

PATENT SPECIFICATION

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(54) OPERATING MECHANISMS FOR TAPE RECORDERS

(71) We, SHIN-SHIRASUNA ELECTRIC CORPORATION, a Japanese Company, of No. 1, 7-chome, Okute-cho, Chikusa-ku, Nagoya-shi, Aichi-ken, Japan, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to operating mechanisms for tape recorders.

Tape records have been proposed and put into use which have the functions of enabling fast forward movement (cue) or rewind (review) of the tape during recording or play-back operation. In these tape recorders it is necessary that the position of the operating mechanism for play-back operation be maintained when and after cueing or reviewing is effected and, moreover, that the erase head be prevented from engaging the tape by mistake, for example. This is because the cue or the review function cannot be performed if the position for play-back operation is released by the cueing or reviewing being effected, and because if the erase head engages the tape by mistake, for example, the record on the tape will be erased thereby.

According to the present invention there is provided an operating mechanism for a tape recorder, the mechanism comprising at least a recording lever, a play-back lever and a review lever or a cue lever each capable of being pushed-in from a first position to a second position, wherein if the review or the cue lever is pushed-in when recording or play-back operation is activated by the recording lever and the play-back lever together being pushed-in or by the play-back lever alone being pushed-in, respectively, the position of the mechanism for play-back operation is maintained during either of recording or play-back operation, the mechanism further comprising:

a) a first slider bar spring-biased in a first direction, and
b) a second slider bar spring-biased in a second direction opposite to said first direction,

c) the first and second slider bars extending transversely of and perpendicularly to said levers and being slidable in a plane orthogonal to a major surface of each of said levers,

d) the first slider bar having a projection associated with each of the recording, play-back and review or cue levers, and the recording, play-back and review or cue levers having cam surfaces thereon engageable with said projections for moving the first slider bar in said second direction,

e) the second slider bar having a projection associated with the recording lever, and the recording lever having a surface for contacting the projection of the second slider bar, such that when said surface is in contact with the projection the recording lever is prevented from being pushed in,

f) the first and second slider bars having cooperating engagement surfaces, the second slider bar being normally held against movement in said second direction by the first slider bar and pushing-in of the cue or play-back lever moving the first slider bar in said second direction for permitting spring bias movement of the second slider bar in said second direction to a predetermined position, and

g) said predetermined position of the second slider bar being such that said projection of the second slider bar will contact said surface of the recording lever if an attempt is made to push in the recording lever whereby recording by the tape recorder is prevented upon depression of the cue, review or play-back lever.

An embodiment of the present invention described hereinbelow prevents an erase head of an associated recorder from engaging the tape to erase the tape when cue or review is effected during recording or play-back.

The invention will now be further described, by way of illustrative and non-limiting example, with reference to the accompanying drawing, in which:

Figure 1 is a schematic plan view showing essential portions of an operating mechanism for a tape recorder according to an

embodiment of the present invention;

Figure 2 is a front elevational view showing a pair of slider bars of the mechanism in relation to Figure 1; and

5 Figures 3(A) to (D) are views useful for explaining the operation of the mechanism shown in Figure 1.

A mechanism embodying the invention will now be described with reference to the drawing. In the drawing, reference characters 1a to 1f designate a recording lever 10 a review lever, a play-back lever, a cue lever, a stop lever and an eject lever each having one end portion (lower end portion as viewed in Fig. 1) projecting from a side wall of a chassis (not shown) and capable of being pushed in the direction of arrow R against the bias force of a spring. These levers 1a to 1f are formed with through-apertures 2a to 2f configured as shown in Fig. 1. The through-apertures 2b and 2d formed in the review lever 1b and the cue lever 1d, respectively, may be similar in configuration and are provided with inclined edges 3b and 3d and restraining recesses 4b and 4d. The through-aperture 2a has a side edge 3a'. The through-aperture in the stop lever 1e has an inclined edge 3e but is not formed with a restraining recess like those mentioned above. The through-aperture 2f in the eject lever 1f is formed in an inverted L-shape. The through-aperture 2c in the play-back lever 1c has an inclined edge 3c and a restraining recess 4c, and the restraining recess 4c is provided with two stepped portions 4c' and 4c'' at the forward edge thereof. Further, it should be noted that the through-aperture 2a in the recording lever 1a has an inclined edge 3a and a restraining recess 4a similar to those in the review lever 1b and the cue lever 1d, and also has an additional restraining recess 4a' provided at the forward edge opposite from the restraining recess 4a.

Below the levers 1a to 1f (as viewed in Fig. 1), a first slider bar 5a (Fig. 2) and a second slider bar 5b (Fig. 2) extend transversely of and perpendicularly to these levers and are slidable in a plane orthogonal to the major surfaces of those levers. These first and second slider bars 5a and 5b are spring-biased in opposite directions as indicated by arrows A and B in Fig. 2, and the spring bias for the first slider bar 5a is greater than the spring bias for the second slider bar 5b. The first slider bar 5a has projections 6a to 6f formed integrally therewith, as shown in Fig. 2, and the second slider bar 5b is provided with a projection 6a'. These slider bars 5a and 5b are further provided with cut-aways 7a, 7b and engagement pieces 8a, 8b at the lower edges thereof, and are engaged with each other in the manner shown in Fig. 2. The projections 6a' and 6a to 6f are inserted in the through-apertures

2a to 2f and associated with respective ones of the levers, as shown in Fig. 1. Fig. 1 shows a position in which none of the levers is pushed in, and Fig. 2 shows the position then adopted by the first and second slider bars 5a and 5b with respect to the positional relation between the projections and associated through-apertures. In this position, it will be seen that the projection 6a is located forwardly of the inclined edges 3a of the through-aperture 2a in the recording lever 1a while the projection 6a' lies inwardly of the additional restraining recess 4a' of the through-aperture 2a, so that the recording lever 2a is ready to be pushed in.

To effect recording operation in the position shown in Fig. 1, the recording lever 1a and the play-back lever 1c may be pushed in at the same time in a conventional manner. Thereupon, as regards the recording lever 1a, the projection 6a is guided into the restraining recess 4a by the inclined edge 3a while the projection 6a' is brought into contact with and guided by the side edges 3a' of the through-aperture 2a and thus, these projections 6a and 6a' assume positions indicated by 6a and 6a' in Fig. 3(A). At the same time, as regards the play-back lever 1c, the projection 6c is guided by the inclined edge 3c and brought into engagement with the first stepped portion 4c' of the restraining recess 4c, and assumes the position indicated by 6c in Fig. 3(A). Thus, the first slider bar 5a is slid in the direction of an arrow A' against the spring bias in the direction of arrow A, by a distance d indicated in Fig. 3(A), while the second slider bar 5b is slid somewhat in the same direction as that of the spring bias acting thereon in the direction of arrow B until the projection 6a' is brought into contact with the side edge 3a' of the through-aperture 2a, as already noted, whereupon the slider bar 5b can be slid no further in the direction of the arrow B. As regards, for example, the cue lever 1d in this case, this lever is not pushed in and so, the projection 6d associated therewith is moved in the direction of arrow A' by a distance d indicated in Fig. 3(A) to assume a position indicated by 6d, which lies forwardly of the inclined edge 3d of the through-aperture 2d.

In such position, when cueing is called for by pushing in the cue lever 1d, the projection 6d is guided in the direction of the arrow A' by the inclined edge 3d of the through-aperture 2d in that lever to thereby move the first slider bar 5a in the same direction, with the result that, as seen in Fig. 3(B), the projection 6c so far engaged with the first stepped portion 4c' of the play-back lever 1c is momentarily shifted to the second stepped portion 4c'' and engaged therewith, whereby the first slider bar 5a is further slid in the direction of the arrow A' by a distance

corresponding to the length d' (Fig. 1) of the first stepped portion $4c'$ of the play-back lever $1c$. When this occurs, the play-back lever $1c$ is retracted by an amount corresponding to the difference between the levels of the first stepped portion $4c'$ and the second stepped portion $4c''$, but suitable means (not shown) is of course provided which is associated with the play-back lever $1c$ to maintain the position for play-back operation irrespective of such retraction of the play-back lever. When the first slider bar $5a$ is so slid in the direction of the arrow A' by a distance corresponding to the aforementioned length d' , as will be seen in Fig. 3(B), the projection $6a$ comes out of engagement with the restraining recess $4a$ of the recording lever $1a$ to permit the lever $1a$ to retract and return to its non-pushed-in position shown in Fig. 1 while, at the same time, the projection $6a'$ of the second slider bar $5b$ comes into the additional restraining recess $4a'$ formed in the recording lever $1a$, thus preventing the recording lever $1a$ from being pushed in by mistake in the position for play-back operation. Also in this case, the projection $6d$ associated with the cue lever $1d$ is shifted to its position of Fig. 3(B) which is off the inclined edge $3d$ of that lever $1d$ and, therefore, the position for play-back operation is maintained without the first slider bar $5a$ being slid even if the cue lever $1d$ is again pushed in while it is in such position. If the stop lever $1e$ is then pushed in, the inclined edges $3e$ thereof is engaged with the projection $6e$, thereby restoring the position of Fig. 1 immediately.

When, in the position of Fig. 1, the play-back lever $1c$ alone is pushed in, namely, when the stop position is shifted into the playback position, the projection $6c$ is engaged with the first stepped portion $4c'$ of that lever while the projection $6a'$ of the second slider bar $5b$ is partly engaged with the additional restraining recess $4a'$ of the recording lever $1a$, as seen in Fig. 3(C), and when the cue lever $1d$, for example, is then pushed in, the projection $6c$ is shifted to the second stepped portion $4c''$ of the play-back lever $1c$ in the same manner as described above, with the result that, as seen in Fig. 3(D), the projection $6a'$ comes into the restraining recess $4a'$, thus preventing the recording lever $1a$ from being pushed in while it is in any of the positions of Figs. 3(C) and (D).

For convenience, the foregoing description refers to a case where the cueing is effected during recording or play-back, but it will readily be appreciated that the above description is equally applicable to a case where reviewing is effected. It will also be apparent that the eject lever $1f$ may be pushed in the position of Fig. 1, namely, in the stop position.

In the above-described embodiment, each lever is provided with a through-aperture and these apertures are formed with inclined edges and restraining recesses as described, whereas the other levers than the recording lever need not be provided with such through-apertures but inclined edges and restraining recesses similar to those described above may be provided on one side edge of those levers.

According to the above embodiment of the present invention, a simple construction, in which the levers are provided with the inclined edges, restraining recesses, etc of the described configuration and a pair of slider bars is associated with the levers, prevents an erase head of the tape recorder from engaging the tape to erase the tape when cueing or reviewing is effected during recording or play-back.

WHAT WE CLAIM IS:-

1. An operating mechanism for a tape recorder, the mechanism comprising at least a recording lever, a play-back lever and a review lever or a cue lever each capable of being pushed-in from a first position to a second position, wherein if the review or the cue lever is pushed-in when recording or play-back operation is activated by the recording lever and the play-back lever together being pushed-in or by the play-back lever alone being pushed in, respectively, the position of the mechanism for playback operation is maintained during either of recording or playback operation, the mechanism further comprising:
 - a) a first slider bar spring-biased in a first direction, and
 - b) a second slider bar spring-biased in a second direction opposite to said first direction,
 - c) the first and second slider bars extending transversely of and perpendicularly to said levers and being slidable in a plane orthogonal to a major surface of each of said levers,
 - d) the first slider bar having a projection associated with each of the recording, play-back and review or cue levers, and the recording, play-back and review or cue levers having cam surfaces thereon engageable with said projections for moving the first slider bar in said second direction,
 - e) the second slider bar having a projection associated with the recording lever, and the recording lever having a surface for contacting the projection of the second slider bar, such that when said surface is in contact with the projection the recording lever is prevented from being pushed in,
 - f) the first and second slider bars having cooperating engagement surfaces, the second slider bar being normally held against movement in said second direction by the first slider bar and pushing-in of the cue or

play-back lever moving the first slider bar in said second direction for permitting spring bias movement of the second slider bar in said second direction to a predetermined position, and
5 g) said predetermined position of the second slider bar being such that said projection of the second slider bar will contact said surface of the recording lever if an attempt
10 is made to push in the recording lever whereby recording by the tape recorder is prevented upon depression of the cue, review or play-back lever.

2. An operating mechanism according to claim 1, wherein the spring bias imparted to the first slider bar is greater than the spring bias imparted to the second slider bar.

3. A tape recorder provided with an operating mechanism according to claim 1 or claim 2.

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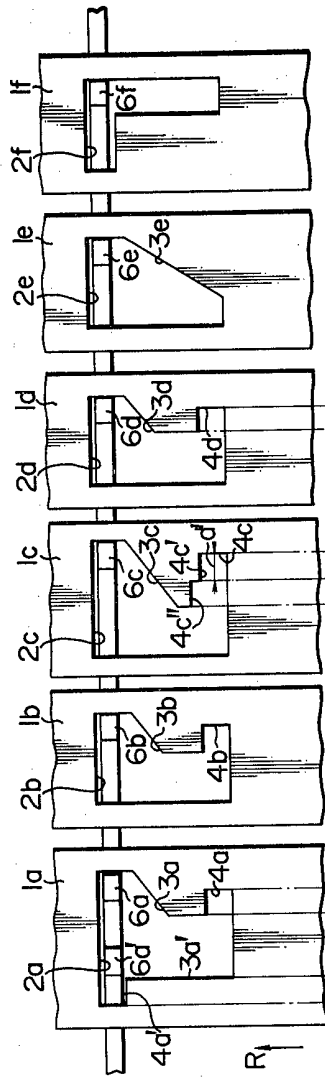


FIG. 1

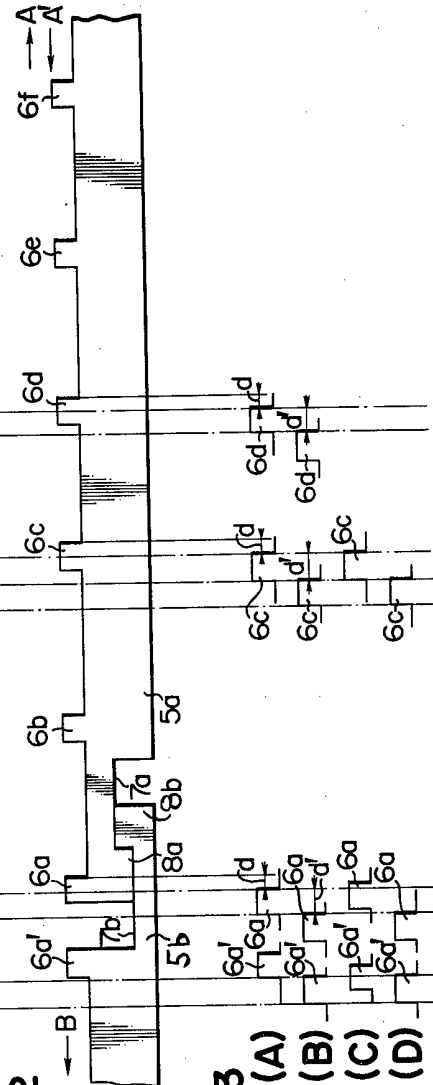


FIG. 2

FIG. 3 (A) (B) (C) (D)

