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"TAPE RECORDER"

This invention relates to a tape recorder, and more particularly to a tape recorder provided with an erroneous-recording preventing mechanism which prevents a recording member from being unnecessarily put into operation.

In recent years, developments are extensively made to mold from plastics material a chassis of, for example, a cassette tape recorder and various mechanical parts mounted on said chassis which have hitherto been formed of metal, for the purpose of rendering the cassette tape recorder compact, light and inexpensive.

The molding of the chassis and mechanical parts mounted thereon from plastics material has the advantages that not only a tape recorder can be reduced in weight and cost, and the chassis and associated mechanical parts can be easily fabricated, but also it is possible to absorb shocks and vibrations which possibly occur when, for example, the operating section is actuated.

What is further demanded regarding a cassette tape recorder for which the above-mentioned developments are being made is that attempts should be made not only to effect the smooth operation of the mechanical parts, but also to reduce their number as much as possible for the purpose of rendering the cassette tape recorder means compact, lighter and less, expensive than has been possible in that past.

To this end, it is necessary to organically arrange the chassis and associated mechanical parts and efficiently assemble the mechanical parts themselves and also said parts and chassis without waste.

5 This invention has been accomplished in view of the above-mentioned circumstances, and is intended to provide a very satisfactory compact, light and costless cassette tape recorder of simple arrangement which uses a small number of mechanical parts, can be reliably
10 operated and is further equipped with an erroneous-recording preventing mechanism adapted to facilitate the operation of a quick review mechanism.

According to an aspect of the present invention, there is provided a tape recorder which comprises:

15 a first operation member for setting the tape recorder for a first operation mode when shifted from an inoperative position to an operative position;

 a second operation member for setting the tape recorder for a second operation mode when shifted from an
20 inoperative position to an operative position jointly with the first operation member;

 a control member which is moved with the actuation of the first operation member;

 a erroneous-operating preventing member so arranged
25 as to occupy a first or second position as need arises by means of said control member, said erroneous-operating preventing member being formed of a body provided with an

engagement member, which, when taking the first position, allows for the shifting of the second operation member to an operative position, and, when taking the second position, prevents the second operation member from being shifted to the operative position, and an elastic member, the end of which is supported by the body of said erroneous-operating preventing member, and the other end of which is engaged with said control member, and wherein, when the tape recorder is shifted from the second operation mode to the first operation mode said erroneous-operating preventing member allows for the shifting of the body thereof toward the first position due to engagement with the second operation member shifted from the operative position to the inoperative position, and, when disengaged from the second operation member, brings the body back to the second position by the elastic action of said elastic member.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a top view of a cassette tape recorder embodying this invention;

Fig. 2 is a top view of said cassette tape recorder from which a chassis is taken off;

Fig. 3a is a top view of an erroneous-recording preventing mechanism of said cassette tape recorder;

Fig. 3b is a side view of the same;

Fig. 4 is an enlarged top view of the main part of the mechanism shown in Fig. 3a;

Figs. 5 and 6 illustrate the operation of the cassette tape recorder embodying this invention; and

5 Fig. 7 indicates the operation of said cassette tape recorder when adapted for a quick review.

There will now be described by reference to the appended drawings the arrangement and operation of a cassette tape recorder embodying this invention.

10 Fig. 1 shows the fundamental structure of a cassette tape recorder embodying the invention. Reference numeral 11 shown a main chassis of the cassette tape recorder, which is prepared from synthetic resin. Set on the front side (the lower side of Fig. 1) of the main
15 chassis 11 is an operating member assembly 12 of a plurality of members 13, 15, 17, 16, 18, 19 for setting the cassette tape recorder for the required operation modes and stop mode. These members are made slidable in the directions of arrows indicated in Fig. 1.

20 Reference numeral 13 denotes a stop/eject member, which stops any of the required operations of the cassette tape recorder or also actuates an ejecting mechanism 14 for taking out a cassette tape (not shown). Reference
25 numeral 15 is a recording member which sets the tape recorder for a prerecording mode, whose operation concurrently actuates a reproducing member 16 by means of a substantially L-shaped projecting piece 151 (Fig. 2)

formed at one end of said recording member 15. Reference numeral 17 is a rewinding member, and reference numeral 18 is a fast forwarding member. Reference numeral 19 is a pause operating member for temporarily suspending recording or reproducing.

Set above the main chassis 11 is a metal head chassis 20, which is provided with notches 53, 54 respectively engageable with engaging projections 51, 52 integrally formed with the main chassis 11. The head chassis 20 slides with the actuation of the reproducing member 16 in the same direction as that in which said reproducing member 16 is inserted. The prescribed section of the head chassis 20 is provided with an attaching member 21 prepared from synthetic resin. Mounted on said attaching member 21 in the prescribed positions are a recording and reproducing head 22, eraser head 23, tape stop detecting lever 24, and spring 25. This spring 25 causes the head chassis 20 and reproducing member 16 to be operated jointly. Set on the attaching member 21 are two mutually facing elastic bifurcate holding sections 211, 212 which are set up perpendicularly to the plane of the head chassis 20. The holding sections 211, 212 clamp together leads 26, 27 drawn from the recording and reproducing head 22.

A thin elastic attachment 213 is integrally formed at the left end of the attaching member 21. An engaging piece 111 is integrally formed on the main chassis 11 for engagement with the thin elastic attachment 213.

The above-mentioned recording and reproducing head 22 is connected to a recording and reproducing circuit (not shown) through the leads 26, 27 indicated in one dot-dash lines in Fig. 1.

5 Disposed on the indicate right side of the head chassis 20 is a pinch lever 29 which is prepared from synthetic resin and in rotated about a pivotal shaft 28 in either of the directions indicated by arroous A and B shown in Fig. 1, as need arises. Provided at one end of
10 said pinch lever 29 is a pinch roller 31 which is pressed against a capstan 30 concentrically arranged with the later described flywheel 44 when the pinch lever 29 is rotated in the direction of the arrow A.

 Provided on the rear side (the upper side of Fig. 1)
15 of the main chassis 11 is an error-erasure preventing mechanism 32 which effects the operation of the recording member 15 when detecting the presence of on error-erasure preventing pawl on the tape cassette, and
20 suspends the operation of the recording member 15 when detecting the absence of said error-erasure preventing pawl on the tape cassette.

 In Fig. 1, reference numerals 33, 34 are guide pins. Reference numerals 35, 36 show left and right reel rests. Reference numeral 37 denotes a motor.

25 Fig. 2 schematically shows the arrangement of various mechanism fitted to the underside of the main chassis 11 of the cassette tape recorder. The recording

member 15, reproducing member 16, rewinding member 17 and fast forwarding member 18 are designed to be locked in the prescribed position by a locking plate 38 which extends at right angles to said linearly arranged members 15, 16, 17, 18 and can slide in either of the directions of arrows C and D indicated in Fig. 2 as need arises in engagement with any of said members 15, 16, 17, 18.

There is further provided a switch slider 39 which extends substantially parallel with the locking plate 38 and can slide in either of the directions of arrows E and F indicated in Fig. 2 as need arises in engagement with any of said members 15, 16, 17, 18. When sliding in the direction of the arrow E, said switch slider 39 actuates a power supply switch 40 of the motor 37.

The reproducing member 16 and rewinding member 17 are urged by a V-shaped coil spring 41 toward the lower side of Fig. 2. Where the reproducing member 16, rewinding member 17 and fast forwarding member 18 are actuated in advance, the recording member 15 is disabled by the later described erroneous-recording preventing mechanism 42 which is prepared from synthetic resin and set in substantially the intermediate part of said recording member 15. The tape stop detecting lever 24 is so arranged as to actuate an automatic operation stop mechanism 43 which is prepared from synthetic resin and disposed on the indicated right underside of the main chassis 11.

Referring to Fig. 2, reference numeral 44 denotes a flywheel, which is connected to a rotating pulley 45 of the motor 37 and a belt 46 for transmission of the rotation moment of the motor 37.

5 There will now be described the erroneous-recording preventing mechanism 42 characterizing a cassette tape recorder embodying this invention. As shown in Figs. 3a and 3b, an erroneous-recording preventing member 61 is disposed above the switch slider 39. The erroneous-
10 recording preventing member 61 is formed of synthetic resin. One end as a body, of the erroneous-recording preventing member 61 is rotatably supported by a pivotal shaft 62. The other end of said member 61 is shaped like a 2-pronged fork. The left prong is an elastic
15 member 611 bent approximately like a crank and rendered elastic by being made thin. The right prong is a bent member 612 bent at the end toward the elastic member 611 and rendered nonelastic by being made thick. The end of the left side prong 611 and that of the right side
20 prong 612 are spaced from each other. A bent engagement attachment 63 formed at the center of one end portion of the switch slider 39 is inserted into said intervening space.

25 A protuberance 64 is formed on that side of the body of the erroneous-recording preventing member 61 which lies adjacent to the base end portion of the left side prong 611. This protuberance 64 extends in the indicated

left direction on the opposite side of the erroneous-recording preventing member 61 to the right side prong 612. A bent engagement attachment 65 (Fig. 3a) is formed substantially at the center of the recording member 15. This bent engagement attachment 65 is made engageable with the protuberance 64 of the erroneous-recording preventing member 61. As seen from Fig. 4, the protuberance 64 which acts as a sort of cam surface comprises an engagement cam surface portion 641 extending at right angles to the direction in which the bent engagement attachment 65 is actuated and another engagement cam surface portion 642 slightly inclined to said direction.

There will now be described the operation of the erroneous-recording preventing mechanism 42 arranged as described above. Where any of the operation members 13, 15, 16, 17, 18 (excluding the pause member 19) is not actuated, the right side prong 612 of the erroneous-recording preventing member 61 is pushed to the right side of Fig. 3a by the bent engagement attachment 63 of the switch slider 39. The protuberance 64 of the erroneous-recording preventing member 61 is displaced from the course (represented by the direction of a arrow H) along which the engagement attachment 65 of the recording member 15 is moved. Where, under the above-mentioned condition, the recording member 15 is actuated, the bent engagement attachment 65 is not engaged with the

protuberance 64 of the erroneous-recording preventing member 61, but passes by the neighborhood of said protuberance 64. At this time, the switch slider 39 is moved jointly with the actuation of the recording member 15. Where the recording member 15 is locked by the locking plate 38, then the erroneous-recording preventing member 61 takes a position shown in Fig. 5. Where, therefore, any of the other operation members 13, 16, 17, 18 is not actuated, then the recording member 15 can be reliably put into operation. Where, as shown in Fig. 5, any of the tape run controlling members, for example, the rewinding member 17 is actuated in advance of the recording member 15, then the switch slider 39 is moved in the direction of an arrow G. As a result, the bent engagement attachment of the switch slider 39 pushes the elastic prong 611 of the erroneous-recording preventing member 61 in the direction of the arrow G, causing the erroneous-recording preventing member 61 to be rotated clockwise as indicated. At this time, the protuberance 64 of the erroneous-recording preventing member 61 is brought into the traveling course of the bent engagement attachment 65 of the recording member 15. Where, therefore, it is attempted to insert the recording member 15 in the direction of the arrow H, then the bent engagement attachment 65 is pressed against the engagement cam surface 641 of the protuberance 64 formed on the erroneous-recording preventing member 61, thereby preventing the recording member 15 from being operated. Where, therefore, any

other operation members than the recording member 15 is actuated in advance, the recording member 15 can not be operated, thereby effecting the prevention of erroneous-recording.

5 Formed on one lateral side of the recording member 15 is a L-shaped projecting piece 151 (Fig. 7) engageable with a bent engagement attachment 71 formed at the central part of one end portion of the reproducing member 16. Where the recording member 15 is actuated, 10 while none of the other operation members are operated, then the projecting piece 151 is engaged with the bent engagement attachment 71 of the reproducing member 16 to effect its actuation. At this time the recording member 15 and reproducing member 16 are locked in position by 15 the locking plate 38. As a result, the head chassis 20 and pinch roller 31 take a position ready for operation. In this case, engagement members 72, 73, 74 by means of which the recording member 15, rewinding member 17, and reproducing member 16 are respectively locked by the 20 locking plate 38 are chosen to have such lengths l_1 , l_2 , l_3 as are related to each other as follows:

$$l_1 < l_2 < l_3$$

Consequently, where the rewinding member 17 is moved in the direction of the indicated arrow I during the 25 recording mode shown in Fig. 7, then the recording member 15 alone is first disengaged from the locking plate 38, because the corresponding engagement member 72

used to lock said recording member 15 to the locking plate 38 has the shortest length l_1 . The locking plate 38 is normally urged by a spring (not shown) in the direction of an arrow D shown in Fig. 7. Where, therefore, the rewinding member 17 is inserted in the direction of the arrow I, then the locking plate 38 is moved in the direction of an arrow C by the length l_2 of the engagement member 73 of the rewinding member 17. When moved to the above-mentioned extent, the locking plate 38 is frictionally engaged with the reproducing member 16 by the urging force of the aforesaid spring acting in the direction of in an arrow J, thereby keeping the reproducing member 16 in said locked position. In other words, the rewinding member 17 remains in an unlocked state, providing an arrangement adapted for the so-called quick review.

The cassette tape recorder of this invention comprises not only the arrangement by which the recording member 15 alone is unlocked when the rewinding member 17 is actuated, but also the arrangement by which the rewinding member 17 is not locked even when operated. Where the rewinding member 17 is operated, the head chassis 20 is slightly retracted from the operative position. The recording and reproducing head 22 touches a tape with a smaller force than in the recording and reproducing mode. The pinch roller 31 is removed from the capstan 30 as when the rewinding member 17 alone is

actuated. At this time, the rotation moment of the flywheel 44 is supplied to that reel rest which is used to take up a tape at the time of rewinding.

Where the rewinding member 17 is actuated at a proper time while recording is made on a tape by the arrangement shown in Fig. 7, then the rewinding of the tape is effected, while the recording member 15 alone is disengaged. In the case where the rewinding member 17 ceases to be operated, then the reproducing member 16 which has still remained actuated, can immediately reproduce previously recorded signals. In other words, the so-called quick review is carried out.

Since the reproducing member 16 remains actuated throughout the above-mentioned cycle of operations, the switch slider 39 still retains the position indicated in Fig. 7. Consequently, the erroneous-recording preventing member 61 also takes the position shown in Fig. 7. Where the recording member 15 alone is disengaged and moved in the direction of the indicated arrow J, then the bent engagement attachment 65 of the recording member 15 pushes the inclined engagement cam surface 642 of the protuberance 64 formed on the erroneous-recording preventing member 61. As a result, the body of the erroneous-recording preventing member 61 is rotated counterclockwise as indicated. However, the thin elastic prong 611 of the erroneous-recording preventing member 61 which still remains engaged with the

bent engagement attachment 63 of the switch slider 39 retains the engaged position due to the elastic force, regardless of the counterclockwise rotation of the body of the erroneous-recording preventing member 61.

5 The above-mentioned counterclockwise rotation of said body slightly broadens the space between the end of the elastic prong 611 of the erroneous-recording preventing member 61 and that of the thick bent prong 612. Since the bent engagement attachment 65 of the
10 recording member 15 is not abstructed by the protuberance 64 of the erroneous-recording preventing member 61, the recording member 15 alone is shifted from the operative position to the inoperative position and unlocked. When the recording member 15 regains an inoperative position,
15 the erroneous-recording preventing member 61 which was rotated counterclockwise by the movement of the bent engagement attachment 65 of the recording member 15 is rotated clockwise by the urging force of the elastic prong 611 up to the point at which the recording member
20 15 is prevented from being shifted to an operative position. Therefore, the erroneous-recording preventing member 61 arranged as described above easily allows for the quick review.

Where, during the recording mode undertaken by the
25 arrangement of Fig. 7, the fast forwarding member 18 is inserted, then the so-called quick cue can also be easily carried out.

This invention is not limited to the above-mentioned embodiment, but can be practised in various modifications without departing from the scope of the invention.

As previously described, this invention provides
5 a very satisfactory compact, light, and inexpensive tape recorder which uses a small number of parts, has a simple arrangement and can be reliably operated, and is further provided with a erroneous-recording preventing mechanism adapted to be used for a quick review.



Claims

1. A tape recorder which comprises:

5 a first operation member for setting the tape recorder for a first operation mode when shifted from an inoperative position to an operative position;

a second operation member for setting the tape recorder for a second operation mode when shifted from an inoperative position to an operative position jointly with the first operation member;

10 a control member which is moved with the actuation of the first operation member;

an erroneous-operating preventing member so arranged as to occupy a first or second position as need arises by means of said control member, said erroneous-operating preventing member being formed of a body provided with an engagement member, which, when taking the first position, allows for the shifting of the second operation member to an operative position, and, when taking the second position, prevents the second operation member from being shifted to the operative position, and an elastic member, the end of which is supported by the body of said erroneous-operating preventing member, and the other end of which is engaged with said control member, and wherein, when the tape recorder is shifted from the second operation mode to the first operation mode, said erroneous-operating preventing member allows for the shifting of the body thereof toward the first position

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due to engagement with the second operation member shifted from the operative position to the inoperative position, and, when disengaged from the second operation member, brings the body back to the second position, by the elastic action of said elastic member.

2. The tape recorder according to claim 1, wherein the second operation member is constituted by a recording member, which, when taking an operative position, sets the tape recorder for a prerecording mode;

the first operation member comprises a first tape run-controlling member which, when taking the operative position, sets the tape recorder for a slow tape run mode; and the erroneous-operating preventing member comprises an erroneous-recording preventing member.

3. The tape recorder according to claim 2, which further comprises a second tape run-controlling member for setting the tape recorder for the fast mode, when shifted from the inoperative position to the operative position; and a tape run-stopping member for rendering the tape recorder inoperative, when shifted from the inoperative position to the operative position.

4. The tape recorder according to claim 2 or 3, wherein one end of the erroneous-recording preventing member is movably supported on a chassis and said elastic member is integrally formed at the other end thereof.

5. The tape recorder according to claim 2, 3 or 4, wherein engagement protuberance integrally formed with



the erroneous-recording preventing member has a cam surface extending perpendicularly to the direction in which the recording member is actuated, and another cam surface which is inclined to said direction; said perpendicularly extending cam surface of the engagement protuberance prevents a projection formed on the recording member from being shifted from the inoperative to the operative position; and said inclined cam surface allows for the shifting of said projection from the operative position to the inoperative position.

6. The tape recorder according to claim 2, 3, 4 and 5, wherein the erroneous-recording preventing member further comprises a nonelastic prong which is set close to said elastic member and extends substantially at right angles to the direction in which said erroneous-recording preventing member is moved jointly with the actuation of the first or second tape-run controlling member.

7. The tape recorder according to claim 2, 3, 4, 5 or 6, wherein the erroneous-recording preventing member is wholly molded from plastics material.

8. The tape recorder according to claim 7, wherein said elastic member is prepared from plastics material to display elasticity as a whole.

9. The tape recorder according to claim 6, 7 or 8, wherein an engagement member moving jointly with the actuation of the first or second tape run-controlling member is provided between said elastic member and said nonelastic



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prong; and said engagement member is pressed against the elastic member to move it when the first or second tape run-controlling member is shifted from the inoperative to the operative position, and abuts against the nonelastic prong when the first or second tape run-controlling member is shifted from the operative to the inoperative position, thereby causing said nonelastic prong to be moved in the opposite direction to that in which said elastic member is moved.

10 10. The tape recorder according to claims 3, 4, 5, 6, 7, 8 or 9, wherein, while recording is carried on by the actuation of the recording member, said recording member is unlocked by the actuation of the first tape run-controlling member, but the second tape
15 run-controlling member is not unlocked, causing recording alone to be stopped; and the first tape-run-controlling member is not locked in the operative position.

11. A tape recorder, substantially as hereinbefore described with reference to the accompanying drawings.

The text of the specification has been reproduced by photocopying the applicants original typescript. It may contain a few amendments which are difficult to read. The original typescript containing these amendments may be inspected on the premises of the Patent Office