles of the magnet being similarly formed and consisting of sector-shaped members 12 projecting inwardly, substantially to the center. The vibrating reed 20 extends upwardly therebetween and it is resiliently mounted on a spring member 22 shown as secured to the underside of the base. A suitable cover 30 is supplied with openings to receive screws for securing it in position.

Referring to the diagram of Fig. 3, it will be seen that when the coil 4 is energized, the reed 20 will become magnetic and as the variable current varies the polarity, the reed will be attracted to one pole 12 and repelled by the other producing vibration. The vibration of this reed may be caused to produce sound by actuating any suitable diaphragm. I have here shown a phonograph sound box 35 having its usual stylus needle resting in a notch 22 in the upper end of this reed, whereby the needle is caused to vibrate in much the same manner as when operated by the phonograph record. In such a case the reed is so shaped as to be a comparatively stiff member having sufficient body to be effectively acted upon by the magnetism generated by the coil.

Some of the magnetic properties of nickel iron alloys are well known and I am familiar with publications prior to this invention giving characteristics of nickel iron alloys with reference to magnetic susceptibility.

For use such as that claimed in this application, however, other properties are important.

The nickel iron alloys divide themselves naturally into two groups, namely those containing between about 100% and 75% iron in which the crystal structure at room temperature is that known as "body centered cubic" and those alloys containing between about 25% nickel and 100% nickel, in which the crystalline structure at room temperature is that known as "face centered cubic." It is the latter class of iron-nickel alloys which are found to be most desirable for the purposes herein set forth.

Such an alloy which has high magnetic susceptibility in low strength fields and which reaches magnetic saturation in a weaker field than soft iron or silicon iron may consist of nickel of about 45% and iron about 55%. This may be considered an ex-

ample of suitable proportions for such an alloy for the purposes of this invention. It is an alloy found very satisfactory for use in sound producing means having a magnetic field generated by radio receiving sets such as are now widely used. These proportions, however, are only illustrative and the use of such a material in a sound producing or loud speaker device is not intended to be limited thereto nor do I wish this invention to be limited to any particular physical characteristic of such a vibrating member, nor to the means for creating a magnetic field for actuating it.

I claim:—

In an electrically operating sound producing device, the combination of means for creating a magnetic field comprising opposed magnetic poles and an adjacent coil, a vibrating reed projecting through said coil and disposed between said poles, said reed consisting of an alloy of nickel and iron of preferably of only somewhat less nickel than iron.

In testimony whereof, I hereunto affix my signature.

ZAY JEFFRIES.