

"Magnetic head and method of manufacturing a magnetic head".

The invention relates to a multitrack magnetic head having a first magnet core which comprises first and second core parts which define a first transducing gap and having a second magnet core which is arranged adjacent to the first magnet core and which comprises third and fourth core parts which define a second transducing gap, the first and the third core parts being supported by a first metal core support, and the second and fourth core parts being supported by a second metal core support, the first and second core supports being rigidly connected together a metal screening plate being present between the first and the second magnet cores.

Such a magnetic head is shown in German Offenlegungsschrift 1,902,103. In the magnetic head construction described in said Offenlegungsschrift the screening plate is spot-welded to the core supports on each side of the tape contact face of the magnetic head. The core supports each consist of a box half having four upright sides which engage each other with the edges of their upright sides to form a closed box. A disadvantage of this construction is that it is difficult to keep the length of the transducing gap accurately at the desired small value when connecting the box halves together and during the welding of the screening plate to the box halves. Moreover, special measures need to be taken to ensure that the welding spots do not disturb the tape contact face.

Another more general problem is that the previously known magnetic head designs, including the above-mentioned one, are not very suitable for automatic assembly.

It is an object of the invention to provide magnetic head construction which is suitable for automatic assembly. The invention provides a multitrack magnetic head as described in the opening paragraph characterized in

that the first and second core supports each comprise a substantially flat base plate on which the respective core parts are rigidly secured and that the base plates are welded to two opposite edges of the screening plate.

5 The magnetic head construction according to the invention avoids the welding spots on the side of the head carrying the tape contact face in that a wide screening plate is used and the core supports are welded to opposite edges of the screening plate, the opposite edges
10 being welded to faces of the head other than the tape contact face. Moreover, the use of flat base plates in combination with a screening plate which engages the base plates during welding enables the dimensions of the screening plate to get the transducing gap. Use may be
15 made of a resilient lug which extends inwardly from the plane of one of the base plates and against which the screening plate engages to fix the gap length. This enables automation of the assembly.

20 To enable the production of an accurately defined engagement of the screening plate against the base plates, the screening plate may be welded to the base plates via engaging surfaces. These surfaces may be formed, for example, at the screening plate by providing recesses at the edges thereof.

25 Laser welding, electron beam welding or plasma welding may be used. The advantage of these welding processes in connecting head components together is that no mechanical load, such as occurs by applying the electrodes in spot welding, is produced and thus the danger of the
30 components moving relative to each other is reduced. Using these welding technique sufficient energy can be applied so that sufficient material is melted and welded together in a short time without harmful heating of the magnetic head components.

35 The use of core supports which essentially consist of flat base plates, to which flat plates the (soft magnetic) screening plate is welded (this latter can be done particularly readily when the base plates are of Cr-Ni

steel), enables the core parts to be welded to the base plates at a previous stage of the manufacturing process. The accurate positioning of the core parts (track location) with the gap faces in one plane may be achieved
5 by the use of a welding jig which can be aligned on a reference plane provided on the base plates so that the accuracy is no longer dependent on the tolerance spreads in the dimensions of the components to be combined. (In the known magnetic head constructions the core parts are
10 usually assembled in slots in the box halves and after assembly fixed by an adhesive). The magnetic head construction according to the invention provides an important step towards enabling complete mechanisation of the assembly process.

15 The mechanisation of the assembly process is further promoted when the core parts are composed of laminations which are welded together. Moreover, the occurrence of glue residues which might influence the accuracy of the track location and/or the track width
20 is avoided.

The assembled core supports which are welded together, magnet cores and screening plate may be mounted in a metal housing which has an aperture through which the ends of the core parts which define the transducing
25 gaps project. For a good electric contact of the screening plate with the housing (which after assembly in an apparatus is connected to earth) the screening plate may have a lug which projects beyond the core supports. The assembly of core supports, magnet cores and screening
30 plate may be embedded in a moulding composition within the housing.

One of the core supports may project beyond the housing on the side opposite to the aperture. The part of the core support projecting beyond the housing may then
35 comprise previously provided references, in particular a plane which lies in one plane with the transducing gaps (azimuth reference), a line which is parallel to the lower side of the transmission gaps (gap height reference), and a

plane which is used in aligning the jig prior to connecting the core parts (track location reference). It is particularly useful if, after the head components have been moulded in the housing, an external gap height reference is available upon grinding the tape contact face and an external azimuth reference is available upon assembling the head in an apparatus. This latter provides the possibility of assembling the head against a fixed azimuth reference plane of the apparatus so that azimuth adjustment need not take place.

The invention also relates to a method of manufacturing a multitrack magnetic head characterized in that a first set of core parts is positioned on a first base plate by means of a jig and is then welded to the first base plate, that a second set of core parts is positioned on a second base plate by means of a jig and is then welded to the second base plate, that the base plates with the core parts facing each other are placed opposite to each other, that a screening plate is placed between and transversely to the surfaces of the base plates, that the base plates are pressed against opposite edges of the screening plate against the pressure of a resilient lug which forms part of one of the base plates and engages one of the edges of the screening plate, and that the base plates are welded to the screening plate while exerting said pressure.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows a known multitrack magnetic head construction,

Figure 2 shows a core part which is suitable for use in the magnetic head according to the invention and which consists of laminations which are welded together,

Figure 3 shows a first base plate on which two core parts of the type of Figure 2 are secured,

Figure 4 shows a second base plate on which two further core parts of the Figure 2 type are connected,

Figure 5 shows a screening plate which also

serves to connect the base plates of Figures 3 and 4 together,

Figures, 6, 7 and 8 are a left-side elevation, a front elevation and a right-side elevation, respectively, of an assembly of base plates, screening plate and core parts for a magnetic head according to the invention, and

Figures 9 and 10 are cross-sectional views through a housing in which the assembly shown in Figures 6, 7 and 8 is provided.

Figure 1 shows a known magnetic head construction in which magnet cores 2 with transmission gaps 3 are embedded in a bipartite box 1. The box halves are connected together by welding a screening plate 4 of metallic soft magnetic material placed between the magnet cores 2 to the front of the box 1 at the points 6 and 7 (and if desired to the rear at the points 8 and 9). It is clearly visible that welds are present in the front face 5 of the construction.

The embodiment of the invention described herein-after provides an improved head construction which is based on the use of flat base plates as core supports instead of box halves and on welding the screening plate thereto at its edges. In order to improve the mechanisation of the assembly process it is advantageous to construct the core parts from separate laminations welded together by means of laser welding. When the core parts are welded to the respective base plates.

Figure 2 shows such a core part 12 which is built up from four laminations 13 by means of laser welding at the points A, B and C. The welding depth is at most 0.1 mm so that the properties of the material of the laminations is influenced as little as possible.

The laminations 13 are provided with abutments 14 with which they can be welded to a base plate in a defined position and orientation. Figure 3 shows a first base plate 16 on which two core parts 17 and 18 of the type shown in Figure 2 have been welded after having been accurately positioned by means of a jig. The laminations

comprise extra studs 15 on their upper side to enable the core parts 17 and 18 to be welded together at the point D so as to improve the stability in the subsequent grinding process of the gap faces 20, 20' and 21, 21'. The

5 base plate 16 comprises upright side edges 22, 23 terminating into bosses 24, 25 which are also ground during the grinding process of the gap faces so that they become located in one plane with the gap faces and may serve as reference faces. Along the lower side of the gap faces 20, 20' material is ground away parallel to the line 26
10 joining the reference faces 24, 25 so that inclined surfaces are formed as denoted by 27 in Figure 2. The lower side of the gap faces 20, 20' denoted by the line 28 hence becomes located at a fixed distance from and parallel to
15 the reference line 26.

Figures 4 and 8 show a base plate 19 which comprises a punched lug 32 which is forced inwardly in the direction of the core parts 30 and 31.

Figure 5 shows a screening plate 35 of a soft
20 magnetic material (for example a nickel iron alloy) which is welded to base plate 16 via abutting surfaces 36, 37 (Figure 6) and is welded to base plate 19 and lug 32, respectively, via stud 38 and face 39 (Figure 8). Upon welding, the base plates are forced towards each other
25 against the spring action of lug 32. Prior to combining the base plates, non-magnetic spacers in the form of thin layers are first deposited on the gap faces 20, 20' (and possibly also 33, 33') and cores 40, 41 have been slid on the core parts. Figure 7 shows the situation during the
30 pressing together.

Figure 9 is a cross-sectional view taken along the gap faces through the assembly of Figure 7 after it has been moulded in a soft magnetic housing 42 by means of a synthetic resin. The ends of the core parts and of the
35 screening plate project through an aperture 43.

Tape contact face 44 has been ground to a desired gap depth. The line (26) serves as a reference. In order to be able to provide the screening plate readily

between the core parts up to the tape contact face and nevertheless to obtain a good screening effect, the part of the screening plate which projects beyond the base plates is thinner than the part therewithin. Furthermore
5 the screening plate has a projecting lug 45 to ensure electric contact with the housing.

Figure 9 is partly an elevation and partly a cross-sectional view at right angles to the gap faces of the Figure 7 assembly provided in housing 42.

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CLAIMS

1. A multitrack magnetic head having a first magnet core which comprises first and second core parts which define a first transducing gap and having a second magnet core which is arranged adjacent to the first magnet core and which comprises third and fourth core parts which define a second transducing gap, the first and third core parts being supported by a first metal core support, the second and fourth core parts being supported by a second metal core support, the first and second core supports being rigidly secured together, a metal screening plate being present between the first and the second magnet core, characterized in that the first and second core supports each comprise a substantially flat base plate on which the respective core parts are rigidly provided and that the base plates are welded to opposite edges of the screening plate.

2. A multitrack magnetic head as claimed in Claim 1, characterized in that the screening plate is welded to the base plates via abutting surfaces.

3. A multitrack magnetic head as claimed in Claim 1, characterized in that the screening plate on one edge engages the base plate of the first core support and on the opposite edge engages a resilient lug projecting from the plane of the base plate of the second core support.

4. A multitrack magnetic head as claimed in Claim 3, characterized in that the screening plate is welded to the resilient lug.

5. A multitrack magnetic head as claimed in Claim 1, characterized in that the screening plate and the core parts project beyond the base plate and that their longitudinal axes intersect each other at a single point outside the base plates.

6. A multitrack magnetic head as claimed in Claim 5, characterized in that the part of the screening plate which



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projects beyond the base plates is thinner than the part between the base plates.

7. A multitrack magnetic head as claimed in Claim 1, characterized in that the assembly of core supports, magnet
5 cores and screening plate is mounted in a metal housing which has an aperture through which the ends of the core parts which define the transducing gaps project, that the screening plate comprises a lug which projects beyond the core supports and which makes electric contact with the
10 housing, and that the assembly of core supports magnet cases and screening plate is embedded in a moulding composition within the housing.

8. A multitrack magnetic head as claimed in Claim 1, characterized in that the core holders are of Cr-Ni steel.

15 9. A multitrack magnetic head as claimed in Claim 7, characterized in that at least one of the core supports projects beyond the housing on the side situated opposite to the aperture.

10. A multitrack magnetic head as claimed in Claim 8,
20 characterized in that the part of the core support projecting beyond the housing comprises a reference face which is situated in the plane of the transducing gaps.

11. A multitrack magnetic head as claimed in Claim 8,
25 characterized in that a reference line joining the core support parts projecting beyond the housing is parallel to the lower side of the transducing gaps.

12. A multitrack magnetic head as claimed in Claim 8,
30 characterized in that the core support part projecting beyond the housing comprises a reference face with track location information.

13. A method of manufacturing a multitrack magnetic head as claimed in Claim 1, characterized in that a first set of core parts is positioned on a first base plate by means of a jig and is then welded to the first base plate,
35 that a second set of core parts is positioned on a second base plate by means of a jig and is then welded to the second base plate, that the base plates with the core parts facing each other are placed opposite to each other, that



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a screening plate is placed between and transversely to the surfaces of the base plates, that the base plates are pressed against opposite edges of the screening plate against the pressure of a resilient lug which forms part of one of the base plates and engages the one of the edges of the screening plate, and that the base plates are welded to the screening plate while exerting said pressure.

14. A multitrack magnetic head substantially as described herein with reference to the accompanying drawings.

15. A method of manufacturing a multitrack magnetic head substantially as described herein with reference to the accompanying drawings.