

SPECIFICATION

Magnetic-head assembly for an apparatus for recording and/or playing back signals on a magnetic tape

- 5 The invention relates to a magnetic-head assembly for an apparatus for recording and/or playing back signals on a magnetic tape. The invention relates particularly to a magnetic-head assembly for an apparatus of the kind (hereinafter referred to as "the kind described") having a
- 10 magnetic-head assembly which is mounted on a head plate and which comprises a magnetic head attached to a magnetic-head support, the assembly being supported on the head plate by a
- 15 first supporting member which is fixed to the head plate and on which the magnetic-head assembly is pivotable, and a second supporting member which is adjustably attached to the head plate for
- 20 adjusting the azimuth angle of the magnetic head by pivoting the magnetic-head assembly on the first supporting member, and the assembly further comprising a plate member to which the magnetic head is attached and which comprises projecting limbs which constitute a tape guide for guiding the
- 25 edges of the magnetic tape.

The present invention is very suitable for use on an apparatus as described and claimed in the specification of the Applicants' co-pending patent application no. 8004897 (Serial No. 2 041 626).

- 30 In a prior apparatus of the above kind which is known from United States Patent Specification 3,649,773, the plate member comprising the tape guide is spaced from the head plate via the magnetic-head support by means of a fixed
- 35 supporting member which takes the form of a cylindrical sleeve. In order to minimize the influence of the adjustable supporting member, constituted by a set screw, on this spacing, the plate member is disposed near the fixed
- 40 supporting member.

- The plate member, which constitutes an integral unit with the magnetic-head support, is bent at right angles to the fixed supporting member. The distance from the tape guide to a
- 45 reference plane formed by the head plate surface which faces the magnetic head is subject to certain tolerances as a result of this bending operation. These tolerances, which further increase owing to the tolerances in respect of the
- 50 axial dimension of the cylindrical sleeve, generally result in the tape guide being positioned at a deviating distance from the reference plane in comparison with other tape guides. As the tape guide of another magnetic head (such as the erase
- 55 head) is also subject to such a tolerance, the difference in distance as a result of these tolerances may be doubled. However, as in an apparatus of the above type it is essential for a correct tape motion that in particular the tape
- 60 guides of the magnetic heads are positioned equidistantly from the reference plane with the greatest accuracy, the desired accuracy is attainable only by eliminating the obtaining tolerances with the aid of expensive, difficult-to-

- 65 operate and time-consuming adjusting means.

- According to the invention there is provided a magnetic-head assembly for an apparatus of the kind described for recording and/or playing back signals on a magnetic tape, the assembly
- 70 comprising a magnetic head attached to a magnetic-head support and to a flat plate member which comprises projecting limbs constituting a tape guide for guiding the edges of the magnetic tape, wherein the flat plate member further
- 75 comprises a part having an edge which extends in a plane containing the projecting limbs and which, when the magnetic-head assembly is mounted on the head plate of the apparatus, pivotally engages a surface of the first supporting member on the
- 80 head plate to define a pivotal axis for the azimuth-angle adjustment of the magnetic-head assembly, the magnetic-head support having a part which is constructed for cooperation with the second supporting member on the head plate.

- 85 With this construction, when the magnetic-head assembly is mounted on the head plate, the distance from the tape guide to the reference plane formed by the surface of the head plate is defined partly by the flat plate member and partly
- 90 by the fixed first supporting member on the head plate. The flat plate member can be formed simply and very accurately by a blanking operation; the first supporting member on the head plate, also, can be formed very accurately, as described in the
- 95 specification of our aforesaid co-pending Patent Application No. 8004897, for example. Thus, there is no need for any adjustment of the tape guide relative to the head plate after the magnetic-head assembly has been mounted on
- 100 the head plate.

- Preferably, said edge of said part of the flat plate member extends perpendicularly to a plane which is tangential to the curved contact face of the magnetic head at the air gap in this face. The
- 105 contact face of the magnetic head is the face with which the magnetic tape cooperates.

- In one embodiment of the invention said part of the flat plate member comprises a tongue which extends in said plane containing the projecting
- 110 limbs and which has an edge arranged for defining said pivotal axis.

- In another embodiment said part of the flat plate member comprises two tongues which extend in said plane containing the projecting
- 115 limbs and which at their distal ends have aligned edges arranged for defining said pivotal axis.

- The flat plate member and the magnetic-head support may be constructed as an integral unit, and a resilient element may be connected to this
- 120 unit and be constructed for cooperation with a member on the head plate of the apparatus so as to urge the magnetic-head assembly about said pivotal axis when the assembly is mounted on the head plate.

- 125 The resilient element may consist of a leaf spring which is connected at one end to the magnetic-head support and from that end extends between the two tongues for cooperation with said member on the head plate of the apparatus.

Embodiments of the invention will now be described in more detail with reference to the accompanying drawings, in which

Figure 1 is a plan view of an apparatus having a magnetic-head assembly according to a first embodiment of the invention,

Figure 2 is an elevation of this magnetic-head assembly, looking in the direction of the arrow II in Fig. 1 and showing part of the head plate of the apparatus,

Figure 3 shows a part of Fig. 2 on an enlarged scale,

Figure 4 is an exploded perspective view of the parts shown in Fig. 2,

Figure 5 is a view similar to Fig. 2 of a magnetic-head assembly according to a second embodiment of the invention,

Figure 6 is a view similar to Fig. 2 of a magnetic-head assembly according to a third embodiment of the invention, and

Figure 7 is an exploded perspective view of the parts shown in Figure 6.

The apparatus 1 shown in Fig. 1 is for recording and/or playing back signals on a magnetic tape 2 which is wound around two winding hubs in a generally rectangular cassette 3 and which between the winding hubs is guided along one of the longer sides of the cassette, which side is referred to herein as the "front" of the cassette.

The apparatus comprises a chassis having a deck plate 4, whose upper surface constitutes a supporting surface for the cassette 3. When the cassette is placed on the supporting surface the winding hubs engage with winding mandrels 5 and 6 of the apparatus, which can be coupled to a drive situated underneath the deck plate 4.

The apparatus further comprises a movable head plate 7 near the front of the cassette, which plate carries the magnetic heads of the apparatus, comprising an erase head 8 and a combined recording/playback head 9. At the front the cassette comprises a wall in which is formed a number of openings which, by shifting the head plate 7 in the direction of the cassette, enable the magnetic heads 8 and 9 to be brought into operative contact with the magnetic tape and the magnetic tape to be pressed against a capstan 11 by a pressure roller 10, which capstan can be coupled to the drive system and extends perpendicularly to the head plate 7.

As is shown in Figs. 2 to 4, a number of supporting members is provided on the head plate 7 for positioning the two magnetic heads relative to the head plate 7. These include fixed supporting members 12, 13, 19 and 20 which are rigidly attached to the head plate 7. If the supporting member and the head plate are both made of a plastics material the supporting members can be moulded integrally with the plate. In the case of a metal head plate the fixed supporting members are formed on the plate preferably by the process known as "outsert moulding". This involves first forming holes in the plate at the places where the supporting members are to be located and then forming these members *in situ* on the plate from a

plastics material by injection moulding. The supporting members are thus rigidly secured in the holes in the plate. Owing to this precision manufacturing technique each of the various fixed supporting members is formed very accurately in respect of the distance (distance *a* for the supporting member 20, for example) of its supporting surface from a reference plane 7A which is constituted by the surface of the head plate 7 facing the magnetic heads (Fig. 3), and the mutual differences in the distances of the supporting surfaces of the supporting members from the reference plane 7A are minimal. The erase head 8, on which in the present embodiment a tape guide 8A is mounted in an accurate manner during manufacture of the head, is directly mounted on two fixed supporting members 12 and 13. The recording/playback head 9 is attached to a magnetic-head support 14, which on the side nearer the erase head 8 bears against an adjustable supporting member constituted by a set screw 15, and on the side nearer the pressure roller 10 is supported by two fixed supporting members 19 and 20 via a flat plate member 16 which forms an integral unit with the head support and which comprises two tongues 17 and 18 which extend towards the head plate 7. For receiving the tongues 17 and 18 the supporting members 19 and 20 are formed with slot-like recesses 21 and 22 respectively of substantially V-shaped cross-section. These recesses extend with their longitudinal axes perpendicular to a plane which is tangential to the curved contact face 9a of the magnetic head 9 at the air gap (not shown) in this face. The recesses 21 and 22 are disposed longitudinally in line with each other, and at their outer ends, i.e., the ends which are remote from each other, they are closed for holding the tongues 17 and 18 in the longitudinal direction of the recesses. At their distal ends the tongues 17 and 18 have edges which extend perpendicularly to the aforesaid tangential plane and which pivotally engage the bottoms of the recesses 21 and 22 respectively to form knife-edge bearings, about which the magnetic-head assembly comprising the magnetic head 9, the magnetic-head support 14 and the flat plate member 16, is pivotable by turning the set screw 15, to adjust the azimuth angle of the magnetic head 9. The edges of the tongues 17 and 18 thus define a pivotal axis for the azimuth-angle adjustment of the magnetic-head assembly 9, 14, 16.

The unit comprising the magnetic-head support 14 and the plate member 16 is preferably manufactured from a thin sheet material. The plate member 16 and the support 14 comprise upstanding wall portions 23 and 24, respectively, between which the magnetic head 9 has an interference fit. The head is secured to the wall portions 23 and 24 by bolts 25. Instead of bolts it is equally possible to secure the magnetic head 9 to the wall portions by means of spot-welding or adhesive.

The wall portions 23 and 24 extend at right

angles to a base portion 26 of the magnetic-head support. The flat plate member 16, in addition to the wall portion 23 and the tongues 17 and 18, comprises a tape guide 27 in the form of two projecting limbs 28 and 29 which extend in the direction of the cassette 3 for guiding the upper and the lower edges respectively of the magnetic tape. Thus, viewed in the elevation of Fig. 2, the limbs 28 and 29 are situated straight above the tongues 17 and 18, in the same plane as the tongues. By blanking the plate member 15 with the tongues 17 and 18 and the limbs 28 and 29 out of one piece of flat sheet material, the distances *b* and *c* of the tape-guiding edges of the limbs 29 and 28 respectively from a plane containing the aforesaid edges of the tongues 17 and 18 and extending perpendicularly to the plate member 16, may be defined very accurately in a blanking die; a tolerance of ± 0.015 mm is found to be feasible.

The base portion 26 of the magnetic-head support 14 extends from the plate member 16 beyond the wall portion 24, and in the part which lies beyond this wall portion the base portion is formed with a bore through which the set screw 15 extends to screw into a screw-threaded hold 43 in the plate 7. The base portion 26 is urged against a head 30 of the screw 15 by a leaf spring which is integral with the support 14 and which within a triangle formed by lines connecting the supporting members 15, 19 and 20, adjoins the base portion 26.

The spring 31 extends from the base portion 26 through the space between the supporting members 19 and 20 towards the head plate 7, and its end portion which is remote from the base portion 26 engages beneath the head of a stud 32 fixed on the head plate 7, so that the spring tends to pivot the magnetic-head assembly 9, 14, 16 about the knife-edge bearings in the direction of the arrow A in Fig. 2. With this arrangement of the spring the magnetic-head assembly is urged against the various supports with an accurately defined spring force.

The magnetic-head assembly 9, 14, 16 can be mounted on the head plate 7 in a simple yet accurate manner. First, the assembly is positioned with the tongues 17 and 18 engaging in the recesses 21 and 22 and the spring 31 engaging beneath the head of the stud 32. The screw 15 is inserted in the hole 43 in the plate 7 and is then tightened, so that the base portion 26 is pressed against the head 30 of the screw 15 under the influence of the spring 31, and finally the azimuth angle of the magnetic head is adjusted by means of the screw 15. When the recording-head assembly 9, 14, 16 and the erase head 8 have been mounted the arrangement of the tape guides and of the magnetic heads ensures that any deviations in the distances of the tape guides 8A and 27 from the reference plane 7A are minimal and that the respective tape-guiding edges of the tape guides 8A and 27 will so guide the tape past the magnetic heads that in this region the longitudinal axis of the tape extends

perpendicularly to the capstan 11. As the recesses 21 and 22 are closed at their outer ends, the tongues 17 and 18 and the magnetic head 9 are not only positioned accurately in respect of their distances from the reference plane 7A but also in respect of their distances from the front wall of the cassette 3 in which the openings are formed and from the magnetic tape contained in the cassette, without the risk of this alignment being disturbed by forces exerted by the tape. Moreover, by thus minimizing the tolerances obtaining, the penetration depth of the magnetic-head into the cassette 3 when the head plate 7 is moved is accurately defined. By means of the set screw 15 the azimuth angle of the magnetic head 9 can be adjusted very precisely, the magnetic-head assembly 9, 14, 16 pivoting very accurately about the axis defined by the distal-end edges of the tongues 17 and 18, considering the normally very small angular movements involved in azimuth adjustments, without thereby affecting the position of the tape guide 27 relative to the reference plane 7A. Thus, the use of the flat plate member 16, which is easy to manufacture, renders adjustment of the tape guide 27 unnecessary, so that an accurate guidance of the magnetic tape past the magnetic-head 9 is obtained in an economically very attractive manner.

In the second embodiment, shown in Figure 5, a separate leaf spring 34 is used instead of the integral spring 32. This spring 34 is clamped underneath a screw 35 at the end which is remote from the base portion 26 of the magnetic-head support 14. As the spring 34 tends to pivot the magnetic-head assembly 9, 14, 16 in the direction indicated by arrow B, the adjustable supporting member is constituted by a nut 36 on the screw 15. The same positioning accuracy can be obtained with this construction as with the first embodiment, the spring 34 being adaptable as required.

In the third embodiment, shown in Figures 6 and 7, the flat plate member 16 is a separate part from the magnetic-head support 14 comprises a single broad tongue 37 which engages in one long slot-like recess 38 of substantially V-shaped cross-section in a single fixed supporting member 39. The magnetic-head support 14 comprises a base portion 40 which is disposed adjacent the magnetic head 9, and a wall portion 41 to which the magnetic head is attached by a bolt 25. A tension spring 42 connected at one end to a lug on the plate member 16 and at the other end to a lug on the head plate 7 tends to pivot the magnetic-head assembly 9, 14, 16 in the direction indicated by the arrow A. The use of a separate plate member 16 provides a high degree of flexibility, for example, in respect of mounting the tape guide 27 on various types of magnetic heads. The one long recess 38 in a single supporting member can provide the desired stability for the positioning of the plate member 16. However, it is alternatively possible to use a separate plate member having two tongues engaging in recesses in two

supporting members, as in the previous embodiments. It is to be noted that in the previous embodiments it is also possible to have a single supporting member (such as the supporting member 39) and only one tongue.

The present invention is not restricted to magnetic-head assemblies for apparatus operating with a magnetic tape accommodated in a cassette; a magnetic-head assembly according to the present invention may also be used with great advantage in equipment operating with magnetic tape carried on reels, which equipment will generally be provided with a plurality of magnetic heads.

15 CLAIMS

1. A magnetic-head assembly for an apparatus of the kind described for recording and/or playing back signals on a magnetic tape, the assembly comprising a magnetic head attached to a magnetic-head support and to a flat plate member which comprises projecting limbs constituting a tape guide for guiding the edges of the magnetic tape, wherein the flat plate member further comprises a part having an edge which extends in a plane containing the projecting limbs and which, when the magnetic-head assembly is mounted on the head plate of the apparatus, pivotally engages a surface of the first supporting member on the head plate to define a pivotal axis for the azimuth-angle adjustment of the magnetic-head assembly, the magnetic-head support having a part which is constructed for cooperation with the second supporting member on the head plate.

2. A magnetic-head assembly as claimed in

Claim 1, wherein said edge of said part of the flat plate member extends perpendicularly to a plane which is tangential to the curved contact face of the magnetic head at the air gap in this face.

3. A magnetic-head assembly as claimed in Claim 1 or 2, wherein said part of the flat plate member comprises a tongue which extends in said plane containing the projecting limbs and which has an edge arranged for defining said pivotal axis.

4. A magnetic-head assembly as claimed in Claim 1 or 2, wherein said part of the flat plate member comprises two tongues which extend in said plane containing the projecting limbs and which at their distal ends have aligned edges arranged for defining said pivotal axis.

5. A magnetic-head assembly as claimed in Claim 1, 2, 3 or 4, wherein the flat plate member and the magnetic-head support are constructed as an integral unit, and wherein a resilient element is connected to this unit and is constructed for cooperation with a member on the head plate of the apparatus so as to urge the magnetic-head assembly about said pivotal axis when the assembly is mounted on the head plate.

6. A magnetic-head assembly as claimed in Claims 4 and 5, wherein the resilient element consists of a leaf spring which is connected at one end to the magnetic-head support and from that end extends between the two tongues for cooperation with said member on the head plate of the apparatus.

7. A magnetic-head assembly substantially as herein described with reference to Figures 2, 3 and 4 or Figure 5 or Figures 6 and 7 of the accompanying drawings.

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