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Braun et al.

[11] **3,737,992**

[45] **June 12, 1973**

[54] **METHOD OF MANUFACTURING MULTIPLE TRACK, DUAL GAP MAGNETIC HEADS**

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[73] Assignee: **Magnetic Head Corporation**, Hauppauge, N.Y.

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[52] **U.S. Cl.** ..... **29/603**, 179/100.2 C

[51] **Int. Cl.** **G11b 5/42**, H01f 7/06

[58] **Field of Search** ..... 29/603; 179/100.2 C; 340/174.1 F; 346/74 MC

[56] **References Cited**

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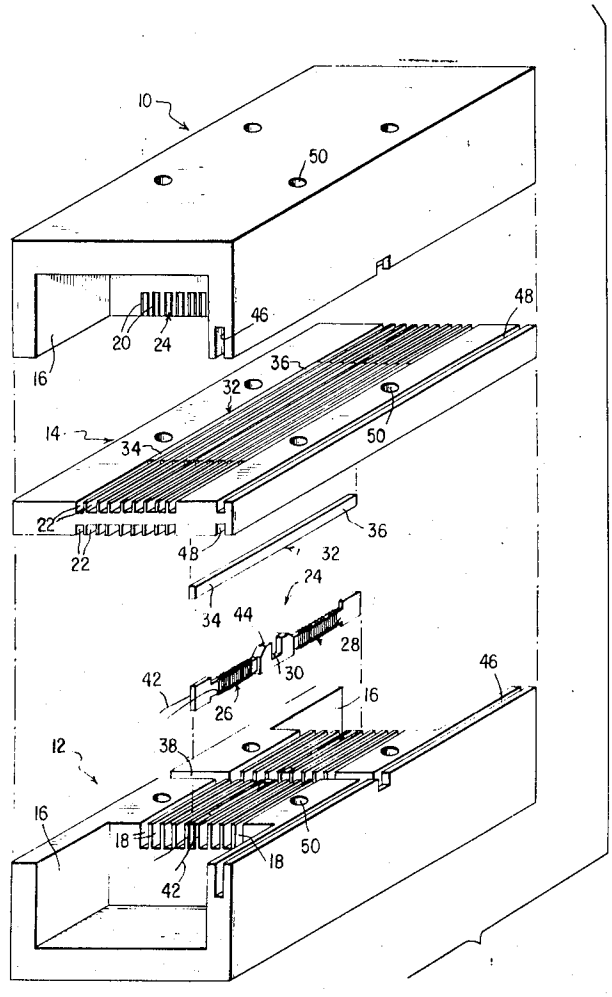
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Primary Examiner—Charles W. Lanham
Assistant Examiner—Carl E. Hall
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[57] **ABSTRACT**

Three sub-assemblies, consisting of an elongate center section having elongate, compound core members assembled with opposite sides thereof and a pair of elongate housing sections having elongate, compound core members assembled therewith, are joined with the housing assemblies sandwiching the center section assembly therebetween with an opposite end portion of each elongate core member of the center section assembly forming a magnetic circuit, including an air gap, with a corresponding end portion of an elongate core member assembled with one of the housing sections. Separation of the joined sub-assemblies substantially perpendicular to the longitudinal axes thereof at a position intermediate the opposite end portions of the elongate, compound core members results in the formation of two complete, dual gap head assemblies.

5 Claims, 3 Drawing Figures



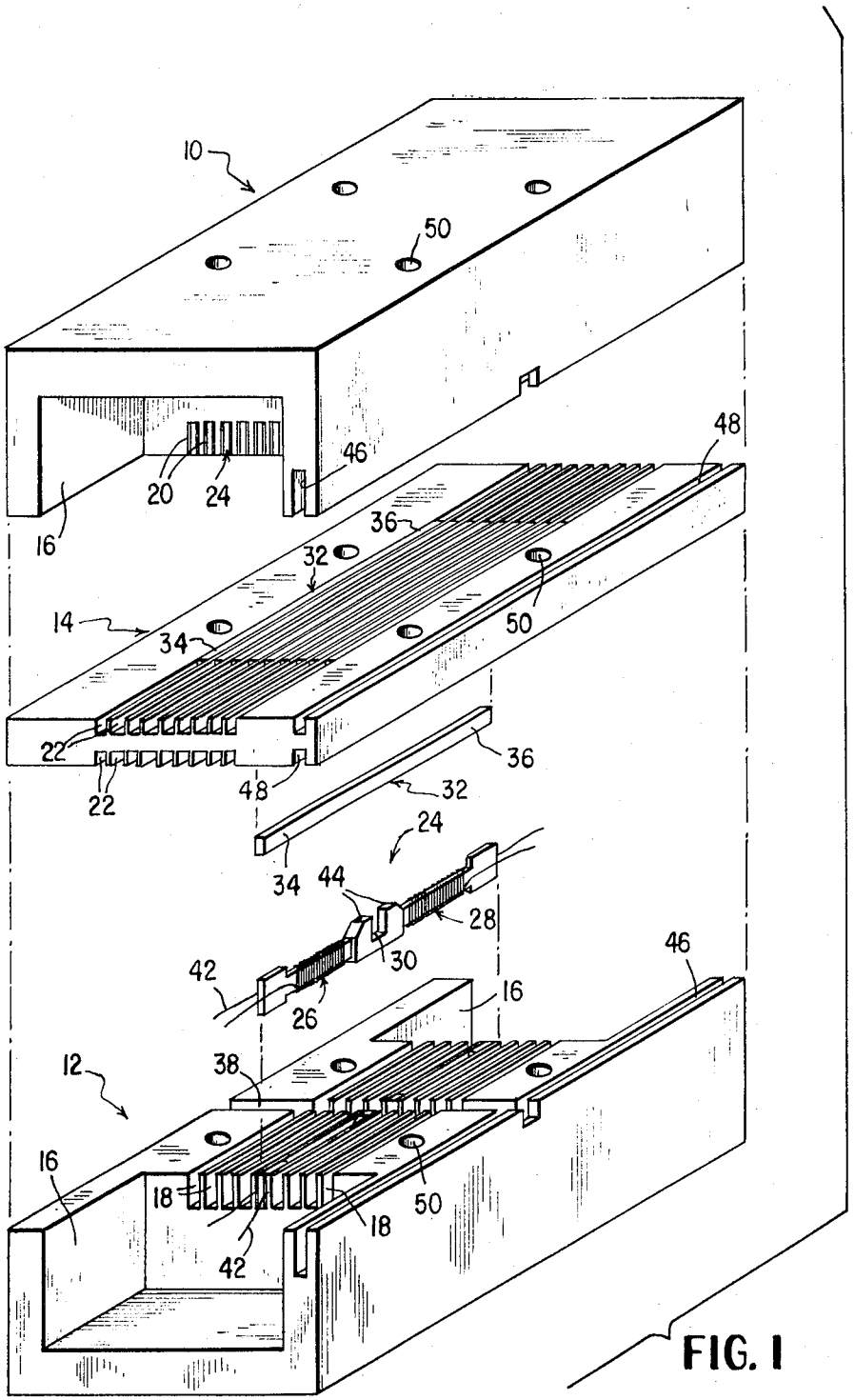

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FIG. 1

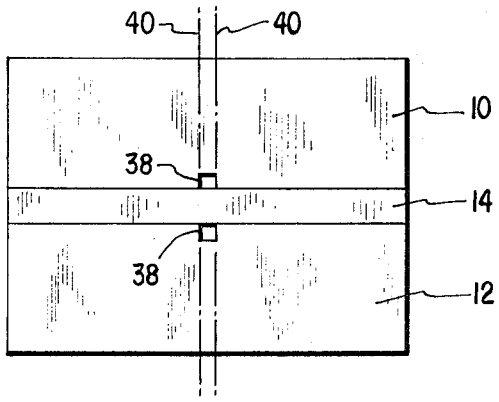
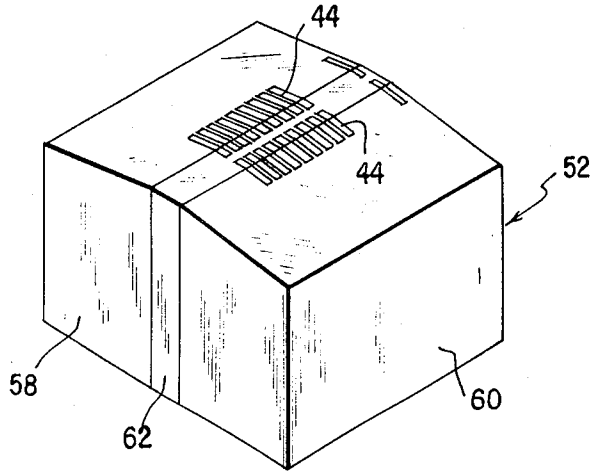
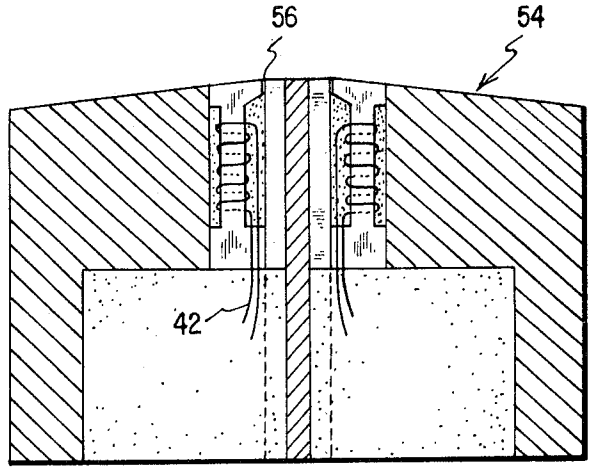


FIG. 2

FIG. 3





METHOD OF MANUFACTURING MULTIPLE TRACK, DUAL GAP MAGNETIC HEADS

BACKGROUND OF THE INVENTION

The usual method of manufacture employed in the production of a multiple track, dual gap magnetic head involves the separate formation and assembly of each of a center section and two housing sections with a plurality of core sections. The housing sections are subsequently joined to opposed sides of the center section in face-to-face engagement therewith, whereby respective core sections on opposite sides of the center sections are aligned with corresponding core sections on the housing sections to provide a plurality of magnetic circuits. Typically, the core sections assembled with the housing sections are wound with a transducing coil and are termed the active core sections while the core sections assembled with the center section simply provide a return path and are referred to as the inactive core sections. Alternatively, this arrangement may be reversed and, in many instances, both the core sections may be wound or active sections.

A substantial disadvantage inherent in the foregoing method of assembly is the necessity for the separate formation, assembly and handling of three separate components (the read and write housing sections and the center section) in the manufacture of a single, dual gap magnetic head. As is well understood by those skilled in the art, the performance standards of a dual gap head are a direct function not only of precision alignment between active and inactive core sections but, also, as between the individual magnetic circuits comprising the coacting read and write circuits associated with each of the multiple tracks. It is apparent that, in the conventional method of assembly just described, manufacturing tolerances for the completed head can be no closer than the greatest alignment tolerance that may exist between the core sections on either side of the center section and those on the two housing sections. Additionally, manufacturing costs are a direct function of the number of separate machining, assembly and handling operations required to produce the head.

A recognition of similar limitations as applicable to the manufacture of single gap magnetic heads appears in copending application Ser. No. 156,809, filed June 25, 1971, now U.S. Pat. No. 3,678,576 assigned to the assignee of the present application; wherein is disclosed a method whereby a single elongate housing may be machined in a single pass to form core receiving recesses; a plurality of compound core members are positioned in the recesses; two of the assembled housings are joined and the assembly then divided to form two single gap heads. A direct extension of this principle is not applicable to the manufacture of double gap heads since a separate center section is required and the core receiving recesses in each of the read and write housing sections are required to be of different widths. The read housing section of a typical nine track dual gap head employs active core receiving recesses having a width of 0.040 inch while the active core receiving recesses in the write housing section are 0.044 inch in width to receive correspondingly different width core members. The center section inactive core members may be of corresponding widths on opposite sides thereof or all of the center section core members may be equal to the width of the greater active core members which would

be 0.044 inch in the foregoing exemplary illustration. This differential in active core widths between the write and read sections is conventional to insure that each total recorded track (0.044 inch) will be read by the read section (0.040 inch) even though there may be some slight misalignment between the head and the recordable medium passing thereacross.

It is thus apparent that the opposed housing sections of a double gap head cannot be machined in a single pass since the required core receiving recess widths are different. Furthermore, even though one side of a center section might be machined along with one of the housing sections in a single pass, such an operation could not be performed on a single blank, as analogous to that of the aforesaid copending application, which would be subsequently divided because of the great disparity in thickness between the center section and a read/write housing section.

SUMMARY OF THE INVENTION

The invention constitutes an improvement over the conventional method of manufacturing multiple track, double gap heads in that only three component subassemblies are required to be worked or handled in the production of two complete magnetic heads as opposed to the required handling of three sub-assemblies in the conventional production of a single magnetic head.

This is achieved by the use of elongate, compound read/write housing and center section blanks, each of which can be machined from a single blank in a single pass to produce the core receiving recesses. After assembly of the compound sub-components with their compound core members, the same are joined to produce an elongate composite head assembly which is then divided substantially perpendicularly to the longitudinal axis thereof to form, from the three joined compound sub-assemblies, two complete dual gap heads.

Although none of the individual components of an individual head derived from a singly machined blank as in the aforementioned copending application; for the reasons previously given, closer manufacturing tolerances are yet achieved because whatever machining errors may be present for a given number of operations to machine a given number of read/write or center section blanks; such errors are quantitatively halved by virtue of the requirement to machine only half as many blanks.

The use of solid copper read/write housings and solid copper center sections obviates the necessity for additional machining and/or assembly operations to provide intertrack and interhead shielding for reasons more fully set out in Applicant's copending application Ser. No. 142,563 filed May 12, 1971.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective illustrating the assembly of a plurality of compound core members with read/write housing sections and a center section prior to joining of the same to provide an elongate composite head assembly destined to become two complete dual gap heads;

FIG. 2 is a schematic illustration of the division of an elongate, composite head assembly to produce two multiple track, dual gap magnetic heads; and

FIG. 3 illustrates the two multiple track, dual gap magnetic heads produced by the division of the com-

posite head assembly of FIG. 2 with one of the heads being shown in perspective and the other in section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 are illustrated elongate, compound read and write housing sections **10, 12** and center section **14** into each of which housing sections and opposite sides of the center section have been machined nine core receiving recesses and a horizontal alignment slot in a single pass. Each of the center and housing sections are symmetrical about a central plane of division constituting a perpendicular bisector of the longitudinal axes thereof with the housing section exhibiting recesses **16** at opposite ends thereof. Core receiving recesses **18** in write housing section **12** are wider than are the corresponding core receiving recesses **20** in read housing section **10.** A conventional width distinction in the case of a nine track, dual gap head is 0.044 inch and 0.040 inch, respectively. The core receiving recesses **22** on both sides of center section **14** are herein illustrated as being of equal width to the write head recesses **18** (0.044 inch). Alternatively, those center section core receiving recesses on the read head side could be 0.040 inch in width which sometimes facilitates machining operations where both one housing section and a corresponding side of the center section may be jigged together for machining in a single pass.

A plurality of elongate, compound core members **24** of appropriate width for reception in housing core receiving recesses **18, 20,** each exhibit wound or active core portions **26, 28** spaced along the length thereof by an intervening vertical alignment slot **30.** A like plurality of elongate, compound core members **32,** corresponding in length to core members **24,** comprise opposite end positions **34, 36** which will ultimately provide the inactive "I" cores to cooperate with each active "C" core **26, 28.** These inactive core portions are spaced by an integral length of core member **32** which will ultimately be removed along with that length of the core members **24** comprising the vertical alignment slots **30.** The compound core members **24** are assembled with the read/write housing sections, as indicated by the assembly lines relative to write housing **12** in FIG. **1,** and mutually aligned therein by the positionment of a vertical alignment pin (not shown) lying across the vertical alignment slots **38** formed in each housing section and engaging the vertical alignment slots **30** in the assembled compound core members **24.** Compound core members **32** are assembled with compound center section **14** as indicated by the dashed assembly lines of FIG. **1** and may be mutually aligned therein by any desired jigging. Alternatively, vertical alignment slots corresponding to those of the housing sections could be provided in those central portions of the compound center section and compound core members **32** that will ultimately be cut away, as along lines **40** in FIG. **2.**

In accordance with the particular compound core configuration illustrated herein; core member **24** has two active end portions in the form of conventional "C" cores which have been previously wound with transducing coils **42** in a conventional manner while core members **32** are depicted in that configuration to produce two inactive "I" cores following a division of the same as indicated in FIG. **2.**

Following the assembly of nine compound core members **24** with each of the read/write housing sections and nine compound core members **32** with each side of the center section; the respective core members are aligned generally in the manner indicated by the read housing assembly and the upper side of the center section in FIG. **1.**

A plurality of male connectors are interconnected with transducer coils **42** and positioned in recesses **16** prior to the usual potting operation. The conventional male connectors have been eliminated from the drawings for clarity of illustration.

Thereafter the confronting faces of the compound read/write housings and both faces of the compound center section are ground or lapped before being sandwiched together, in the manner indicated in FIG. **1,** following the positionment of a desired shim material (not shown) adjacent the pole tips **44** of each active core portion **26, 28** to define the necessary air gaps between the pole tips and those ends of the associated "I" cores with which they will be related in the composite head assembly of FIG. **2.** A horizontal alignment key is positioned between each compound housing section **10, 12,** and the compound center section in respective engagement with the horizontal alignment slot **46** in each housing section and the opposed alignment slots **48** in the center section to insure that the elongate subassemblies are perfectly aligned. It will be seen that movement of the parts shown in FIG. **1** into face-to-face engagement results in the establishment of a magnetic circuit path, including an air gap, between each "C" core portion **26, 28** and an associated "I" core portion **34, 36.** The compound center and housing sections may then be joined together in any conventional manner such as by threaded fasteners (not shown) extending through aligned openings **50** in the various subassemblies to produce the composite head assembly shown in FIG. **2.** The composite head assembly is then divided, such as by parallel saw cuts **40** as indicated in FIG. **2,** to produce the two complete multiple track, dual gap magnetic heads **52, 54** shown in FIG. **3.** The heads are then polished and otherwise finished in a conventional manner.

It will be apparent that the parallel saw cuts **40** remove those intermediate portions of compound core members **24** comprising the vertical alignment slots **30** as well as the corresponding intermediate portions of compound core member **32** resulting in the formation of the individual magnetic circuits in the finished head which include the air gap **56.**

Each of the finished heads include identical read and write housing sections **58, 60** and identical center sections **62.**

We claim

1. A method of manufacturing multiple track, dual gap magnetic heads, comprising; providing first and second pluralities of elongate, magnetic core members, each having core portions spaced along the longitudinal axes thereof; providing a winding on each of said spaced core portions; providing third and fourth pluralities of elongate, magnetic core members, each, having core portions spaced along the longitudinal axes thereof; assembling a like number of said first and second plurality of core members with first and second elongate housings, respectively; assembling a like number of said third and fourth plurality of core members with opposite sides, respectively, of an elongate center

section; joining the housing assemblies in face-to-face engagement with said opposite sides of said center section with each of the spaced core portions of each housing assembly defining individual magnetic circuits, including transducing gaps, with spaced core portions of the center section assembly; and dividing the joined housing and center section assemblies at a position intermediate the spaced core portions of the assembled core members to produce two dual gap magnetic heads.

2. A method of manufacturing multiple track, dual gap magnetic heads, comprising; providing first and second pluralities of elongate, magnetic core members, each having core portions spaced along the longitudinal axes thereof; providing third and fourth pluralities of elongate, magnetic core members, each, having core portions spaced along the longitudinal axes thereof; assembling a like number of said first and second pluralities of core members with first and second elongate housings, respectively; assembling a like number of said third and fourth pluralities of core members with opposite sides, respectively, of an elongate center section; joining the housing assemblies in face-to-face engagement with said opposite sides of said center section whereby each of the spaced core portions of each housing assembly defines an individual magnetic circuit, including a transducing gap, with a spaced core portion of the center section assembly; and dividing the joined housing and center section assemblies at a position intermediate the spaced core portions of the assembled core members to produce two dual gap magnetic heads.

3. The method of claim **2** including the prior step of machining core member receiving recesses in opposite sides of said elongate center section and in each of said elongate housings.

4. The method of claim **3** including the step of machining greater width core member receiving recesses in one of said housing than in the other.

5. The method of claim **4** wherein the core member receiving recesses in each said elongate housing is machined in a single pass.

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