Jan. 30, 1951 M. CAMRAS 2,539,400

ELECTROMAGNETIC TRANSDUCER HEAD

Filed Aug. 30, 1947

Fig. 1

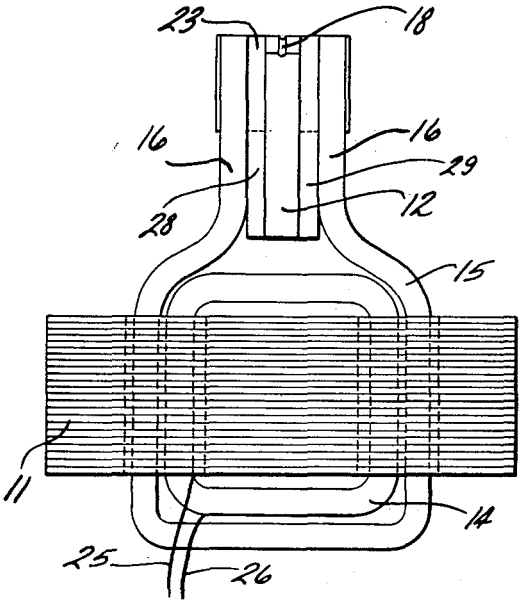


Fig. 3

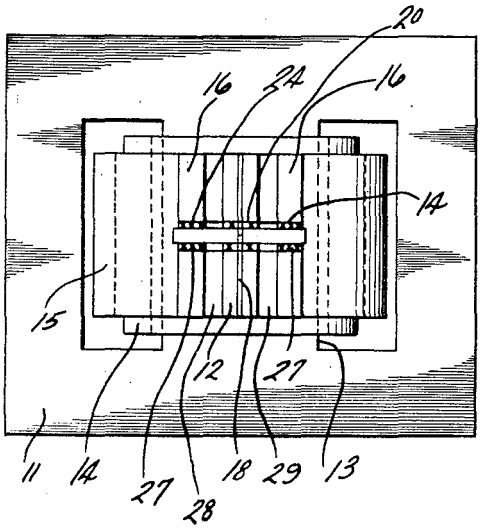
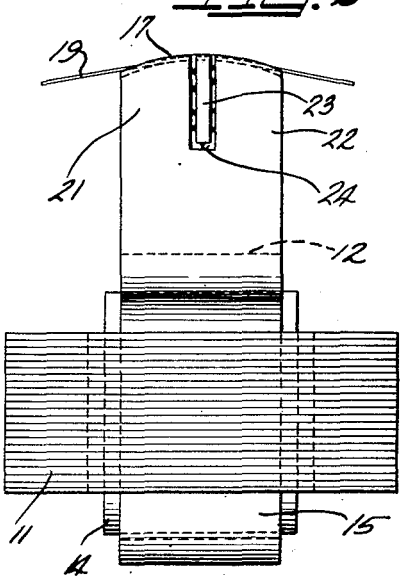


Fig. 2



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UNITED STATES PATENT OFFICE

2,539,400

ELECTROMAGNETIC TRANSDUCER HEAD

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8 Claims. (Cl. 179—100.2)

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This invention relates to an electromagnetic transducer head, and more particularly, to a combination transducer head and transformer formed as a single unitary structure.

One of the particular features and objects of the present invention is to provide a novel head which may be conveniently and efficiently employed for making a magnetic record on an elongated record member and for detecting and transducing a magnetic record into fluctuating electric energy which may thereafter be changed into corresponding sound waves if desired.

A further feature and object of the present invention is to provide a novel record and playback head for a magnetic recording and reproducing machine in which a transformer is built into and made a direct part of the head, thereby providing a low impedance head with a high impedance connection thereto.

Another and further object of the present invention is to provide a novel electromagnetic transducer head which is economical to manufacture, which is reliable in use, and which is particularly efficient in operation.

Another and still further object of the present invention is to provide a novel electromagnetic structure.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization, manner of construction and method of operation together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a front elevational view of an electromagnetic transducer head embodying the novel teachings and principles of the present invention;

Figure 2 is an end view of the electromagnetic transducer head shown in Figure 1; and

Figure 3 is a plan view of the electromagnetic transducer head shown in Figure 1.

Referring now to the illustrated embodiment of the present invention, the electromagnetic transducer head includes two core portions 11 and 12 which are formed of magnetic material having relatively high permeability but low retentivity. The core portion 11 forms the transformer core and is of the closed magnetic circuit type having a center leg 13 and commonly known as a "rectangular shell-type" core. A coil 14 is disposed around the center leg 13 and this coil 14

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is preferably made up of a large number of turns of wire and is of relatively high impedance.

A copper or other low electrical resistance strap 15 extends substantially around the coil 14 but is provided with two upstanding arm portions 16 which straddle the core piece 12. The core piece 12 is a single lamination of generally C shape having the end edges of its leg of arcuate form. A wire-receiving groove or slot 18 is provided in the top surface thereof and extends lengthwise thereover. Thus, a convenient wire or other magnetic record member support and guide is provided. The core 12 is preferably coated with a layer of insulation on each side as at 28 and 29.

As is shown in Figure 2, a magnetizable wire 19 having a relatively high coercive force is caused to travel across the core piece 12 in the groove 18. The core 12 has a slot 20 extending downwardly from the top edge 17 thereof, thereby to provide a pair of magnetic poles 21 and 22 in the core piece 12.

A bar or strip 23 of conducting material, such, for example, as copper, is disposed in the slot 20 and is preferably soldered therein. The strip 23 extends out away from the core piece 12 on either side thereof. The tops of the legs 16 are also slotted as at 24 to receive the ends of the bar 23. The ends of the bar 23 are soldered or otherwise electrically connected and secured to the arms 16 as at 27, thereby providing a single-turn transformer winding formed of the strap 15 and the bar 23, and also providing a support for the core 12. The single-turn winding extends around both the core piece 11 as well as the core piece 12 and provides a low impedance winding for the head. The high impedance winding 14 extends around only the core piece 11.

When fluctuating electric current is fed through the conductors 25 and 26 to the high impedance winding 14, current flows through the conducting bar 23 in the core 12 and longitudinally magnetizes the wire record member 19 as it travels across the gap between the poles 21 and 22.

A very close coupling of the low impedance circuit between the transformer and the recording and play-back core piece 12 enables the use of a low impedance head without the customary disadvantages of restraining the magnetic fields picked up in the coupling circuit.

While I have shown a particular embodiment of my invention, it will, of course, be understood that I do not wish to be limited thereto, since many modifications may be made, and I,

therefore, contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

I claim as my invention:

1. A combined electromagnetic transducer head and transformer comprising a transformer core, a transducer head core having a pair of closely spaced poles defining a non-magnetic recording and reproducing gap, a relatively high impedance winding on said transformer core, and a single conductor in the form of a closed loop common to both cores, said conductor comprising a support for said transducer head core and having a portion thereof within said gap itself.

2. A combined electromagnetic transducer head and transformer comprising a transformer core, a transducer head core having a pair of closely spaced poles, a relatively high impedance winding on said transformer core, a metal strip disposed between said poles and extending out on opposite sides of said transducer head core, a low resistance strap extending substantially around said windings and secured at its opposite ends to the opposite ends respectively of said strip.

3. A unitary electromagnetic transducer head and coupling transformer comprising a shell-type transformer core having an inner leg with a coil thereon, a generally U-shaped metal strap around said coil with its ends in closely spaced relation, a metal member spanning the ends of said strap and electrically connected thereto, a transducer head core having a gap therein to define a pair of magnetic poles, said spanning member being disposed in said gap.

4. A unitary electromagnetic transducer head and coupling transformer comprising a shell-type transformer core having an inner leg with a coil thereon, a generally U-shaped metal strap around said coil with its ends in closely spaced relation, a metal member spanning the ends of said strap and electrically connected thereto, a transducer head core having a gap therein to define a pair of magnetic poles, said spanning member being disposed in said gap and secured to said transducer head core thereby to support said transducer head core on said strap.

5. A unitary electromagnetic transducer head and coupling transformer comprising a rectangular shell-type transformer core having a center leg with a coil thereon, a copper strap extending substantially entirely around said coil, the ends of said strap extending away from said coil in closely spaced substantially parallel relationship, each of said ends of said strap having a slot extending back from the outer edge thereof, a strip of good electrical conductivity seated in the slots of said ends and secured thereto, a generally C-shape transducer head core straddling said strip, the main body of said C-shape core being between said strip and said transformer core.

6. A unitary electromagnetic transducer head and coupling transformer comprising a rectangular shell-type transformer core having a center leg with a coil thereon, a copper strap extending substantially entirely around said coil, the ends of said strap extending away from said coil in closely spaced substantially parallel relationship, each of said ends of said strap having a slot extending back from the outer edge thereof, a strip of good electrical conductivity seated in the slots of said ends and secured thereto, a generally C-shape transducer head core straddling said strip, the main body of said C-shape core being between said strip and said transformer core, said C-shape core being secured to said strip and supported thereby.

7. A unitary electromagnetic transducer head and coupling transformer comprising a rectangular shell-type transformer core having a center leg with a coil thereon, a copper strap extending substantially entirely around said coil, the ends of said strap extending away from said coil in closely spaced substantially parallel relationship, each of said ends of said strap having a slot extending back from the outer edge thereof, a strip of good electrical conductivity seated in the slots of said ends and secured thereto, a generally C-shape transducer head core straddling said strip, the main body of said C-shape core being between said strip and said transformer core, the end edges of the legs of said C-shape core having a magnetic record member path-confining means thereon.

8. A combined electromagnetic transducer head and transformer comprising a transformer core, a transducer head core having a pair of closely spaced poles, a relatively high impedance winding on said transformer core, a metal strip disposed between said poles and extending out on opposite sides of said transducer head core, and a low resistance strap extending around a portion of said transformer core and secured at its opposite ends to the opposite ends respectively of said metal strip.

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