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TAPE RECORDER

BACKGROUND OF THE INVENTION

1) Field of the Invention

This invention relates to a tape recorder, and more particularly to improvements in or relating to a head mounting structure of a tape recorder wherein azimuth adjustment of a magnetic head is made by adjustment of an azimuth adjusting screw screwed into a head mounting plate which is mounted for movement toward and away from an operative position on a chassis of the tape recorder.

2) Description of the Prior Art

A tape recorder is already known wherein a magnetic head is secured to a head mounting plate which is mounted for movement to and from a position in which the magnetic head thereon engages with a magnetic tape to record on or reproduce from the magnetic tape. Typically, a mounting bracket having suitable resiliency is secured to a magnetic head, and one end portion thereof is fixedly mounted at a predetermined vertical position above a head mounting plate by means of a screw or bolt with a spacer in the form of a tube interposed between the mounting bracket and the head mounting

plate. The spacer is fitted around the screw or bolt. The mounting bracket extends in parallel to the path of a magnetic tape to be fed, and an azimuth adjusting spring in the form of a compression coil spring is
5 interposed between the other end portion of the mounting bracket and the head mounting plate. The compression coil spring is fitted around an azimuth adjusting screw or bolt which is adjustably screwed into the head mounting plate and extends through the other end portion
10 of the mounting bracket. If the azimuth adjusting screw is loosened, then the other end portion of the mounting bracket will be resiliently displaced upwardly away from the head mounting plate by the biasing force of the compression coil spring, but if the screw is tightened,
15 the other end portion will be displaced downwardly against the biasing force of the compression coil spring while in either case the one end portion of the head mounting plate remains fixed relative to the head mounting plate. Such vertical displacement of the other
20 end portion relative to the one end portion of the mounting bracket provides azimuth adjustment of the magnetic head.

Such a head mounting plate is mounted on a tape recorder chassis for back and forth bodily movement in a
25 direction perpendicular to the direction of the path of

a magnetic tape to be fed, and a spring normally biases the head mounting plate to an operative position in which the magnetic head engages with a magnetic tape for recording or reproduction. The operative position of
5 the head mounting plate is defined by a stopper securely provided on the chassis for engaging with the head mounting plate.

Upon recording or reproducing operation of the tape recorder, the head mounting plate is moved forward
10 to the operative position against the biasing force of the spring. When the head mounting plate is stopped by the stopper, the mounting bracket and the magnet head thereon tend to continue their forward movement due to their own inertia. The azimuth adjusting screw receives
15 the force of inertia at the upper end thereof. Since the extent of a portion of the azimuth adjusting screw which engages with a threaded hole of the chassis and thus bears the force applied to the screw is considerably small relative to the length of another
20 portion of the screw which extends between the head mounting plate and the mounting bracket, the azimuth adjusting screw may readily be inclined and turned by the force applied thereto, which will loosen the screw. If the azimuth adjusting screw is loosened, the magnetic
25 head is brought out of its azimuth adjusted condition.

It is also known that a short tubular member is secured to a head mounting plate and an azimuth adjusting screw is screwed into threaded holes of the tubular member and the head mounting plate so that the azimuth adjusting screw may be supported over a sufficient extent to bear the force of inertia of a mounting bracket and a magnetic head without causing inclination or loosening of the azimuth adjusting screw. The axial length of the tubular member is, for example, four or five times the thickness of the head mounting plate. With the construction, there is no possibility that the azimuth adjusting screw may be inclined nor loosened. In the construction, however, the tubular member is produced separately and securely mounted on the head mounting plate. The tubular member is normally produced by machining, which requires considerable time and a considerable cost. Besides, a securing step such as caulking or riveting is necessitated to securely mount the tubular member on the head mounting plate, which involves a corresponding cost, resulting in high cost of the tape recorder.

Whether such a tubular member is provided or not, special care must be taken of mounting of the mounting bracket. In particular, if the mounting bracket is securely mounted first at the fixed side end thereof by

a fastening screw, a slot or opening at the other adjustable end of the mounting bracket may not be aligned or centered with a threaded hole of the head mounting plate for the azimuth adjusting screw. In such
5 an out-of-alignment condition, the azimuth adjusting screw may not be screwed into the threaded hole of the head mounting plate. Therefore, where the azimuth adjusting screw is to be securely mounted first at the fixed side end thereof, the mounting bracket must be
10 held by hand with the slot or opening thereof kept in an aligned relationship with the threaded hole of the head mounting plate. This requires much care and makes assembly difficult.

To avoid the difficulty, at first the adjustable
15 side end of the mounting bracket is temporarily fastened lightly, and then the fixed side end of the mounting bracket is secured in position to the head mounting plate by the fastening screw, whereafter the azimuth adjusting screw is tightened to a desired degree to
20 mount the adjustable side end of the mounting bracket at a desired azimuth adjusted position above the head mounting plate. This process, however, involves an increased number of working steps and is complicated accordingly.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a tape recorder of a low cost wherein an azimuth adjusting screw is not inclined by
5 the impact force upon stopping of movement of a magnetic head.

It is another object of the present invention to provided a tape recorder wherein a magnetic head can be assembled readily to a head mounting plate.

10 In order to attain the object, according to the present invention, there is provided a tape recorder which comprises a chassis, a head mounting plate mounted for movement on the chassis, a magnetic head, a mounting bracket secured to the magnetic head and having one end
15 portion securely mounted at a predetermined vertical position spaced above the head mounting plate, an azimuth adjusting spring interposed between the other end portion of the mounting bracket and the head mounting plate for biasing the other end portion of the
20 mounting bracket away from the head mounting plate, an azimuth adjusting screw adjustably screwed into the head mounting plate for adjustably holding the other end portion of the mounting bracket against the biasing force of the azimuth adjusting screw, a spring means for
25 biasing the head mounting plate to an operative position

in which the magnetic head contacts with a magnetic tape in a predetermined path in the tape recorder, and a stopper for defining the operative position of the head mounting plate against the biasing force of the spring means, whereby the head mounting plate has a screw inclination preventing element formed by bending a part of the head mounting plate and located close to an edge of the other end portion of the mounting bracket on the leading side of movement of the head mounting plate toward the operative position.

With the construction of the tape recorder, even if some impact force acts upon the mounting bracket when the head mounting plate is stopped at the operative position by the stopper during forward movement thereof toward the operative position under the biasing force of the spring means, the front edge of the other end portion of the mounting bracket is contacted with and stopped by the screw inclination preventing element. Consequently, the azimuth adjusting screw will receive no inclining force, and accordingly it will never be inclined.

Besides, the mounting bracket can be secured first at the fixed side end thereof and can be thus assembled readily to the head mounting plate. When the

fixed side end portion of the mounting bracket is to be secured, preferably the other adjustable end portion of the mounting bracket is held in contact with the screw inclination preventing element. This naturally assures
5 alignment of a recess or slot formed at the other adjustable side end portion of the mounting bracket with a threaded hole formed in the head mounting plate, and consequently the azimuth adjusting screw can be readily screwed into the threaded hole of the head mounting
10 plate through the thus aligned slot of the mounting bracket.

Since the screw inclination preventing element is formed by bending part of the head mounting plate, inclination of the azimuth adjusting screw can be
15 prevented effectively at a considerably reduced cost.

A specific embodiment of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

20 FIG. 1 is a top plan view of a mechanism of a tape recorder showing an embodiment of the present invention;

FIG. 2 is a perspective view of a head mounting plate of the tape recorder mechanism of FIG. 1;

FIG. 3 is a fragmentary perspective view showing a structure for mounting a magnet head on the head mounting plate of FIG. 2;

FIG. 4 is a similar view but showing a
5 conventional magnetic head mounting structure; and

FIG. 5 is a similar view showing another conventional magnetic head mounting structure.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring first to FIG. 4, an exemplary one of
10 conventional head mounting structures is shown. The head mounting structure shown includes a mounting bracket 2 to which a magnetic head 1 is secured. One end portion of the mounting bracket 2 is mounted fixedly at a predetermined vertical position above a head
15 mounting plate 4 by means of a headed fastening screw 5 which extends through a hole 2b formed in the mounting bracket 2 and is screwed into a threaded hole 11 formed in the head mounting plate 4. A spacer 3 in the form of a short tube is fitted around the fastening screw 5 and
20 interposed between the mounting bracket 2 and the head mounting plate 4 and thus defines the vertical position of the mounting bracket 2 fixedly relative to the head mounting plate 4. An azimuth adjusting screw 8 in the form of a headed screw is adjustably screwed into

another threaded hole 9 formed in the head mounting plate 4 and is received at a portion just below the head thereof in a recess or slot 2a formed at the other end of the mounting bracket 2. An azimuth adjusting spring 6 in the form of a compression coil spring is fitted around the screw 8 and thus biases, via a washer 7 interposed between the spring 6 and the mounting bracket 2, the mounting bracket 2 to press against the head of the screw 8. Accordingly, by turning the screw 8, the other end of the mounting bracket 2 is adjusted in a vertical direction away from or toward the head mounting plate 4 with respect to the one end of the mounting bracket 2. The head mounting plate 4 is mounted for back and forth movement on a chassis not shown of the tape recorder and is normally biased by a spring not shown to an operative position in which the magnetic head 1 contacts with a magnetic tape for recording or reproduction. The operative position of the head mounting plate 4 is defined by a stopper not shown which is provided for engagement with the head mounting plate 4.

Referring to FIG. 5, another exemplary one of conventional head mounting structures is shown. The structure shown is similar to the structure shown in FIG. 4, and only the difference resides in that a short

tubular member 10 having a threaded hole 10a formed therein is secured to a head mounting plate 4, for example, by riveting or caulking with the threaded hole 10a thereof held in register with a threaded hole not shown formed in the head mounting plate 4. An azimuth adjusting screw 8 is thus screwed into the threaded hole 10a of the tubular member 10 and the threaded hole of the head mounting plate 4. Therefore, the azimuth adjusting screw 8 is supported over a comparatively great extent and accordingly with sufficient rigidity.

Referring now to FIG. 1, there is shown a mechanism of a tape recorder according to the present invention. The cassette tape recorder mechanism shown includes a head mounting plate 21 mounted for movement within a predetermined range on a lower face of a chassis 20. Referring to FIGS. 2 and 3, the head mounting plate 21 has a main plate portion 21a having a substantially triangular or rather T-shape in plan with a wide side located at one longitudinal end and a narrow side located at the other longitudinal end thereof, and a side wall 21b extending perpendicularly upwardly from the wide side of the main plate portion 21a.

A reproducing magnetic head 22 and a pinch roller 23 are mounted on an upper face adjacent the wide side of the head mounting plate 21.

The magnetic head 22 is designed such that a front face thereof is contacted with a magnetic tape not shown within a tape cassette not shown loaded in position in the tape recorder mechanism, and a mounting bracket 24 is secured to a lower face of and extends rearwardly from the magnetic head 22 as shown in FIG. 3. The mounting bracket 24 is fastened fixedly at one end thereof to a bent lug 25 of the head mounting plate 21 by means of a headed screw 27 which extends through a hole 24a formed at one end portion of the mounting bracket 24 and is screwed into a threaded hole 26 formed in the bent lug 25. The bent lug 25 extends perpendicularly horizontally inwardly from a substantially central portion of an upper edge of the side wall 21b of the head mounting plate 21 in an opposing spaced relationship to the main plate portion 21a of the head mounting plate 21 and corresponds to the spacer member 3 of the head mounting structure of the conventional tape recorder described hereinabove with reference to FIG. 4 or 5. The mounting bracket 24 is thus securely supported at a predetermined vertical position above the main plate portion 21a of the head mounting plate 21 so that the magnetic head 22 thereon may be in level with a path of a magnetic tape to be fed for recording or reproduction. The mounting bracket 24

extends in parallel to the path of such a magnetic tape, and the other end portion of the mounting bracket 24 is supported for adjustment in a vertical direction above the main plate portion 21a of the head mounting plate 21. In particular, an azimuth adjusting spring 29 in the form of a compression coil spring is interposed between the other end portion of the mounting bracket 24 and the main plate portion 21a of the head mounting plate 21 for biasing the other end portion of the mounting bracket 24 upwardly away from the main plate portion 21a of the head mounting plate 21. A washer 28 is interposed between the azimuth adjusting spring 29 and the mounting bracket 24. The azimuth adjusting spring 29 and the washer 28 are fitted around an azimuth adjusting screw 31 in the form of a headed screw which extends through a slot or recess 24b formed at the other end of the mounting bracket 24 and is screwed into a threaded hole 30 formed in the main plate portion 21a of the head mounting plate 21. Accordingly, as the screw 31 is turned, the other end portion of the mounting bracket 24 is adjusted in a vertical direction away from or toward the main plate portion 21a of the head mounting plate 21 with respect to the one end of the mounting bracket 24 thereby to effect azimuth adjustment of the magnetic head 22, that is, fine adjustment of the

inclination of the magnetic head 22 with respect to the path or feeding direction of a tape.

Referring to FIGS. 2 and 3, a screw inclination preventing element 32 in the form of a perpendicularly upwardly bent lug is formed in parallel with the side wall 21b of the head mounting plate 21 along a front edge of one of a pair of arms of the T-shape of the head mounting plate 21 in which the threaded hole 30 is formed. The screw inclination preventing element 32 extends upwardly a little farther than the vertical position of the mounting bracket 24 and is located at a possible nearest position to a front edge (left edge in FIG. 2 and right edge in FIG. 3) of the mounting bracket 24.

Referring to FIGS. 1 and 2, the pinch roller 23 is mounted for contact with a capstan shaft 33 supported for rotation on the upper face of the chassis 20 with a tape not shown of a tape cassette not shown interposed therebetween. The pinch roller 23 is located sidewardly of the magnetic head 22 and is supported for rotation on and between a pair of upper and lower mounting walls 35a and 35b of a mounting bracket 35 made of an elastic synthetic resin material and secured to the upper face of the main plate portion 21a of the head mounting plate 21 by means of a fastening screw 34.

The head mounting plate 21 is normally biased in the forward direction, that is, in the leftward direction in FIG. 1 by means of a tension coil spring 37 to an operative position in which the magnetic head 22 contacts with a magnetic tape not shown within a tape cassette not shown loaded in position in the tape recorder to effect recording or reproduction of the tape.

When no tape cassette is loaded, the head mounting plate 21 is held at an inoperative home position, that is, a rightmost position as shown in FIG. 1 by an arresting mechanism not shown against the biasing force of the spring 37.

If a tape cassette is loaded in position into the tape recorder, then the arresting mechanism releases the head mounting plate 21 so that the head mounting plate 21 is moved forward in the leftward direction in FIG. 1 by the biasing force of the spring 37. The forward movement of the head mounting plate 21 is stopped by the capstan shaft 33 abutting with the pinch roller 23 on the head mounting plate 21. The capstan shaft 33 thus has an additional function as a stopper for stopping the head mounting plate 21 at a predetermined position, that is, the operative position. In the operative position of the head mounting plate 21, the magnetic head 22

contacts with a magnetic tape in the tape cassette while the pinch roller 23 presses against the capstan shaft 33 with the magnetic tape interposed therebetween, thereby performing a recording or reproducing operation as in a conventional tape recorder.

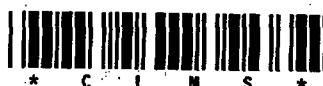
Also with the arrangement of the embodiment, when the forward movement of the head mounting plate 21 is stopped at the operative position, the azimuth adjusting side end, that is, the slot 24b side end of the mounting bracket 24 tends to continue its horizontal movement in the same direction to pivot the mounting bracket 24 around the fastening screw 27 due to inertia of the mounting bracket 24 and the magnetic head 22. Such pivotal motion of the mounting bracket 24, however, will be stopped by the screw inclination preventing element 32 which is thereupon engaged with the front edge of the mounting bracket 24. Accordingly, the azimuth adjusting screw 31 will not be inclined and the azimuth adjusted condition of the magnetic head 22 is maintained.

In assembling the mounting bracket 24, it can be secured first at the fixed side end thereof without causing a trouble. In particular, when the mounting bracket 24 is secured at the fixed side end thereof, it is kept in contact at the other azimuth adjusting side end portion thereof with the screw inclination

preventing element 32. In the position of the mounting bracket 24, the slot 24b therein and the threaded hole 30 of the head mounting plate 21 are naturally aligned or centered with each other, and the azimuth adjusting screw 31 can be readily screwed into the threaded hole 30 through the slot 24b. The screw inclination preventing element 32 thus serves as a positioning element for the mounting bracket 24 when the latter is secured to the head mounting plate 21.

CLAIMS:

1. A tape recorder, comprising a chassis, a head mounting plate mounted for movement on said chassis, a magnetic head, a mounting bracket secured to said magnetic head and having one end portion securely mounted at a predetermined vertical position spaced above said head mounting plate, an azimuth adjusting spring interposed between the other end portion of said mounting bracket and said head mounting plate for biasing the other end portion of said mounting bracket away from said head mounting plate, an azimuth adjusting screw adjustably screwed into said head mounting plate for adjustably holding the other end portion of said mounting bracket against the biasing force of said azimuth adjusting screw, a spring means for biasing said head mounting plate to an operative position in which said magnetic head contacts with a magnetic tape in a predetermined path in said tape recorder, and a stopper for defining the operative position of said head mounting plate against the biasing force of said spring means, whereby said head mounting plate has a screw inclination preventing element formed by bending a part of the head mounting plate and located close to an edge of the other end portion



of said mounting bracket on the leading side of movement of said head mounting plate toward the operative position.

2. A tape recorder substantially as hereinbefore
5 described with reference to, and as shown in, any of
FIGS. 1 to 3 of the accompanying drawings.

