March 20, 1962 D. J. CARPENTER 3,026,379

ELECTROMAGNETIC TRANSDUCER

Filed Aug. 13, 1958

Fig. 2.

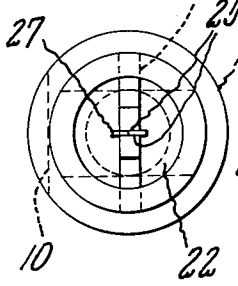


Fig. 1.

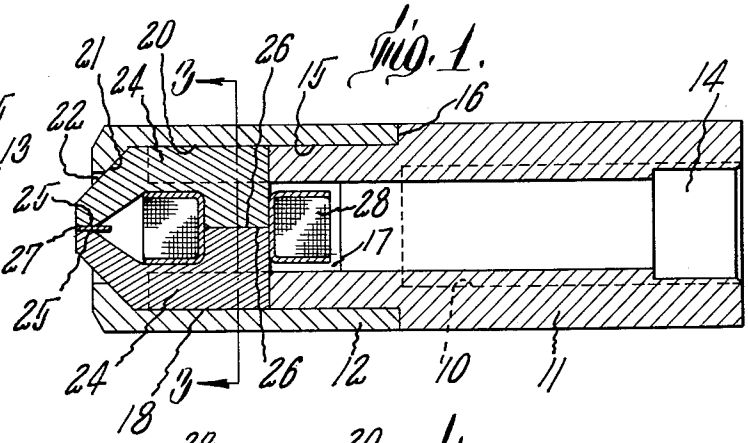


Fig. 3.

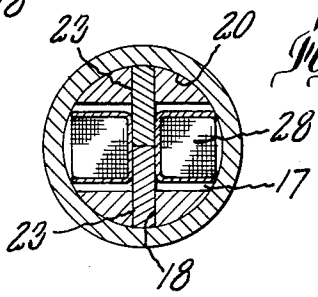


Fig. 6.

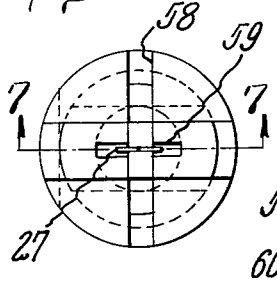


Fig. 5.

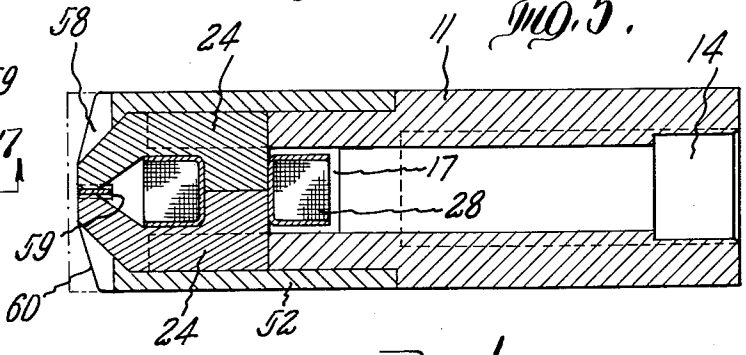


Fig. 7.

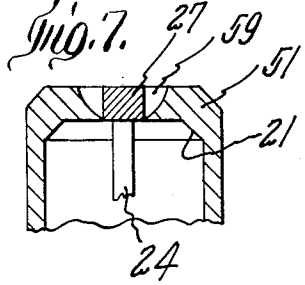
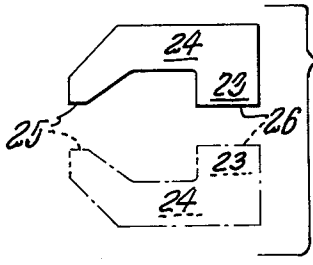


Fig. 4.



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ELECTROMAGNETIC TRANSDUCER

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7 Claims. (Cl. 179—100.2)

This invention relates to magnetic intelligence recording and reproducing devices in general, and in particular to improvements to the electromagnetic transducers or heads employed in said devices to impart the recording to the movable intelligence storage medium or to read therefrom such imparted intelligence.

The principal object of the invention is to provide an improved transducer head structure in which the transducer core is fixedly supported in a casing to achieve and retain the desirable correct alignment of the transducing gap transverse of the direction of the motion of the medium.

Another object of this invention is to provide a head which may be assembled in a unitary structure from components which are easily manufactured to provide a transducer having constant magnetic characteristics.

A further object of this invention is to provide a transducer head that can be assembled utilizing various previously manufactured coils.

Another object of this invention is to provide a head wherein the core at the pole tips may be provided with magnetic shielding.

The various features of the invention will be described in embodiments thereof with reference to accompanying drawings in which:

FIG. 1 is a side sectional view of a head of this invention.

FIG. 2 is an end view viewed from left of FIG. 1.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1.

FIG. 4 is a plan view of a magnetic core piece.

FIG. 5 is a side sectional view illustrating a variation of the invention in a different embodiment.

FIG. 6 is an end view viewed from left of FIG. 5.

FIG. 7 is a fragmental sectional view taken along line 7—7 of FIG. 6.

In FIG. 1 a body **11** and a cap **12** together constitute a casing **13** for the head components. The body **11** is generally tubular and has a central hole enlarged at one end by a counterbore **14** which is adapted to retain a lead connector or the like. The exterior of the body **11** is provided with a flattened reference surface portion **10**, for the purpose of positioning the transducer with reference to the record medium as described in the copending application Serial No. 684,278, filed September 16, 1957 by H. Taft assignor to the same assignee as the present invention, and which has now matured as Patent No. 3,001,181, issued on September 19, 1961. The end of the body **11** opposite counterbore **14** has on its exterior a reduced diameter portion **15** terminating in a shoulder **16**. The same end of the body **11** includes a recess **17** running crosswise of the body, and a keying slot **18**, disposed transversely thereto (FIG. 3). The sides of the recess and the slot are located at right angles relative to each other, and the flattened portion **10** is oriented parallel to slot **18** as viewed in FIG. 2.

The cap **12** has the same outside diameter as body **11** and also has a cylindrical bore **20** adapted to snugly fit over the reduced portion **15**. Cap **12** includes an inwardly tapering flange portion **21** which terminates in a hole **22** in the end portion thereof.

FIG. 4 illustrates a half core **24** made of suitable material, such as ferrite or the like, as is well known in the art.

Two such half cores are employed in each head and the other half core is indicated in phantom. The half core **24** is generally U-shaped having two legs connected by a web and has a thickness to snugly fit in slot **18** (FIG. 3). One leg of the core is shaped to form a pole piece with a flux gap defining face **25** and the other leg **23** terminates in a surface **26** adapted to be positioned in contact with the like surface of a complementary mating core in the completed assembly. To initially define and permanently secure the desired flux gap, a sliver shim **27** of suitable material, e.g. silver, and of proper thickness is inserted between faces **25—25** of the half cores **24**. A coil **28**, that may be previously manufactured, may be placed over the leg **23** and within the recess **17** to complete the assembly of elements.

The transducer head may be assembled by pasting the sliver **27** to the face **25** of a half core **24** and slipping the coil **28** over its leg **23**. The leg **23** of a second half core **24** is then inserted in the coil until the surfaces **26—26** are brought in intimate contact with each other and face **25** of this second half core abuts sliver **27**. This now forms a sub-assembly, being the magneto-electric operative portion of the transducer, which is inserted in the body **13** where slot **18** provides a seat for the cores **24—24** and the cavity partly formed by recess **17** affords space for the coil **28**, the leads thereof passing towards counterbore **14**. The cores may be cemented to the sidewalls of slots **18**. The cap **12** is then pushed over the reduced body portion **15**, and the tapered interior portion **21** of the cap abuts complementary tapered portions of the cores **24—24** to securely hold the sub-assembly with the cores abutting the bottom portions of slot **18**. The completed assembly may then be "potted" in a manner well known in the art, i.e. the interior is filled with a suitable thermo-setting plastic or the like in fluid form and cured.

The flattened surface **10**, according to aforesaid Patent No. 3,001,181, is for the purpose of orienting the magnetic flux gap between the pole pieces of the core transverse of the direction of movement of the track of the storage medium when the head is assembled in its support. To fully utilize the capacity of the record medium it is desirable that the recording tracks thereon be spaced as close as possible, and to inhibit cross-talk between adjacent transducers it is of utmost importance that the magnetic flux gap be exactly aligned along the recording track, particularly when two heads are applied to the same track, e.g. when using separate "write" and "read" heads spaced along the track. Further, because of aforesaid close track spacing it is desirable to magnetically shield the pole pieces. A variation of the present invention to fulfill the requirement of orientation and shielding is shown in the embodiment of FIGS. 5, 6 and 7.

In this embodiment all the elements are generally similar to those described in FIGS. 1 through 4 with the difference that a cap **52** has been substituted for cap **12**. The cap **52** differs from the cap **12** in that the inwardly tapered flange portion **21** terminates in a wall portion **51** close off the end of the cap. This wall **51** contains a slot **58** adapted to fit snugly against the pole piece tips of the half cores **24—24** and substantially surrounds these tips. In the completed assembly the slot **58** will then serve as an effective guide to orient the pole piece in desired manner, and by choosing a material for the cap which has high permeability, e.g. Mu-metal, the desired shielding effect is achieved. A second slot **59** may be provided as shown in FIGS. 6 and 7 to provide clearance for shim **27** and to facilitate the potting operation. When the assembly is completed the cap and the pole piece tips may be machined to afford a clearance of the head relative the recording medium such that only the pole piece tips and the immediate portion of the cap protrude

to the extreme. This machining may be made in the form of arcuate or slanting relief profile 69.

From the foregoing description it will be evident to those skilled in the art that various changes and modifications of structure and various combinations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An electromagnetic transducer head for coaction with a magnetic intelligence recording-reproducing device comprising; a magnetic core in two sections of generally U-shaped form, one leg of said U forming a pole piece, and the other leg of said U forming the other pole piece, said sections mounted such that the extremes of the pole piece legs face each other in spaced relationship to provide a magnetic flux shaping gap and the extremes of the other legs abut each other, a wound magnetizing coil surrounding said abutting legs, a casing body of tubular form, means defining a referencing keying slot in one end of said casing body, the keying slot cooperating with the magnetic core for orienting the core with respect to the body, and a cap fitted over the body to hold the core within said slot.

2. An electromagnetic transducer head as defined in claim 1 wherein the exterior of the body is provided with a flat locating reference surface portion extending in one direction substantially parallel to the body axis and in the other direction parallel to said slot.

3. A magnetic transducer head as defined in claim 1 wherein an open ended recess is provided in the same end as the slot said recess being positioned at right angles to the slot being adapted to receive and contain said wound magnetizing coil.

4. A magnetic transducer head as defined in claim 1 wherein the body and the cap are of the same outside diameter to form a unitary structure of general cylindrical

form providing an envelope for the core with its pole pieces in proximity of one extreme and having provisions in the other extreme to attach leads for the magnetizing coil.

5. An electromagnetic transducer head having a core in two sections each being of substantially U-shaped configuration, the end faces of the first legs of the substantially U-shaped core sections being positioned to form a magnetic flux shaping gap, and the extremes of the second legs of the substantially U-shaped core sections being in intimate contact, a magnetizing coil surrounding said second legs, a tubular casing body provided with a keying slot in one end thereof, said keying slot providing a seat for the said core and orienting the same centrally and radially with the legs forming the flux shaping gap protruding outside the extreme of the body, a partially closed end cap having a slit therein telescoped over the body in a manner that between an interior portion of its closed end and the bottom of said keying slot the core is fixed axially, said slit in the closed end surrounding the protruding legs.

6. A magnetic transducer head as defined in claim 5 wherein the core terminates flush with the outer end surface of the cap.

7. A magnetic transducer head as defined in claim 6 wherein said cap is made from material of high permeability to provide magnetic shielding for the core.

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