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(54) TAPE CASSETTE

(71) We, MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD., a corporation organised under the laws of Japan, and of 1006 Oaza Kadoma, Kadoma-shi, Osaka, 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:—

The invention relates to a tape cassette accommodating reels wound with a tape, such as a magnetic tape, which is so constructed that unnecessary rotation and movement of the tape reels is prevented when the tape cassette is not in a position of use in a magnetic recording-reproducing apparatus, whereby slackening of the tape in the cassette is prevented.

Usually, in magnetic recording-reproducing apparatus using a tape cassette, the tape cassette is inserted into a cassette holder. Then, either the holder is moved towards a reel driving shaft, or the reel driving shaft is moved towards the holder, so that engagement between the tape reel and reel driving shaft is effected.

According to the present invention, there is provided a tape cassette for use in a magnetic recording-reproducing apparatus provided with a brake release pin and a pair of reel engaging shafts, which comprises a casing including a bottom plate, first and second spaced-apart tape reels mounted in the casing, the lower flange of each reel having peripheral teeth, first and second brake pieces pivotally mounted in the casing and having end portions for engagement with the teeth of the respective first and second reels, biasing means for biasing the end portions of the brake pieces into locking engagement with the teeth of the respective reels, a hole formed in the bottom plate through which, when the cassette is in its position of use, the brake release pin is adapted to project, and brake releasing means including an operating arm positioned to close the hole in the bottom plate and to co-act with the brake release pin, and actuating means positioned to pivot the brake pieces against the action of the biasing means to move the end portions of the brake pieces out of locking engagement with the reels upon deflection of the operating arm by the release pin entering the casing through said hole in use.

One of the embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a tape cassette according to the invention,

Fig. 2 is a plan view with part of the casing removed,

Fig. 3 is a detail, on an enlarged scale, of the main parts of the braking mechanism, and

Fig. 4 is a side view corresponding to part of Fig. 3.

In the drawings, 1 denotes a cassette body which, like a conventional tape cassette of the same kind, is divided into an upper half body 1*a* and a lower half body 1*b*. These two half bodies constitute a casing.

The tape cassette 1 accommodates a supply reel 2 and a take-up reel 3 which are rotatable. A magnetic tape 4 from the supply reel 2 is led to the take-up reel 3 by way of guide posts 5 and 6. The tape is exposed in an opening on one side of the cassette body 1. In the opening, recessed portions 7 and 8 are provided, through which the tape is pulled during recording and reproducing, the tape abutting a magnetic head. Also in the opening, another recessed portion 9 is provided. The tape 4 extends across the recessed portions 7, 8 and 9.

When the cassette is not in its position of use, a cover 10 shuts the opening. During recording and reproducing, the cover 10 is removed as shown in Fig. 1 to expose the tape 4.

The above-mentioned construction is similar to that of a conventional tape cassette of this kind.

Next, characteristic parts of the inventive construction will be described.

A multiplicity of teeth 11 and 12 are formed on the outer peripheral edges of the lower flange of both reels 2 and 3 with equal

spacing. 14 denotes a projecting rib positioned between the reels 2 and 3 on the bottom plate 13 of the lower half body 1*b*. The rib has two parallel side walls 14*a* and 14*b*. 15 and 16 denote brake pieces of V-shaped formation which are pivotally mounted at their centres on shafts 17 and 18 respectively. These brake pieces are biased, in the direction of the arrows, by springs 19 and 20 respectively, end portions 15*a* and 16*a* thereof being engaged with the teeth 12 and 11 respectively to prevent any rotational movement of the reels in the direction of feeding of the tape.

The other end portions 15*b* and 16*b* of the brake pieces 15 and 16 are positioned between the side walls 14*a* and 14*b*. The brake pieces ride over the walls 14*a* and 14*b*. 21 denotes a brake release member which can be turned on by a shaft 22 supported in the side walls 14*a* and 14*b*. Actuating means in the form of arms 23 and 24 are mounted on the brake release member 21, as shown in Fig. 4, so as to abut the end portions 15*b* and 16*b* of the brake pieces 15 and 16.

An operating arm 25 is fixed on the brake release member 21 and is positioned to close a hole 27 which is formed in the bottom plate 13 of the lower half body 1*b*.

Next, the operation of the above construction will be described.

When the cassette is not in its position of use, the brake pieces 15 and 16 are engaged with the teeth 12 and 11 of the reel flanges by the biasing force of the springs 19 and 20 respectively so that any rotational movement of the reels 3 and 2 in the direction of feeding of the tape is prevented, as can be seen from Figs. 2 and 3.

In use, the cassette is inserted into the cassette holder and the holder is moved downwardly towards the reel driving shaft. During this movement, a brake release pin 26 provided in parallel with the reel driving shaft extends into the casing through the hole 27 of the plate 13, as is shown in Fig. 4. The pin 26 at the same time pushes the operating arm 25 and causes the brake release member 21 to be angularly turned.

As a result of the turning movement of the brake release member 21, the arms 23 and 24 thereof impart pivotal movement to the brake pieces 15 and 16 against the bias of springs 19 and 20 thereby releasing the brake pieces 15 and 16 from engagement with their co-acting flanges. Both reels can now be freely rotated.

In this position, each reel driving shaft projects through a hole (not shown) into the casing so as to be in driving engagement with the respective reels.

It is preferable to provide the tip of the brake release pin 26 so that it is in spaced relationship with the tip of the reel driving shaft. In this way, the brake release pin 26 is firstly inserted into the casing and releases the above-mentioned braking engagement, after which the reel driving shaft is inserted into the casing.

Furthermore, when the cassette is removed from the recording-reproducing apparatus, the springs 19 and 20 automatically restore the braking action, as shown in Fig. 3.

As described above, according to this invention, the brake release pin projects through the hole formed in the bottom surface of the cassette casing and is used to release the braking engagement of the reels. Therefore, in such an arrangement, after the cassette is inserted into the cassette holder of the cassette recording and reproducing apparatus, the holder is lowered to effect engagement between the reels in the cassette and the reel receiving mechanism of the recording-reproducing apparatus, and no unnecessary slackness in the tape is brought about in the cassette because the reels continue to be in the braked position until they engage with the reel receiving mechanism.

Further, since insertion of the release pin is effected through the bottom plate of the cassette, it does not influence or disturb the tape feeding operation. Therefore, the hole for the brake release pin may be formed in the central portion of the tape cassette. This construction makes it possible to effect a simultaneous release of both reels.

WHAT WE CLAIM IS:—

1. A tape cassette for use in a magnetic recording-reproducing apparatus provided with a brake release pin and a pair of reel engaging shafts, which comprises a casing including a bottom plate, first and second spaced-apart tape reels mounted in the casing the lower flange of each reel having peripheral teeth, first and second brake pieces pivotally mounted in the casing and having end portions for engagement with the teeth of the respective first and second reels, biasing means for biasing the end portions of the brake pieces into locking engagement with the teeth of the respective reels, a hole formed in the bottom plate through which, when the cassette is in its position of use, the brake release pin is adapted to project, and brake releasing means including an operating arm positioned to close the hole in the bottom plate and to co-act with the brake release pin, and actuating means positioned to pivot the brake pieces against the action of the biasing means to move the end portions of the brake pieces out of locking engagement with the reels upon deflection of the operating arm by the release pin entering the casing through said hole in use.

2. A tape cassette as claimed in claim 1, wherein the actuating means comprise a pair of actuating arms mounted, with the operating arm, on a brake release member which is mounted for angular turning movement

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An operating arm 25 is fixed on the brake release member 21 and is positioned to close a hole 27 which is formed in the bottom plate 13 of the lower half body 1*b*.

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Further, since insertion of the release pin is effected through the bottom plate of the cassette, it does not influence or disturb the tape feeding operation. Therefore, the hole for the brake release pin may be formed in the central portion of the tape cassette. This construction makes it possible to effect a simultaneous release of both reels.

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2. A tape cassette as claimed in claim 1, wherein the actuating means comprise a pair of actuating arms mounted, with the operating arm, on a brake release member which is mounted for angular turning movement

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about an axis lying perpendicular to the pivot axes of the brake pieces, the actuating arms engaging respectively with end portions of the brake pieces opposite from that of the teeth engaging end portions thereof.

3. A tape cassette as claimed in claim 1 or claim 2, which further comprises a rib projecting upwardly from the bottom plate and enclosing an area of the bottom plate which includes said hole.

4. A tape cassette, substantially as hereinbefore described with reference to, or as shown in, the accompanying drawings.

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