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(19)

(54) IMPROVEMENTS IN CASSETTE TAPE RECORDERS AND/OR PLAYBACK APPARATUS

(71) I, RODOLFO CICATELLI, an Italian Subject, of Gandria—Lugano, Switzerland, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be described in and by the following statement:—

This invention relates to magnetic tape recording and/or play-back apparatus utilizing removable tape cassettes.

The cassette herein specified is of the type having an end-to-end magnetic tape wound on and extending between two tape reels which are located side by side in a common plane, hereinafter called 'the plane of the cassette.' The tape and reels are housed in a rectangular casing having two opposite major surfaces and apertures for receiving reel take up and rewind spindles, drive capstans, pinch rollers and heads of the play-back and/or recording apparatus.

Heretofore, such cassettes may be engageable with and disengageable from the apparatus by insertion and ejection through a frontal slot into a stationary enclosure of the apparatus and the spindles, capstans and pinch rollers are themselves moved into operative engagement with the tape and tape reels. In other known arrangements the cassette is inserted into a pivotally mounted cassette holder which holder swings arcuately into or out of an operative position where the tape reels are engaged by the reel spindles.

These aforementioned known arrangements therefore involve either arcuate movement of the cassette or movement of the spindles as the cassette reels are engaged with or disengaged from the spindles.

Following the present invention, the cassette is arranged to be movable into and out of operative engagement with the drive spindles of the recording and/or play-back apparatus with the movement taking place in a direction virtually at right angles to the plane of the cassette. In this way, firstly arcuate movements of the cassette are avoided as are movements of the spindles.

According to the invention there is provided magnetic tape recording and /or playback apparatus for use with a removable twin-reel tape cassette of the type specified, wherein the cassette is movable into and out of its operative position, where its tape reels are engaged with drive spindles of the apparatus, by movement along a line substantially at right angles to the major surfaces of the cassette, and wherein guide means are provided for controlling the location of the cassette as it is moved to and from its operative position, said guide means comprising two pivotally mounted members, each pivoted about a respective axis, said axes being at right angles to one another, at least one of said members being spring loaded toward the other member, and each said member being arranged to engage a respective one of the two opposite major surfaces of the cassette.

Preferably the said guide means comprises a pair of spaced members pivotal about respective ones of two axes parallel to one another, said pair of members being arranged to engage one of the major surfaces of the cassette, and a further member mounted pivotally on an axis normal to said two parallel axes, said further member being adapted to engage the other major surface of the cassette.

The said further member may comprise a fork-like element with the individual prongs thereof each adapted to engage the cassette adjacent a respective one of its opposite ends.

Advantageously, the edges of said pair of members and of said further member are rounded to facilitate insertion of the cassette between said members.

Suitably means are provided for preventing lateral movement of the cassette as it moves into and out of its operative position.

The invention will be further described

SPECIFICATION AMENDED - SEE ATTACHED SLIP

with reference to the accompanying diagrammatic drawing which illustrates various embodiments of guide means for controlling movement of a removable cassette into an operative position in which it reels are engaged by driving spindles of a recording and/or play-back apparatus, (the spindles and most of the remainder of the recording and/or play-back apparatus being omitted from the drawing which shows only the cassette and the guide means).

In the drawing:

Figure 1 shows diagrammatically a first constructional form of the invention in plan view;

Figure 2 shows diagrammatically the kinematic motion of a lower pair of guide members in a second constructional form;

Figure 3 is a diagrammatic side view of the second embodiment; and

Figure 4 shows a diagrammatic plan view of a third embodiment.

With reference to Figure 1 of the said drawing, a magnetic tape cassette 1 is shown located between two members 2 and 3 orthogonal one to the other; whereas lateral guide elements (not shown) prevent lateral movements of the cassette once the cassette loading movement is started. At least one of the members, for example the member 3, is spring loaded towards the other member 2 to hold the cassette.

The member 2 and the member 3 can swing each about its own axis, the said axes being orthogonal one to the other. If a pressure is applied on the member 3 in the direction orthogonal to the plane of the cassette 1, the member 2 will be compelled to swing about its axis of rotation and therefore, the cassette will be moved in a direction perpendicular to its major surfaces to its operative position engaged with the drive spindles.

As shown in Figure 2, opposite ends of the underside of the cassette are engaged by two members 4 and 5, that are functionally similar to the member 2 shown in Figure 1, these last two members rotating, as a consequence of a directly or indirectly applied force on the cassette 1, around their axes 6 and 7, until they reach respectively the positions 4' and 5', where the cassette will have its reels operatively engaged with the drive spindles (not shown) of the apparatus. Of course, an upper member, that is not shown in Figure 2, follows the swinging movement of the members 4 and 5 and holds the cassette against the members 4 and 5 as it moves.

For example, and as shown in Figure 3, the upper member 8 moves from the position depicted by the broken line to the position 8' depicted by the solid line.

The members 4 and 5 are spring loaded, and, in a preferred embodiment, they are pre-stressed in such a way as to hold the cassette in a lifted position, means (not shown) being provided to hold the cassette in its operative position with its reels engaged with the drive spindles. The obtention of such a stress is diagrammatically depicted in Figures 2 and 3, in which the members 4 and 5 are equipped with arms 9 and 10, so that when the members 4 and 5 reach the positions 4' and 5', the arms reach the positions 9' and 10' and this against the operation of the respective springs 11, that are put under tension.

As already mentioned the upper members, that are shown in Figures 1 and 3 as a single element, can, on the contrary, be composed by two or more elements, but are preferably as shown in the Figure 4. In Figure 4, the upper member comprises a fork element 12 which engages the cassette towards its opposite ends, the fork element being pivotally supported on an axis 13 which is orthogonal to the axes round which the members 4 and 5 turn. A pressure applied on the cassette, whether directly or, preferably, through the fork 12, effects the movement of the cassette 1 into engagement with reel driving spindles of the record and/or play-back apparatus.

In order to facilitate the engagement of the cassette with the members, for example by being inserted in the direction of the arrows A of Figures 3 and 4, the members may be shaped suitably by rounding to obviate obstructions to the insertion of the cassette.

WHAT I CLAIM IS:—

1. Magnetic tape recording and/or playback apparatus for use with a removable twin-reel tape cassette of the type specified, wherein the cassette is movable into and out of its operative position, where its tape reels are engaged with drive spindles of the apparatus, by movement along a line substantially at right angles to the major surfaces of the cassette, and wherein guide means are provided for controlling the location of the cassette as it is moved to and from its operative position, said guide means comprising two pivotally mounted members, each pivoted about a respective axis, said axes being at right angles to one another, at least one of said members being spring loaded toward the other member, and each said member being arranged to engage a respective one of the two opposite major surfaces of the cassette.

2. Apparatus according to claim 1 wherein said guide means comprises a pair of spaced members pivotal about respective ones of two axes parallel to one another, said pair of members being arranged to engage one of the major surfaces of the cassette, and a further member mounted

with reference to the accompanying diagrammatic drawing which illustrates various embodiments of guide means for controlling movement of a removable cassette into an operative position in which it reels are engaged by driving spindles of a recording and/or play-back apparatus, (the spindles and most of the remainder of the recording and/or play-back apparatus being omitted from the drawing which shows only the cassette and the guide means).

In the drawing:

Figure 1 shows diagrammatically a first constructional form of the invention in plan view;

Figure 2 shows diagrammatically the kinematic motion of a lower pair of guide members in a second constructional form;

Figure 3 is a diagrammatic side view of the second embodiment; and

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With reference to Figure 1 of the said drawing, a magnetic tape cassette 1 is shown located between two members 2 and 3 orthogonal one to the other; whereas lateral guide elements (not shown) prevent lateral movements of the cassette once the cassette loading movement is started. At least one of the members, for example the member 3, is spring loaded towards the other member 2 to hold the cassette.

The member 2 and the member 3 can swing each about its own axis, the said axes being orthogonal one to the other. If a pressure is applied on the member 3 in the direction orthogonal to the plane of the cassette 1, the member 2 will be compelled to swing about its axis of rotation and therefore, the cassette will be moved in a direction perpendicular to its major surfaces to its operative position engaged with the drive spindles.

As shown in Figure 2, opposite ends of the underside of the cassette are engaged by two members 4 and 5, that are functionally similar to the member 2 shown in Figure 1, these last two members rotating, as a consequence of a directly or indirectly applied force on the cassette 1, around their axes 6 and 7, until they reach respectively the positions 4' and 5', where the cassette will have its reels operatively engaged with the drive spindles (not shown) of the apparatus. Of course, an upper member, that is not shown in Figure 2, follows the swinging movement of the members 4 and 5 and holds the cassette against the members 4 and 5 as it moves.

For example, and as shown in Figure 3, the upper member 8 moves from the position depicted by the broken line to the position 8' depicted by the solid line.

The members 4 and 5 are spring loaded, and, in a preferred embodiment, they are pre-stressed in such a way as to hold the cassette in a lifted position, means (not shown) being provided to hold the cassette in its operative position with its reels engaged with the drive spindles. The obtention of such a stress is diagrammatically depicted in Figures 2 and 3, in which the members 4 and 5 are equipped with arms 9 and 10, so that when the members 4 and 5 reach the positions 4' and 5', the arms reach the positions 9' and 10' and this against the operation of the respective springs 11, that are put under tension.

As already mentioned the upper members, that are shown in Figures 1 and 3 as a single element, can, on the contrary, be composed by two or more elements, but are preferably as shown in the Figure 4. In Figure 4, the upper member comprises a fork element 12 which engages the cassette towards its opposite ends, the fork element being pivotally supported on an axis 13 which is orthogonal to the axes round which the members 4 and 5 turn. A pressure applied on the cassette whether directly or, preferably, through the fork 12, effects the movement of the cassette 1 into engagement with reel driving spindles of the record and/or play-back apparatus.

In order to facilitate the engagement of the cassette with the members, for example by being inserted in the direction of the arrows A of Figures 3 and 4, the members may be shaped suitably by rounding to obviate obstructions to the insertion of the cassette.

WHAT I CLAIM IS:—

1. Magnetic tape recording and/or playback apparatus for use with a removable twin-reel tape cassette of the type specified, wherein the cassette is movable into and out of its operative position, where its tape reels are engaged with drive spindles of the apparatus, by movement along a line substantially at right angles to the major surfaces of the cassette, and wherein guide means are provided for controlling the location of the cassette as it is moved to and from its operative position, said guide means comprising two pivotally mounted members, each pivoted about a respective axis, said axes being at right angles to one another, at least one of said members being spring loaded toward the other member, and each said member being arranged to engage a respective one of the two opposite major surfaces of the cassette.

2. Apparatus according to claim 1 wherein said guide means comprises a pair of spaced members pivotal about respective ones of two axes parallel to one another, said pair of members being arranged to engage one of the major surfaces of the cassette, and a further member mounted

pivotally on an axis normal to said two parallel axes, said further member being adapted to engage the other major surface of the cassette.

3. Apparatus according to claim 2 wherein said further member comprises a fork-like element with the individual prongs thereof each adapted to engage the cassette adjacent a respective one of its opposite ends.

4. Apparatus according to either of claims 2 or 3, wherein the edges of said pair of members and of said further member are rounded to facilitate insertion of the cassette beetween said members.

5. Apparatus according either of claims 2 or 3, including means for preventing lateral movement of the cassette as it moves into and out of its operative position.

6. Apparatus according to claim 1 and substantially as hereinbefore described with reference to or as shown in the accompanying drawing.

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