

MECHANISM FOR ADJUSTING THE POSITION
OF THE MECHANISM HEAD OF A VIDEO TAPE
RECORDER AND/OR PLAYER

BACKGROUND OF THE INVENTION

The present invention relates to a mechanism for adjusting the position of the magnetic head of a video tape recorder and/or player. In this specification the term "video tape recorder" or "VTR" includes a video tape player unless the context otherwise dictates. A preferred embodiment facilitates the adjustment of the position of the magnetic head relative to a rotation head cylinder and improves the assembly precision.

There has been disclosed in Japanese Utility Model Publication No. 89-38736 a mechanism for adjusting the position of the magnetic head of a VTR which comprises a vertical position adjustment means enabling the control head (hereinafter referred to as magnetic head) to be adjusted to the tape running height so as to control the tracking between the sound read/write head relative to the rotation head and a video recording track, and a horizontal position adjustment means for adjusting the distance between the magnetic head and the rotation head cylinder. In this mechanism, the operation of the vertical position adjustment means does not affect the horizontal position adjustment means.

In such a conventional vertical position adjustment means, a head mounting plate is pivotably mounted on a supporting shaft to be upwardly and downwardly movable. Pivoting of the head mounting plate is controlled by means of a pin. In addition, another plate mounted on the supporting shaft and upwardly and downwardly movable is biased in one direction by the force of a compression spring that is received by a nut threadedly engaged with the supporting shaft. By means of this nut is adjusted the vertical position. The compression spring presses against the surface of a tapered nut threadedly engaged with the other plate and the head mounting plate. Moreover, because the head mounting plate and the other plate vertically move integrally together even if the vertical position of the magnetic head is adjusted by means of the tapered nut, there is caused no change in the relative position between the head mounting plate and the tapered nut performing the horizontal position adjustment. However, the construction of such a mechanism is complicated.

Moreover, in such a conventional vertical position adjustment mechanism, because a metal cylindrical member is fixed on one side of the head mounting plate made of a metal by means of a self-locking nut and the magnetic head is mounted on the other side of the head mounting plate so that the self-locking nut causes to deteriorate the perpendicularity between the cylindrical member and the head mounting plate, it results that the range of the vertical position adjustment of the magnetic

head is increased.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a mechanism of simple structure for adjusting the position of the magnetic head of a VTR, wherein the vertical position adjustment means performs the adjustment without affecting the horizontal position adjustment means.

Accordingly the present invention provides a mechanism for adjusting the position of the magnetic head of a video tape recorder and/or player comprising an up/down movable member, mounted by means of a sleeve fitting over a shaft on a chassis, for mounting said magnetic head; a vertical position adjustment means for adjusting the vertical position of said up/down movable member by means of a compression spring and a vertical position adjustment screw, said compression spring biasing said sleeve in a direction parallel to the vertical axis of said supporting shaft; and a horizontal position adjustment means for adjusting the horizontal position of said magnetic head by rotating said up/down movable member about said supporting shaft, characterised in that said horizontal adjustment means comprise a horizontal position adjustment body rotatable relative to said chassis about an axis parallel to said supporting shaft and having a peripheral surface parallel to said axis, the distance between said peripheral surface and said axis taken on a fixed line in transverse section changing gradually with the rotational movement of said horizontal position adjustment body; and resilient means for resiliently pressing a portion of said up/down movable member on the peripheral surface of said horizontal adjustment body.

The sleeve may comprise a cylindrical member and on which said up/down movable member is mounted, the member fitting over the shaft and having one end wall facing one end of the shaft, the compression spring of the vertical adjustment means extending between the opposing end wall and shaft end, the vertical adjustment screw extending through the end wall towards the shaft, a slot to receive a blade being present in the head of the screw, rotation of the screw being arranged to adjust the length of the spring.

If the horizontal position body is pivoted in a fixed range, the up/down movable plate accordingly pivots in a horizontal plane in a fixed range so that the position of the magnetic head is changed.

If the vertical position adjustment screw is pivoted in a fixed range, the up/down movable plate moves upwardly or downwardly in the direction parallel to the axis of the supporting shaft so as to change the vertical position of the magnetic head.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 illustrates a plan view of a mechanism for adjusting the position of the magnetic head of a VTR embodying the present invention;

Figure 2 is a cross-sectional view according to line II-II;

Figure 3 is a cross-sectional view according to line III-III'

Figure 4 is a view similar to Figure 3 of another embodiment of the present invention;

Figure 5 is a cross-sectional view of the sleeve of Figure 1; and

Figure 6 is a plan view illustrating the circumferential portion of the horizontal position adjustment body and the resilient means of a further embodiment of the present invention.

DETAILED DESCRIPTION

Referring Figures 1 and 2, supporting shaft 2 of circular cross-section is mounted on the upper surface of chassis 1 of a VTR, and a spring insert opening 3 is formed in the upper end

portion of the supporting shaft 2. On the supporting shaft 2 is mounted an up/down member in the form of a plate 4 that may pivot about the axis I_1 of the supporting plate 2 and move upwardly and downwardly in the direction parallel to the axis I_1 . The up/down movable plate 4 comprises a main plate 5 of a plastics material of a synthetic resin and a subordinate plate 6 of a metal. In the approximately central portion of the main plate 5 is integrally formed a sleeve 7 having an inner end surface that is extended upwardly and downwardly.

The cross-sectional outline of the inner peripheral surface of the sleeve 7 forms a polygon (e.g. hexagon) to be in point contact with the outer peripheral surface of the supporting shaft 2, as shown in Figure 3. The outer peripheral surface of the sleeve 7 has a plurality of tongues (e.g. four tongues) 8 equidistantly arranged around the periphery thereof and positioned at a certain distance corresponding to the thickness of the subordinate plate 6) upwardly from the upper surface of the main plate 5. The subordinate plate 6 has a circular receiving hole 9, around whose periphery are formed a plurality of access openings 10 corresponding to the tongues 8 to pass them.

The receiving hole 9 of the subordinate plate 6 receives the sleeve 7 of the main plate 5 so that the tongues 8 pass the

corresponding access openings 10. Thereafter, the main plate 5 is rotated relative to the subordinate plate 6 so as to change the rotational position of the tongues 8 relative to the receiving hole 10, thereby interposing the subordinate plate 6 between the main plate 5 and the tongues 8.

The sleeve 7 is rotatably mounted on the supporting shaft 2 and upwardly and downwardly movable. At first, when the sleeve 7 receives the supporting shaft 2, it is resiliently expanded into the state as shown by the solid lines in Figure 3. Thus, the periphery of the supporting shaft 2 is tightly engaged with the inner periphery of the sleeve 7 so as to stabilise the up/down movable plate 4 relative to the supporting shaft 2.

On the up/down movable plate 4 is mounted the magnetic head 12 through a direction adjustment means 11 having a plate 13 for fixing the magnetic head thereon. The plate 13 is mounted over the subordinate plate 6 by means of mounting screw 14 and first adjustment screw 15, and movable upwardly and downwardly. The mounting screw 14 is threaded into first thread hole 16 of the subordinate plate 6, and into a hole 17 of the main plate 17 in a tapping manner, so that loosening of the mounting screw 14 is prevented. Moreover, the mounting screw 14 prevents the relative rotation between the main plate 5 and the subordinate plate 6. Also, the mounting screw 14 is received by first opening 18 of the plate 13. The first adjustment screw 15 is threaded into

second threaded hole 19 of the subordinate plate 6. The first adjustment screw 15 is received by second opening 20 of the plate 13. Between the head of the first adjustment screw 15 and the plate 13 is interposed spring 21 to bias the plate 13 downwardly. Into a threaded hole 22 of the plate 13 is threaded second adjustment screw 23, whose lower end abuts the upper surface of the subordinate plate 6. Thus, in such a direction adjustment means 11, the direction of the magnetic head 12 relative to the tape contacting position and the position perpendicular thereto is adjusted by respectively rotating the second adjustment screw 23 and the first adjustment screw 15 in a fixed range. From the upper surface of the subordinate plate 6 projects a guide pin 24 that is received by an opening 25 of the plate. Thus, when the plate 13 is mounted over the subordinate plate 6, the positional arrangement of the openings is easily achieved.

In the inner end surface of the sleeve 7 is formed a screw insert hole 26 to receive a vertical position adjustment screw 28 of the vertical position adjustment means 27, whose end is threaded into threaded hole 29 of the supporting shaft 2. As the screw 28 is turned in a fixed range, the up/down movable plate 4 moves upwardly and downwardly in the direction parallel to the axis 2 of the supporting shaft 2. The up/down movable plate 4 is biased upwardly by the compression spring 30 compressedly interposed between the inner end surface of the sleeve and the lower end of spring insert opening 3. The pressure of the compression spring

30 compressed the thickness A between the inner end surface of the sleeve 7 and the head 28a of the screw 28, so that the thickness A creeps, thus tending to become thin. However, the pressure of the compression spring 30 does not affect substantially the part B between the inner end surface of the sleeve 7 and the upper surface of the main plate 5, so that the vertical dimensional change of the magnetic head 12 due to the creep may be ignored.

On the outer end surface of the sleeve 7 is integrally formed an annular projection 31 tapering upwardly, whose inner diameter is designed to be smaller than the diameter of the head 28a of the screw 28. Thus, the head 28a of the screw 28 is forcedly fitted into the annular projection 31 so as to prevent loosening of the screw 28.

On the peripheral portion of the main plate 5 opposite to the portion having the magnetic head 12 is mounted horizontal position adjustment means 32 having a horizontal position adjustment body 33 of cylindrical shape. The horizontal position adjustment body 33 is made of a synthetic resin, and eccentrically and pivotably mounted on a mounting shaft 34 supported parallel to the supporting shaft 2 on the chassis 1. The peripheral surface 35 of the horizontal position adjustment body 33, as shown in Figure 1, gradually moves away from the axis ℓ_2 of the mounting shaft 34 parallel to the axis ℓ_1 of the

supporting shaft 2, and is parallel to the axis 2 as shown in Figure 2. The horizontal position adjustment body 33 is rotatably and slidably engaged with approximately rectangular opening 36 formed in the peripheral portion of the main plate 5 opposite to the portion having the magnetic head 12. One side of the opening 36 consists of a thin resilient membrane 37, by means of which the peripheral surface 35 of the horizontal position adjustment body 33 is resiliently held by the side surface of the opening 36. In the upper surface of the horizontal position adjustment body 33 is formed a cross-shaped tool insert groove 38. Though not shown in the drawings, a rotation head cylinder is mounted on the upper surface of the chassis 1.

Hereinafter will be described the operation of the mechanism for adjusting the position of the magnetic head of a VTR. If the horizontal position adjustment body 33 is turned clockwise by inserting a tool in the insert groove 38 in Figure 1, the up/down movable plate 4 is pivoted clockwise about the supporting shaft 2 together with the sleeve 7, and the magnetic head 12 is horizontally pivoted together with the up/down movable plate 4. Conversely, if the horizontal position adjustment body 33 is turned anti-clockwise, the up/down movable plate 4 is pivoted anti-clockwise about the supporting shaft 2 together with the magnetic head 12. Thus, the horizontal position of the magnetic head 12, i.e. the distance from the rotation head cylinder, is changed.

Meanwhile, if the screw 28 is rotated clockwise by inserting a tool in the insert groove in Figure 1, the up/down movable plate 4 together with the sleeve 7 is moved downwardly parallel to the axis ℓ_1 of the supporting shaft 2 against the force of the compression spring 30, and accordingly the magnetic head 12 is moved. Conversely, if the screw 28 is rotated anti-clockwise, the force of the compression spring 30 causes the sleeve 7 to move upwardly parallel to the axis ℓ_1 of the supporting shaft 2 together with the up/down movable plate 4, and accordingly the magnetic head 12 is moved. Hence, the vertical position of the magnetic head 12 relative to the height of the tape running is changed.

Thus, it is similar to the conventional mechanism that the horizontal and the vertical positions of the magnetic head 12 is adjusted by respectively pivoting the horizontal position adjustment body 33 and the screw 28. However, the novel point of the present invention over prior art is embodied in that the peripheral surface of the horizontal position adjustment body 33 is parallel to the axis ℓ_1 of the supporting shaft 2 so that, if the vertical position of the magnetic head 12 is adjusted by turning the screw, the horizontal position of the magnetic head 12 is not changed.

In the embodiment described above, while the cross-sectional

shape of the inner peripheral surface of the sleeve 7 is a polygon so as to contact the peripheral surface of the supporting shaft 2 in points, instead a plurality of ribs 39 having a semicircular cross-section may be projected on the inner peripheral surface of the sleeve 7 with an equal interval from each other along the peripheral direction, so as to contact the peripheral surface of the supporting shaft 2, as shown in Figure 4.

In addition, instead of the thin resilient membrane 37 on one side of the opening 36 integrally formed with the main plate 5, a separate spring 37a may be attached to the main plate 5 as shown in Figure 6. Also, the horizontal position adjustment body 33 may be designed to have an elliptical cross-section, concentrically mounted on the shaft 34, as shown in Figure 6.

The present invention may provide a mechanism for adjusting the position of the magnetic head with high precision that the operation of the vertical position adjustment means does not affect the horizontal position adjustment means.



CLAIMS

1. A mechanism for adjusting the position of the magnetic head of a video tape recorder and/or player comprising:

an up/down movable member, mounted by means of a sleeve fitting over a shaft on a chassis, for mounting said magnetic head;

a vertical position adjustment means for adjusting the vertical position of said up/down movable member by means of a compression spring and a vertical position adjustment screw, said compression spring biasing said sleeve in a direction parallel to the vertical axis of said supporting shaft; and

a horizontal position adjustment means for adjusting the horizontal position of said magnetic head by rotating said up/down movable member about said supporting shaft, characterised in that said horizontal adjustment means comprise:

a horizontal position adjustment body rotatable relative to said chassis about an axis parallel to said supporting shaft and having a peripheral surface parallel to said axis, the distance between said peripheral surface and said axis taken on a fixed line in transverse section changing gradually with the rotational movement of said horizontal position adjustment body; and

resilient means for resiliently pressing a portion of said up/down movable member on the peripheral surface of said horizontal adjustment body.

2. A mechanism as claimed in Claim 1 wherein said sleeve comprises a cylindrical



member and on which said up/down movable member is mounted, the member fitting over the shaft and having one end wall facing one end of the shaft, the compression spring of the vertical adjustment means extending between the opposing end wall and shaft end, the vertical adjustment screw extending through the end wall towards the shaft, a slot to receive a blade being present in the head of the screw, rotation of the screw being arranged to adjust the length of the spring.

3. A mechanism as claimed in Claim 2 wherein the cylindrical member is made of a plastics material.
 4. A mechanism as claimed in Claim 2 wherein the cylindrical member is made of a synthetic resin.
-

JM/BW/4.2.94/P0012GB.D&C