

MOUNTING STRUCTURE FOR CASSETTE HOLDING
DOWN SPRING PLATE IN TAPE RECORDER

BACKGROUND OF THE INVENTION

1) Field of the Invention

This invention relates to a mounting structure for a cassette holding down spring plate in a tape recorder, and more particularly to improvements in or relating to a spring plate mounting structure in a tape recorder wherein the cassette holding down spring plate for holding down a tape cassette loaded in position in the tape recorder is mounted onto a spring plate supporting plate only by an easy operation to insert one end portion of the spring plate into a slit of the supporting plate and pivot the spring plate in a direction in a plane of the spring plate.

2) Description of the Prior Art

An exemplary one of cassette tape recorder mechanisms in which a conventional mounting structure for a cassette holding down spring plate is incorporated is shown in FIG. 5.

Referring to FIG. 5, the cassette tape recorder mechanism is constituted such that, when a tape cassette 4 is inserted in position into a cassette holder 3 which

is supported for pivotal motion on a pair of opposite side walls of a chassis 1 and biased to its operative position or in the downward direction toward a bottom wall of the chassis 1 by a spring 2, the cassette holder 5 3 is released from its arrested condition by an arresting member 5 so that it is pivoted to its operative position by the spring 2 whereupon a downwardly bent end of an extension 7 of a spring plate supporting plate 6 which extends between and is 10 supported for pivotal motion on a pair of opposite side walls 3a and 3b of the cassette holder 3 is contacted with and stopped by an upper face of the chassis 1 to pivot the spring plate supporting plate 6 around its axis thereby to cause a cassette holding down spring 15 plate 8 secured at one end portion thereof to the supporting plate 6 to press against an upper face of the tape cassette 4 to hold down the tape cassette 4.

The tape recorder mechanism shown in FIG. 5 further includes a take-up reel receiver 9 and a capstan 20 10 mounted on and extending upwardly from an upper face of the chassis 1, and a reproducing head 11 and a pinch roller 12 also mounted on the chassis 1.

A structure for mounting the cassette holding down spring plate 8 on the spring plate supporting plate 25 6 in the tape recorder is particularly shown in FIGS. 6

to 8.

Referring to FIGS. 6 to 8, the spring plate supporting plate 6 has a slit 13 formed therein in which one end portion of the spring plate 8 is received. The supporting plate 6 further has an engaging hole 15 formed therein through which an offset engaging portion 14 of the spring plate 8 pass from the upper to the down face side of the supporting plate 6 thereby to hold the spring plate 8 at a predetermined mounted position on the supporting plate 6. The supporting plate 6 has a swell 17 which is fitted in a rectangular hole 16 perforated in the spring plate 8 to prevent the spring plate 8 from dropping off the supporting plate 6.

When the spring plate 8 is to be mounted onto the supporting plate 6, at first the one end portion of the spring plate 8 is inserted forwardly in one direction into the slit 13 as seen in FIG. 7, and then the spring plate 8 is pushed down at the offset engaging portion 14 thereof to deform the offset engaging portion 14 downwardly until it passes downwardly through the engaging hole 15 of the supporting plate 6 as seen in FIG. 8. After then, with the offset engaging portion 14 of the spring plate 8 held down in this condition, the spring plate 8 is pushed strongly in the one direction until the offset engaging portion 14 comes to a position

below the supporting plate 6 and a step of the offset engaging portion 14 is stopped by an edge of the engaging hole 15 of the supporting plate 6. Thereupon, the swell 17 of the supporting plate 6 is fitted into the rectangular hole 16 by the resilient restoring force of the spring plate 8 itself.

With the conventional mounting structure for a cassette holding down spring plate, it is necessary, after the one end portion of the spring plate 8 is inserted into the slit 13 of the supporting plate 6, for an operator to strongly push the entire spring plate 8 forwardly in the one direction with one hand while it is held down at the offset engaging portion 14 thereof so as to be resiliently deformed downwardly with a fingertip of the other hand in which a body of the tape recorder mechanism or the spring plate supporting plate 6 is grasped. There is a problem, accordingly, that, in order to perform such a mounting operation rapidly, both hands must cooperate skillfully, and high skill is required for the operation.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a mounting structure for a cassette holding down spring plate in a tape recorder wherein a cassette

holding down spring plate can be mounted rapidly onto a spring plate supporting plate without skill.

In order to attain the object, according to the present invention, there is provided a mounting structure for a cassette holding down spring plate in a tape recorder wherein, when a tape cassette is inserted into a cassette holder supported for pivotal motion on a chassis, the arrested condition of the cassette holder at an inoperative position is canceled so that the cassette holder is pivoted to an operative position whereupon a spring plate supporting plate which is mounted for pivotal motion on and extends between the opposite side walls of the cassette holder is abutted with and stopped by a particular portion of the chassis to pivot the spring plate supporting plate around its axis thereby to cause a cassette holding down spring plate secured at one end portion thereof to the spring plate supporting plate to press against an upper face of the tape cassette to hold down the tape cassette, characterized in that the spring plate supporting plate has a slit formed therein for passing the one end portion of the cassette holding down spring plate therethrough and further has a pivot projection formed on and extending from an edge of the slit into the slit while a pivotal support hole for receiving the pivot

projection therein is formed in the one end portion of the cassette holding down spring plate, and the spring plate supporting plate and the spring plate have engaging portions for engaging with each other to hold
5 the spring plate at a predetermined mounted position on the spring plate supporting plate and slidably contacting portions for slidably contacting with each other when the spring is pivoted around the pivot projection of the spring plate supporting plate, whereby
10 at least one of the slidably contacting portions is inclined relative to a plane of the spring plate so that, when the spring plate is pivoted around the pivot projection, the one end portion of the spring plate is deformed laterally from the plane of the spring plate
15 upon sliding contact between the slidably contacting portions, and then when the slidably contacting portions are disengaged from each other, the spring plate is resiliently returned to its initial shape whereupon the engaging portions are brought into engagement with each
20 other.

With the mounting structure for a cassette holding down spring plate in a tape recorder of the present invention, the spring plate is to be mounted onto the spring plate supporting plate, it is first
25 inserted from the one end portion thereof into the slit

of the supporting plate, and the pivot projection of the supporting plate is fitted into the pivotal support hole of the spring plate. Then, the spring plate is pivoted around the the pivot projection whereupon the slidably
5 contacting portions of the spring plate and the supporting plate are slidably contacted with each other so that the spring plate is deformed laterally and then the engaging portions are engaged with each other, thereby completing the mounting operation.

10 Thus, when the cassette holding down spring plate is to be mounted onto the supporting plate, the mounting operation is completed very readily only by grasping a body of the tape recorder mechanism or the supporting plate with one hand and then inserting the one end
25 portion of the cassette holding down spring plate into the slit of the supporting plate and pivoting the cassette holding down spring plate with the other hand. Thereupon, pivotal motion of the spring plate is made around a fulcrum provided by the pivot projection.

20 Since the pivot projection is provided, however, at a position near the end of the spring plate to which a load is applied and besides at least one of the slidably contacting portions on the supporting plate or the spring plate is inclined, if a slight force is applied
25 to the other end portion of the spring plate to pivot

the spring plate, the spring plate can be pivoted by the very light force. Besides, there is no necessity of making an operation with the one end portion of the spring plate held down with one hand as in the conventional structure, the operation requires no skill and can be performed rapidly.

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

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a tape recorder mechanism in which a mounting structure for a cassette holding down spring plate according to an embodiment of the present invention is incorporated;

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FIG. 2 is a partial perspective view of the tape recorder mechanism of FIG. 1;

FIG. 3 is a fragmentary perspective view showing details of the spring plate mounting structure of the tape recorder mechanism of FIG. 1;

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FIG. 4 is a fragmentary perspective view of a spring plate mounting structure showing a second embodiment of the present invention;

FIG. 5 is a plan view of a cassette tape recorder mechanism which employs a conventional mounting

structure for a spring plate mounting structure;

FIG. 6 is a partial perspective view showing details of the spring plate mounting structure of the tape recorder mechanism of FIG. 5; and

5 FIGS. 7 and 8 are a partial perspective view and a sectional view of the spring plate mounting structure of FIG. 6 illustrating a cassette holding down spring plate being mounted onto a spring plate supporting plate.

10 DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring first to FIGS. 1 to 3, there is shown a tape recorder mechanism in which a mounting structure for a cassette holding down spring plate according to the present invention is incorporated. The tape
15 recorder mechanism shown includes a chassis 20 formed from a metal plate of a substantially rectangular shape as viewed from above, and a cassette holder 21 mounted for pivotal motion on and relative to the chassis 20 with the opposite end portions thereof adjacent a
20 cassette insertion opening of the tape recorder being pivotally supported at upwardly bent walls 22a and 22b of the chassis 20. The cassette holder 21 is arrested at an inclined inoperative position relative to a bottom wall 20b of the chassis 20 by an arresting member 23

which is mounted at a lower end thereof for limited pivotal motion at an end portion of the chassis 20 at an upper left location in FIG. 1.

The arresting member 23 has an ejecting finger 23a located adjacent a pivoting end of the cassette holder 21 and extending upwardly above a bottom wall 21a of the cassette holder 21. The arresting member 23 further has an arresting finger 23b for contacting with a lower face of the bottom wall 21a of the cassette holder 21 to arrest the cassette holder 21 at its inclined inoperative position. A torsion coil spring 25 extends between a pivoting end portion of the ejecting finger 23a of the arresting member 23 and an end portion of a pivotal member 24 at which the pivotal member 24 is connected to a pivoting end portion of the cassette holder 21. When the cassette holder 21 is in its inoperative position, the spring 25 biases the arresting member 23 in a direction opposite the direction in which a tape cassette 4 is to be inserted and also biases the cassette holder 21 to its operative position toward the bottom plate 20b of the chassis 20.

An eject operating member 26 is mounted for back and forth sliding movement in the cassette inserting direction on the chassis 20 and extends along the bottom wall 20a and the left side wall 22a of the chassis 20.

When the eject operating member 26 is manually pushed to move in the direction of an arrow mark I against a biasing force of a return spring not shown while the cassette holder 21 is in its operative position, the pivotal member 24 is pushed to pivot by the eject operating member 26 whereupon the pivoting end portion of the cassette holder 21 is pushed to pivot the cassette holder 21 upwardly to its inoperative inclined position. When the cassette holder 21 reaches its inoperative position, the eject operating member 26 is arrested at the pushed in position by the pivotal member 24. When the cassette holder 21 is pivoted to its inoperative position, the arresting finger 23b is pivoted to an arresting position below the bottom wall 21b of the cassette holder 21 by way of the torsion coil spring 25 interconnecting the pivotal member 24 and the arresting plate 23 while at the same time the tape cassette 4 within the cassette holder 21 is pushed back in the reverse cassette removing direction by the ejecting finger 23a of the arresting plate 23.

A motor 27 is mounted at a rear side extension 20a of the chassis 20. The motor 27 is deenergized by way of a switch 28 when the cassette holder 21 is moved to its inoperative position but is energized to rotate due to switching of the switch 28 when the cassette

holder 21 is moved its operative position.

A capstan 29 and a take-up reel receiver 30 are mounted on the bottom wall 20b of the chassis 20 and connected to be driven to rotate by the motor 27.

5 A head mounting plate 31 is mounted on the rear face of the bottom wall 20b of the chassis 20 for sliding movement in a direction perpendicular to the cassette inserting direction, that is, in a leftward or rightward direction in FIG. 1. A reproducing head 32
10 and a pinch roller 33 are mounted on the head mounting plate 31 and extend upwardly above the bottom wall 20b of the chassis 20. The head mounting plate 31 is normally biased in the leftward direction in FIG. 1 by the biasing force of a spring not shown. When the eject
15 operating member 26 is moved to its pushed in position, the head mounting plate 31 is retracted in the rightward direction in FIG. 1 by the eject operating member 26. To the contrary, when the eject operating member 26 is released from the arrested condition thereof by the
20 pivotal member 24 and returned to its initial position by the return spring not shown, the head mounting plate 31 is advanced in the leftward direction in FIG. 1 so that the pinch roller 33 is pressed against the capstan 29 and the reproducing head 32 is contacted with a tape
25 within the tape cassette 4 thereby to perform a

reproducing operation.

The cassette holder 21 has a pair of upwardly bent side walls 21b and 21c on the opposite left and right sides of the bottom wall 21a thereof, and an
5 elongated spring plate supporting plate 34 is supported for pivotal motion on and extends between upper end portions of the side walls 21b and 21c of the cassette holder 21. A cassette holding down spring plate 35 is secured at one end portion thereof to an intermediate
10 portion of the spring plate supporting plate 34 and extends from the latter over a large extent toward the cassette insertion opening of the tape recorder.

An abutting element or tab 41 is formed at a left end portion in FIG. 1 of the supporting plate 34 and
15 extends in the direction opposite the cassette insertion opening of the tape recorder with respect to the axis of pivotal motion of the supporting plate 34. When the cassette holder 21 is in its inoperative position, the abutting tab 41 is held in abutting engagement with the
20 top end of the left side wall 21b of the cassette holder 21 under the biasing force of a torsion coil spring 42. But when the cassette holder 21 is pivoted down from the inoperative to the operative position, the abutting tab 41 is soon abutted with and stopped by a stopping
25 element or projection 43 (refer to FIG. 2) formed on the

left side wall 22a of the chassis 20. As the cassette holder 21 is further pivoted down, the supporting plate 34 is pivoted around its axis against the biasing force of the torsion coil spring 42 while the abutting tab 41 of the supporting plate 34 is spaced away from the top of left side wall 21b of the cassette holder 21.

Thereupon, the cassette holding down spring plate 35 is pivoted to move the other end portion thereof toward the bottom wall 21a of the cassette holder 21.

Such pivotal motion of the cassette holding down spring plate 35 is caused by pivotal motion of the cassette holder 21 from the inoperative to the operative position. Thus, if a tape cassette 4 is inserted in position into the cassette holder 21, the other end portion of the cassette holding down spring plate 35 will press against an upper face of the tape cassette 4 and hold down the tape cassette 4 against the cassette holder 21.

The structure for mounting the cassette holding down spring plate 35 on the spring plate supporting plate 34 is particularly shown in FIG. 3.

Referring to FIG. 3, the spring plate supporting plate 34 has an upwardly bent wall 34b on one side of a body portion 34a thereof adjacent the cassette insertion opening of the tape recorder, and a slit 36 is formed in

the supporting plate 34 across the boundary between the body portion 34a and upwardly bent wall 34b. A pivot projection 37 is formed on and extends downwardly from an upper edge of the slit 36 into the slit 36. A

5 widened portion or extension 34c is formed on the side of the supporting plate 34 remote from the slit 36 and has an opening 38 of a substantially L-shape in plan perforated therein. The widened portion 34c of the supporting plate 34 further has an engaging hole 39
10 perforated therein in an opposing relationship to the two sides of the L-shape of the opening 38. A slidably contacting portion 40 is formed on an edge of the L-shaped opening 38 adjacent the engaging hole 39 on the same arcuate line centered at the pivot projection 37 on
15 the supporting plate 34. The slidably contacting portion 40 is here in the form of an inclined tab which is inclined in the upward direction toward the inside of the opening 38.

The spring plate 35 has a small round pivot
20 projection receiving hole 44 formed therein for receiving the pivot projection 37 of the supporting plate 34 therein. The spring plate 35 has an extension 35a at the one end thereof. The extension 35a extends horizontally in one direction and is bent first
25 downwardly, then horizontally in the one direction and

then upwardly so that it presents a substantially angular U-shape in side elevation. The upwardly bent portion at the end of the extension 35a serves as an engaging portion 45 for engaging with the engaging hole 39 of the supporting plate 34 from below. The engaging portion 45 of the spring plate 35 is cut obliquely at the opposite corners of the top end thereof, and the left cut portion in FIG. 3 serves as a slidably contacting portion 46 for slidably contacting with the slidably contacting portion 40 of the supporting plate 34.

When the cassette holding down spring plate 35 having such a construction as described above is to be mounted onto the supporting plate 34, at first the one end portion of the spring plate 35 is inserted into the slit 36 from the side of the cassette insertion opening of the tape recorder. In this instance, the spring plate 35 can be easily inserted into the slit 36 because the slit 36 is formed over the bent wall 34b and the body portion 34a of the supporting plate 34. Subsequently, the pivot projection 37 of the supporting plate 34 is fitted into the pivotal support hole 44 of the spring plate 35 as shown in FIG. 3. Then, the U-shaped extension 35a of the spring plate 35 is dropped into the opening 38 of the supporting plate 34 such that

the slidably contacting portion 46 on the spring plate 36 may oppose the slidably contacting portion 40 on the support plate 34 from sidewardly. The spring plate 35 is then manually operated at the other end portion thereof to pivot in the direction of an arrow mark III in FIG. 3 around the pivot projection 37 of the supporting plate 34. Thereupon, the inclined slidably contacting portion 46 of the spring plate 35 is first pressed against and slidably moved along the inclined slidably contacting portion 40 of the supporting plate 34 while resiliently deforming the extension 35a of the spring plate 35 laterally downwardly. Then when the spring plate 35 is pivoted until the engaging portion 45 thereof reaches the engaging hole 39 of the supporting plate 34, the engaging portion 45 is admitted into and engaged with the engaging hole 39 from below as the extension 35a of the spring plate 35 is returned to its initial shape by its own resiliency. The one end portion of the spring plate 35 is thus secured in position to the supporting plate 34 as shown in phantom in FIG. 3.

FIG. 4 shows a cassette holding down spring plate mounting structure according to a second embodiment of the present invention. The mounting structure of the present embodiment includes a modified spring plate

supporting plate 54 and a modified cassette holding down
spring plate 55 which are generally similar to the
spring plate supporting plate 34 and the cassette
holding down spring plate 35, respectively, of the first
5 embodiment described hereinabove. In particular, the
cassette holding down spring plate 55 is similar to the
cassette holding down spring plate 35 in that it has a
similar round hole 58 formed therein. Meanwhile, the
spring plate supporting plate 54 is similar to the
10 spring plate supporting plate 34 in that it has a
similar slit 56 formed therein for passing one end
portion of the cassette holding down spring plate 55
therethrough and it also has a pivot projection 57
formed thereon which extends into the slit 56 and is
15 received in the hole 58 of the cassette holding down
spring plate 55. The other cooperating portions of the
spring plate supporting plate 54 and the cassette
holding down spring plate 55, however, are different
from those of the spring plate supporting plate 34 and
20 the cassette holding down spring plate 35.

In particular, an extension 59 is provided at an
intermediate portion of the supporting plate 54 in which
the slit 56 is formed. The extension 59 has a
substantially angular S-shape in plan and extends in the
25 direction away from a cassette insertion opening of the

tape recorder.

Engaging portions for restraining pivotal motion of the spring plate 55 are provided by a right edge 60a in FIG. 4 of a base portion of the extension 59
5 extending in the cassette inserting direction, and a left edge 60b in FIG. 4 at an end portion of the extension 59. Another right edge in FIG. 4 of the end portion of the extension 59 extending in the cassette inserting direction serves as a slidably contacting
10 portion 61 on the supporting plate 54 side.

Meanwhile, the cassette holding down spring plate 55 has an extension 55a which is bent substantially in an angular U-shape in side elevation similarly as in the first embodiment. The top edge of an upwardly bent
15 portion 63 at the end of the extension 55a is inclined, however, such that the height increases toward the right end from the left end thereof in FIG. 4, and thus serves as a slidably contacting portion 62 on the spring plate 55 side. Further, a right side edge in FIG. 4 of the
20 upwardly bent portion 63 serves as an engaging portion 63a on the spring plate 55 side.

Also in the cassette holding down spring plate mounting structure of the present embodiment, a mounting operation of the cassette holding down spring plate 55
25 only involves insertion of the one end portion of the

spring plate 55 into the slit 56 of the supporting plate 54 until the pivot projection 57 is fitted into the pivot projection receiving hole 58 and pivotal motion of the spring plate 55 in a certain direction, that is, in the direction indicated by an arrow mark IV in FIG. 4, but does not involve a step of deforming an end portion of the spring plate 55 with a hand in which a body of the tape recorder mechanism or the spring plate supporting plate 54 is grasped. Accordingly, the spring plate 55 can be mounted readily and rapidly onto the spring plate supporting plate 54 with one hand.

It is to be noted that while in the first embodiment the slidably contacting portions 40 and 46 of the spring plate supporting plate 34 and the spring plate 35 are inclined relative to the plane of the spring plate and in the second embodiment only the slidably contacting portion 62 on the spring plate 55 side is inclined, only the slidably contacting portion on the spring plate supporting plate side may alternatively be inclined.

CLAIMS:

1. A mounting structure for a cassette holding
down spring plate in a tape recorder wherein, when a
tape cassette is inserted into a cassette holder
5 supported for pivotal motion on a chassis, the arrested
condition of said cassette holder at an inoperative
position is canceled so that said cassette holder is
pivoted to an operative position whereupon a spring
plate supporting plate which is mounted for pivotal
10 motion on and extends between the opposite side walls of
said cassette holder is abutted with and stopped by a
particular portion of said chassis to pivot said spring
plate supporting plate around its axis thereby to cause
a cassette holding down spring plate secured at one end
15 portion thereof to said spring plate supporting plate to
press against an upper face of the tape cassette to hold
down the tape cassette, characterized in that said
spring plate supporting plate has a slit formed therein
for passing the one end portion of said cassette holding
20 down spring plate therethrough and further has a pivot
projection formed on and extending from an edge of said
slit into said slit while a pivotal support hole for
receiving said pivot projection therein is formed in the
one end portion of said cassette holding down spring



plate, and said spring plate supporting plate and said
spring plate have engaging portions for engaging with
each other to hold said spring plate at a predetermined
mounted position on said spring plate supporting plate
5 and slidably contacting portions for slidably contacting
with each other when said spring is pivoted around said
pivot projection of said spring plate supporting plate,
whereby at least one of said slidably contacting
portions is inclined relative to a plane of said spring
10 plate so that, when said spring plate is pivoted around
said pivot projection, the one end portion of said
spring plate is deformed laterally from the plane of
said spring plate upon sliding contact between said
slidably contacting portions, and then when said
15 slidably contacting portions are disengaged from each
other, said spring plate is resiliently returned to its
initial shape whereupon said engaging portions are
brought into engagement with each other.

2. A mounting structure for a cassette holding
20 down spring plate in a tape recorder as set forth in
claim 1, characterized in that said slidably contacting
portion of said spring plate supporting plate is inclined
relative to the plane of said spring plate supporting plate.

3. A mounting structure for a cassette holding
25 down spring plate in a tape recorder as set forth in



claim 1, characterized in that said slidably contacting portion of said cassette holding down spring plate is inclined relative to the plane of said spring plate.

4. A mounting structure for a cassette holding
5 down spring plate in a tape recorder as set forth in any one of the preceding claims, characterized in that said spring plate supporting plate has an upwardly bent wall formed on one side of a body portion thereof, and said slit is formed in said supporting plate across the
10 boundary between said body portion and said upwardly bent wall.

5. A mounting structure for a cassette holding
down spring plate in a tape recorder substantially as
hereinbefore described with reference to, and as shown
15 in, the accompanying drawings.

