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H. M. KIRSCHBAUM

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ELECTROMAGNETIC SOUND RECORDER

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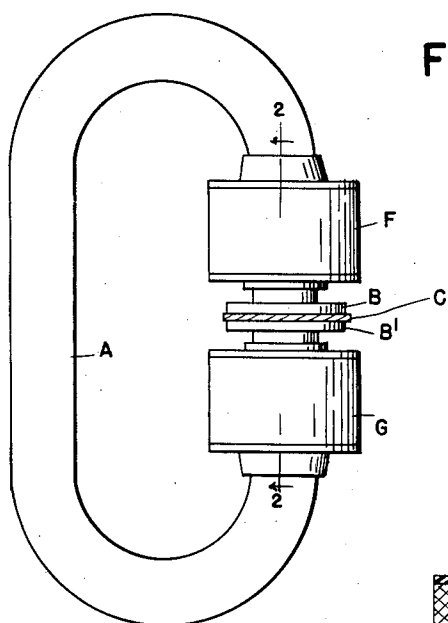


FIG. 1.

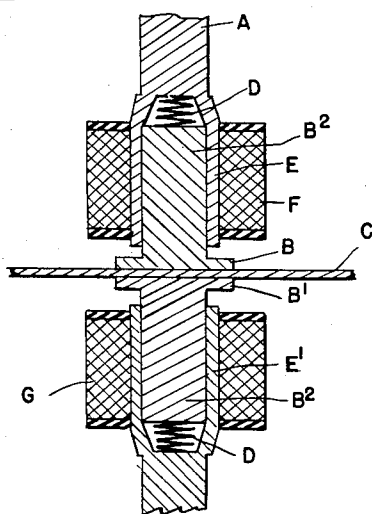


FIG. 2.

INVENTOR

HARRY M. KIRSCHBAUM

BY

Whitmore Hulbert & Belknap

ATTORNEYS

UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC SOUND RECORDER

Harry M. Kirschbaum, Detroit, Mich.

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2 Claims. (Cl. 179-100.2)

The invention relates to electromagnetic sound recorders of that type in which a ribbon or strip of magnetizable material is advanced over the pole of an electromagnet, the magnetism of which is varied in intensity by an undulatory electric current passing through an energizing coil. The undulatory current is supplied by a telephonic transmitter, together with suitable current amplifying means, so that the strip will be impressed with a corresponding undulatory magnetic record.

It is the object of the invention to obtain a recording means of this general type which is particularly adapted for recording sounds fundamentally of relatively low frequency, but with high frequency modulations which impart peculiar characteristics thereto.

More specifically, it is an object of the invention to obtain a recorder for the amplified sound of a human heart, which will preserve all of the characteristics by which this sound is known to the physician or surgeon. To this end, the invention consists in the construction as hereinafter set forth.

In the drawing:

Fig. 1 is an elevation of my improved electromagnetic recorder; and

Fig. 2 is an enlarged section on line 2-2 of Fig. 1.

Experimental use with the usual constructions of recorders of the type above referred to has demonstrated that they do not produce a satisfactory record of human heart sounds. This I attribute to the fact that the fundamental sound is of low frequency, but that its peculiar characteristics are due to high frequency modulations. Apparently the usual type of electromagnetic recorder is not well adapted to record sound complexes including such widely differing frequencies and amplitudes of vibrations. I have therefore devised a modified construction which is capable of making a more accurate record of sounds of the character above referred to.

The essential characteristic of my improved recorder is that the magnetizable tape is passed through a substantially closed magnetic circuit. In other words, instead of passing the tape over a single magnetic pole or between like poles of separate electromagnets energized by the undulatory current, my improved construction passes the tape between unlike poles of a single substantially closed magnetic circuit. This, I have found, produces a more accurate record of such peculiar sounds.

As illustrated, A is the magnetic core of the energizing electromagnet which forms a nearly

closed loop, with its opposite ends in axial alignment. B and B' are pole pieces for the member A and which have a slight telescopic movement relative thereto. These pole pieces are on opposite sides of the ribbon or tape C of magnetizable material and are pressed in contact therewith when the magnet is not energized by springs D. The telescopic joint between the poles and the core member is preferably formed by tubular members E and E' which are welded and thus integrally united to the core member A to form a continuation of the magnetic circuit thereof. These tubular members receive the shanks B² of the pole pieces B and B', with a very slight working clearance of preferably a fraction only of one-thousandth of an inch. All of these parts, viz., the core member A, the tubular extensions E, E', and the pole pieces B and B', with their shanks B², are formed of soft iron or other highly conductive material for the magnetic flux.

Surrounding one of the tubular members such as E is a coil F which is supplied with a constant direct current. The other tubular member is surrounded by a coil G which receives the amplified undulatory current supplied by a telephonic or microphonic transmitter. As this transmitter is not a part of the instant invention, it is unnecessary that it should be further described.

In operation, the tape C is advanced preferably in a direction transverse to the plane of the looped magnetic core A and with its opposite faces in contact with the poles B and B'. The coil F, which is supplied with a constant D. C. current, will cause a constant flow of magnetic flux through the circuit closed by the core A and including the pole pieces B, B' and intermediate tape C. When, however, undulatory current is supplied to the coil G, this will modify the flow of flux by either impeding or augmenting the same, with the corresponding fluctuation in intensity of the magnetic poles. This will produce a magnetization of the tape with unlike poles on opposite sides thereof which correspondingly vary in intensity longitudinally of the tape in its direction of advancement. The magnetic record thus formed in the tape will, when the latter is passed through sound reproducing means, produce a very faithful repetition of the original sound.

If desired, this same apparatus used for making the record can be employed in connection with a loud speaker for reproducing the sound by drawing the tape therethrough.

What I claim as my invention is:

1. An electromagnetic sound recorder comprising a tape of magnetizable material, pole mem-

bers having unlike poles on directly opposite sides of said tape and in axial alignment with each other, a loop core member having axially aligned tubular portions at its opposite ends for receiving said pole members and together therewith and the intermediate tape forming a single substantially closed magnetic circuit, and an energizing coil surrounding one of said tubular portions adapted to be supplied with an undulatory current corresponding to the sound to be recorded.

2. An electromagnetic sound recorder comprising a tape of magnetizable material, pole mem-

bers of unlike polarity on opposite sides of said tape and in axial alignment with each other, each having an outwardly extending shank portion, a loop core member having axially aligned tubular portions at its opposite ends for respectively telescopically engaging the shank portions of said pole pieces, and energizing coils surrounding said tubular portions, one being supplied with an undulatory current corresponding to the sound to be recorded.

HARRY M. KIRSCHBAUM.