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Best et al.

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[54] **MULTICHANNEL TRANSDUCER WITH GLASS SUPPORT ELEMENTS**

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[52] **U.S. Cl.** **360/121,** 360/122

[51] **Int. Cl.** **G11b 5/27,** G11b 5/22

[58] **Field of Search** ..... 179/100.2 C, 100.2 P; 340/174.1 F, 174.1 E; 346/74 MC; 360/121, 127, 122

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[57] **ABSTRACT**

A multichannel magnetic transducer assemblage which includes a ferrite block member notched along one edge thereof to provide a series of ramp like slots extending from one face thereof to an adjacent face thereof. The area between the slots forming a series of teeth over which separate C-shaped ferrite slabs are placed to form with the mating teeth a series of active transducer gaps.

3 Claims, 4 Drawing Figures

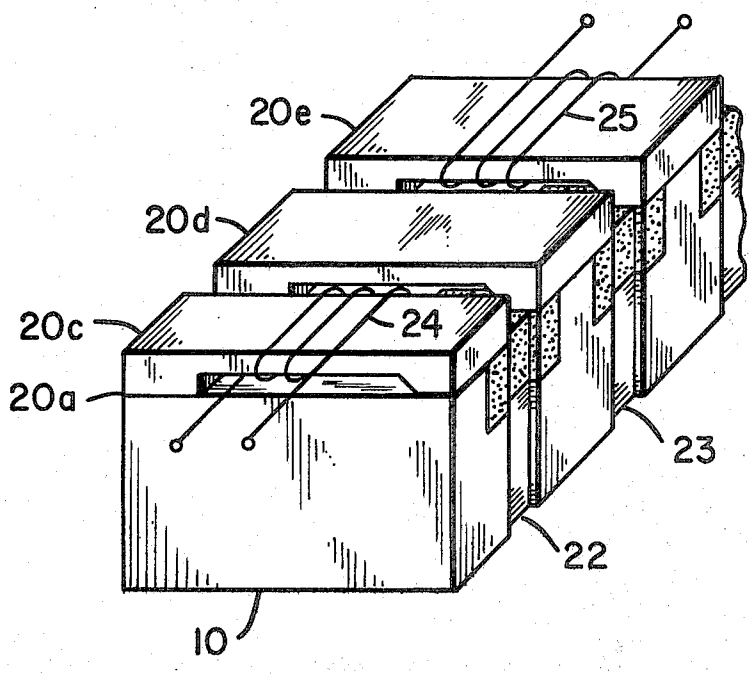
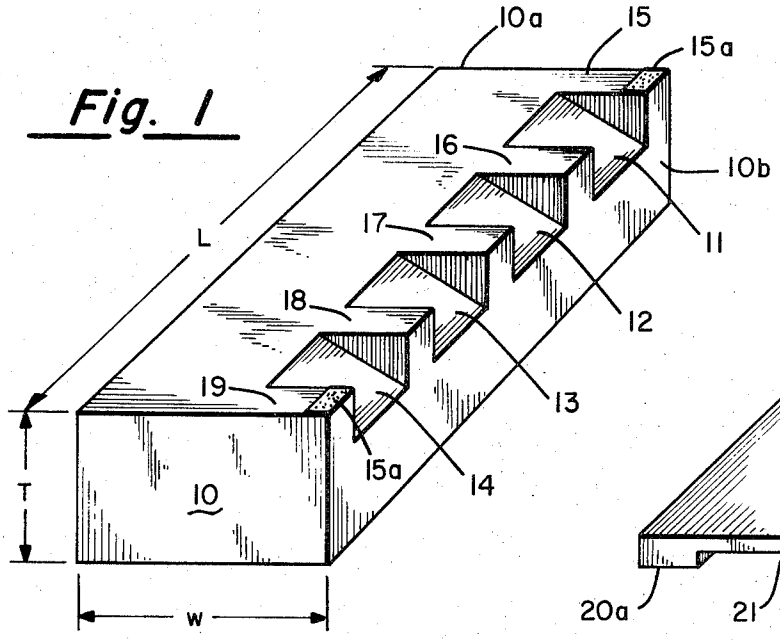


Fig. 1



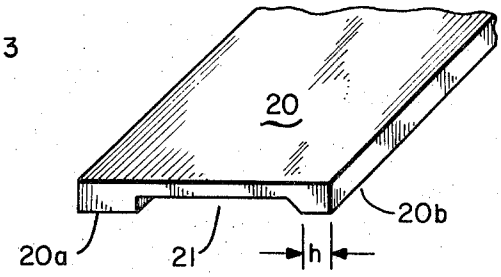
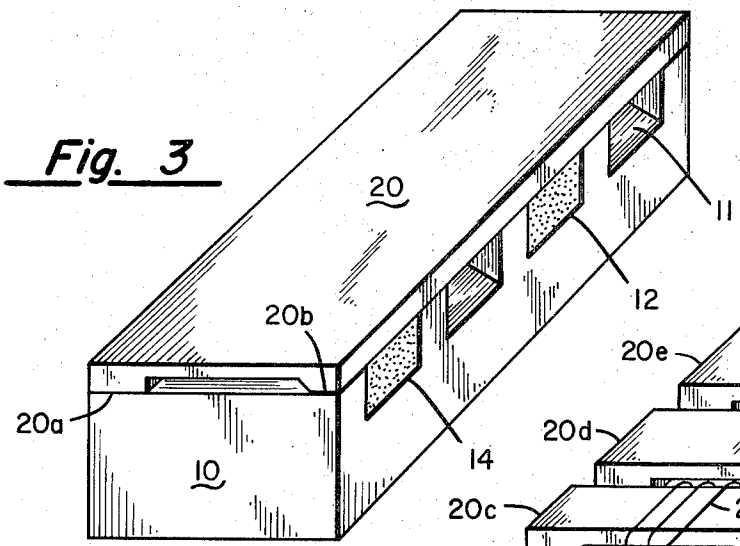


Fig. 2

Fig. 3



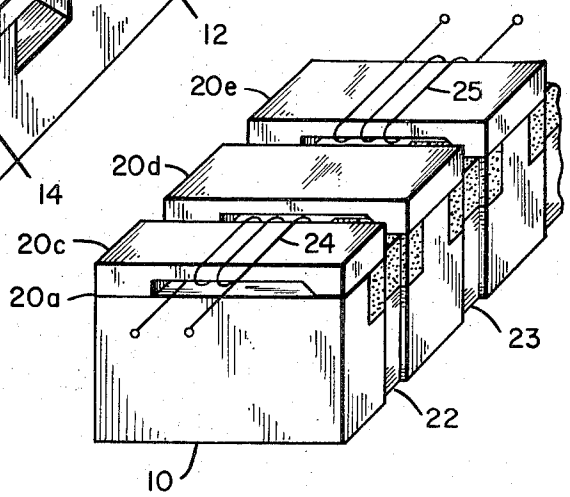


Fig. 4

MULTICHANNEL TRANSDUCER WITH GLASS SUPPORT ELEMENTS

BACKGROUND OF THE INVENTION

This invention relates to a multichannel magnetic transducer and to a method of fabricating the same.

The magnetic transducer of the present invention is particularly suited for use with magnetic discs, drums or tape units commonly employed with digital computers. In its preferred embodiment the present invention contemplates a ferrite type of transducer. Such transducers are not new per se, but the present transducer has the advantages of being simple and inexpensive to make; has a very low loss characteristic and provides a good production yield.

SUMMARY OF INVENTION

In accordance with the teaching of the present invention, a multichannel transducer is provided which comprises a first comparatively thick rectangular ferrite block machined to form a common I piece for the multichannel transducer assemblage. The block has a top face and a front face extending at right angles to one another and bounded by a common edge. A series of spaced ramp like slots are cut downwardly from the top face of the block to its front face across the common edge. The slots form a series of intermediate tooth portions which act as the individual I pole pieces for the respective transducer channels. Bonded to the top face of the first ferrite block is a mating second ferrite block which has a C-shaped cross section. The second block is cut on each side of a tooth along lines that parallel the slots to thus form a separate C-shaped slab overlying each tooth of the first block. Each of the C-shaped slabs and its mating tooth portion form an active transducer gap along the common edge of the first block. The separate C-shaped slabs are made much wider than the teeth of the I block to thus provide a large area, low loss back gap for the transducer and at the same time permit a good bonding surface between the C-shaped slab and the I piece. Likewise, the tooth portions formed by the ramp like slots are made shallow so that the remaining surfaces act as a protective support for the teeth.

An object of the present invention is to provide a multichannel transducer which is simple in design and inexpensive to fabricate.

It is another object of the invention to provide a multichannel transducer which has low loss characteristics.

It is still another object of the present invention to provide a multichannel transducer which offers a high production yield.

These and other objects of the present invention will become apparent from the following description when read in connection with the drawings, in which:

FIG. 1 is a perspective view of the I block employed by the present invention;

FIG. 2 is a perspective view of a fragmentary portion of the C piece employed by the present invention;

FIG. 3 is a perspective view showing the C and I pieces of FIGS. 1 and 2 bonded together; and

FIG. 4 is a perspective view showing a fragment of the completed multichannel transducer.

DESCRIPTION

Reference will now be made to the drawings as the description of the invention proceeds. In accordance with the teaching of the present invention, the multichannel magnetic transducer described herein comprises a unitary I piece shown at **10** in the figures. The I piece **10** is made from any suitable ferrite material which has been cut to the desired length L, width W and thickness T dimensions. In a typical embodiment where a **15** channel transducer was fabricated, the finished length L was made equal to 1.204 inches, the thickness T to 0.3 inches and the width W to 0.280 inches. After the block **10** has been machined to its desired dimensions, a series of uniformly spaced slots **11** through **14** are cut on an angle, from the top face **10***a* of the block **10** to its front face **10***b*. In the typical embodiment this angle was 15° to 20°. The slots **11** through **14** form a series of spaced teeth members **15** through **19**. Again, in the typical embodiment each slot was 0.064 inches wide and each tooth **15** through **19** was 0.008 inches wide. The height of the teeth **15** through **19** at the active typical embodiment were made equal to 0.025 inches. Each of the teeth **15** through **19** form the individual I pole piece for the respective channels of the transducer. Forming the pole pieces **15** to **19** as described offers the advantages that the pole pieces are both supported and protected by the surrounding material so that they are not readily broken during fabrication and assembly of the transducer. The slots **11** to **14** are then filled with a melted glass, as illustrated at **12** and **14** (FIG. **3**). The surface **10***a* is then lapped to remove the excess glass and to restore it to the desired degree of flatness, typically one light band or better. A suitable spacer material such as platinum or silicon monoxide may then be deposited on the end tooth portions **15** and **19** as shown at **15**a. The spacer material establishes the size of the active gap of the transducer elements.

After the I piece **10** has been prepared as described, a unitary C member is prepared. The C member shown at **20** in FIG. **2** comprises a suitable ferrite block in which a longitudinal channel **21** has been cut so as to provide the block **20** with a generally C-shaped cross section. The C member **20** has length and width dimensions corresponding to the length and width dimensions of the I piece **10**. The longitudinal channel **21** in the typical embodiment was cut to a depth of 0.045 inches and to a width of 0.220 inches leaving surfaces **20***a* and **20***b* of 0.050 inches and 0.010 inches, respectively in width. These latter surfaces are lapped to the desired degree of flatness which again may be one light band or better, and the C member **20** is then bonded along the surfaces **20***a* and **20***b* to the mating surface **10***a* of the transducer as shown in FIG. **3**. In the bonding operation a glass bond utilizing conventionally known glass bonding techniques can be employed and the glass can if desired have a lower temperature than that used to fill the slots **11** to **14**.

After the C member has been bonded to the I member the active gap end **10***b* of the assembly is machined to produce the proper gap height *h* (FIG. **2**). Also at this time a series of air spoilers as shown by grooves **22** and **23** may be machined into the I member as shown in FIG. **4**. These air spoilers are grooves cut to a depth of for example 0.015 inches and to a width of 0.047 inches, centered about the slots **11** to **15** cut in the I piece **10**. The purpose of the spoilers **22** and **23** is to provide a vent area for air trapped between the recording medium (not shown) and the face **10***b* of the transducer as the medium moves across the transducer face.

These grooves then provide a pressure relief for the entrained air so that the recording medium can be moved in close proximity to the active face **10***b* of the transducer.

Finally, after the active surface **10***b* has been machined to establish the desired gap height, the active face of the assembled transducer then can undergo a final lapping operation.

The final step in the fabrication of the multichannel transducer is the formation of the individual C members **20**c, **20***d*, **20***e* etc. as shown in FIG. **4**. These members are formed by transversely cutting the common C member midway between each of the notches **11** through **14** so as to provide a relatively wide C piece for each channel of the transducer. In a typical embodiment the C pieces were 0.040 inches wide. The C members being relatively wide provide a large surface (0.040 × 0.050 inches) at their back gap (along surface **20***a*). This large surface at the back gap provides both a good mechanical bond to the I member **10** and a large area across which the electrical losses in the transducer itself can be kept to a minimum. After the individual C pieces **20***c*, **20***d*, **20***e* etc. have been formed, suitable signal windings such as shown at **24** and **25** in FIG. **4** are wound around each of the C pieces as illustrated.

The resulting head structure can then be contoured and mounted directly in a suspension system. In the alternative, additional case work such as a slider block can be employed in the head mounting but is not required depending upon the application of the head. Also if desired the head can be initially fabricated with *n* channels and then sliced to provide an assembly having any number of channels *m* where *m* is less than *n*.

What is claimed is:

1. A multichannel magnetic transducer assemblage comprising: a unitary I piece which includes a ferrite block member having top, front, bottom and rear faces wherein the intersection between the front and top faces forms a front edge for the top face of the block and the intersection between the top and rear faces forms a rear edge for the top face of the block, a series of uniformily spaced ramp-like slots extending downwardly from a line intermediate said front and rear edges of the top face of said block to a line intermediate the front edge of said block and the bottom face of said block, said series of slots forming a series of teeth along the front edge of said block, a series of spaced C-shaped ferrite slabs bonded to the top face of said block, each of said slabs overlying a respective tooth of said series of teeth to form with said teeth a series of active transducer gaps spaced along the front edge of said block and a corresponding series of back gaps spaced along the rear edge of said block, and a melted glass material filling each of said slots to provide structural support for said teeth and the overlying C-shaped ferrite slabs.

2. The transducer assemblage of claim **1** wherein each of said ferrite slabs is wider than its mating tooth.

3. The structure of claim **1** wherein a plurality of air spoiling grooves are formed in the front face of the block extending from the bottom edge of the block toward the top face thereof between said teeth.

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