

TAPE CASSETTE

The present invention relates to a tape cassette such as a
5 magnetic tape cassette, a cleaning tape cassette or a video
tape cassette.

British patent application No. 9512596.9 (publication No.
2289670) has been divided from this application. The
10 divisional application claims a tape cassette comprising a
cassette casing composed of an upper half casing and a lower
half casing, a pair of hubs around which a tape is wound and
which are rotatably held in the cassette casing, and tape
guide members formed in the cassette casing at positions
15 through which the tape wound around the hubs travels, the
tape cassette being characterised in that the tape guide
members are tape guide poles having substantially U-shaped
cross sections and which are formed integrally with either
of the upper and lower casings wherein the circular arc
20 surface of the U-shaped tape guide poles is a tape
contacting surface, and wherein the casing has a wall
thickness in a range of 0.8 to 1.2mm.

In a conventional tape cassette having a head house and a
25 pair of hubs, a magnetic tape is guided in a tape travelling
path between the head house and the hubs in the cassette
casing. In this way, the magnetic tape is wound onto or
unwound from the hubs. The hubs are supported for rotation
by circular wall portions. The Circular Wall Portions are
30 formed around axial holes formed in the casing in order to
receive the shaft portions of the hubs. Usually, various
auxiliary elements are installed in the head house.
Therefore, in order to ensure that the casing has a
sufficient strength, reinforcing ribs or partition walls are
35 formed in the head house. Alternatively, the wall thickness
of the casing may be increased, or a highly durable material
may be used.

In conventional tape cassettes, the outer wall of the casing is made thicker than the flat surface wall portion of the casing in order to increase the impact resistance of the casing.

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However, the conventional tape cassette has numerous disadvantages. At many portions there is a large scatter in the wall thickness. Moulding properties are not good and there are strains and deformations in the moulded casing.

- 10 Further, the many ribs and partition walls in the head house area at the front portion of the casing cause a high concentration of resin when the resin is injected to form the casing. This often leads to the formation of recesses in the moulded product. In addition, when there is a change
- 15 in the thickness of the casing wall the rate of flow of the molten resin stream changes thereby causing strains in the resin. At these points, thermal deformation is apt to occur. When a casing having a thin wall thickness is required, such an undesirable tendency is increased, and
- 20 there are often conspicuous recesses on the surface of the

casing. These recesses seriously detract from the appearance of the casing.

It is an object of the present invention to provide
5 a tape cassette which provides good moulding properties, minimise strains or deformations and which minimises the occurrence of recesses whilst increasing the strength of the casing when the wall thickness of the cassette casing is small.

10 According to the present invention, there is provided a tape cassette comprising:

(a) a cassette casing comprised of an upper half casing and a lower half casing, said upper half casing and said lower half casing having a flat surface wall portion and an
15 outer peripheral wall portion of uniform thickness;

(b) a pair of hubs around which a tape is wound;

(c) circular wall portions formed in said cassette casing, said hubs being rotatably fitted in said circular wall portions; and

20 (d) tape guide members formed in the cassette casing at positions through which the tape travels; said cassette being characterised in that:

(e) said flat surface wall portion and said outer peripheral wall portion have a thickness of 0.8 to 1.2mm;
25 and

(f) rib means are provided for strengthening the cassette casing.

Preferably, the flat surface portion and said outer
30 peripheral portion have a scatter in thickness of 20% or less.

In one embodiment, the rib means comprises:

(a) a center rib provided on a line that connects said
35 circular wall portions and said outer peripheral wall portion;

(b) a plurality of side ribs formed parallel to and spaced from said center rib; and

(c) a plurality of partition walls, each being formed at a corner portion of said cassette casing.

Preferably, at least one of said rib means is provided with a shoulder portion at each end for supporting a tape movement controlling sheet.

The above mentioned invention will be more readily understood upon reading the following description with reference to the accompanying drawings in which:

Figure 1 is a plane view showing an embodiment of the tape cassette of the present invention wherein the upper and lower half casings are shown in a separated state to show the inside of them; and

Figure 2 is an enlarged perspective view partly omitted of the lower half casing depicted in Figure 1.

Figure 3 is a perspective view of the tape cassette depicted in Figure 1 as assembled for use.

Figure 4 is a perspective view in an exploded state of an alternative embodiment of the tape cassette depicted in the preceding drawings.

A preferred embodiment of the tape cassette according to the present invention will now be described with reference to the drawings.

Figure 1 shows a preferred embodiment of the tape

cassette of the present invention. The tape cassette casing comprises an upper half casing 1 and a lower half casing 2 and a head house 14 integrally formed in each respective half casing. Inside the cassette casing, a pair of hubs 3; 5 around which a tape 4 such as a magnetic tape is wound; are rotatably supported by circular wall portions 8. The circular wall portions engage the hubs 3, and are formed integrally with the upper and lower half casings 1, 2.

Tape guide poles 5 are provided as tape guide members 10 located in the tape traveling path between the hubs 3, 3. The tape guide poles 5 have a substantially U-shape in cross section. The tape guide poles 5 are formed integrally with the upper half casing 1 or the lower half casing 2 so that the circular arc surface of the substantially U-shape comes 15 in contact with the travelling tape. The circular wall portions 8, for supporting the hubs 3, are projected from the inner surface of the upper and lower half casings 1, 2 at positions around axial holes 10. The axial holes 10 receive the shaft portion of the hubs. A plurality of 20 linear ribs 9, 9₁ are formed in a parallel relation so as to extend in an area including the circular wall portions 8, 8 and in the vicinity of them.

With additional reference to Figure 2, the thickness of the flat surface wall portion 1₁, 2₁ of the upper and 25 lower half casings 1, 2 is determined in a range of $t_1 = 0.8-1.2$ mm, and the thickness of the outer peripheral wall portions 1₂, 2₂ is determined in a range of $t_2 = 0.8-1.2$ mm. The wall thickness of each of the upper and lower half casings 1, 2 and the outer peripheral walls 1₂, 2₂ is 30 substantially uniform. A scatter in the wall thickness of each of the flat surface walls 1₁, 2₁ and the outer peripheral walls 1₂, 2₂ should be 20% or lower.

Reinforcing ribs formed projecting from the inner surface of the upper and lower half casings have a height 35 sufficient to mount thereon the hubs 3, and include a center rib 9 connected to the circular walls 8. The center rib 9 is arranged on a linear line connecting the center of each of the axial holes 10, 10. The side ribs 9₁, 9₁ are provided

on either side of the center rib 9 and spaced therefrom. The circular walls 8 are constructed so as to reduce the surface area of contact of the hubs 3 with the cassette casing thereby reducing torque.

5 In addition to the reinforcing ribs 9, 9₁, the provision of reinforcing ribs 9₂ on either side of and near to the head house 14 enables the reduction of the thickness of the cassette casing wall. When the width of each of the ribs 9, 9₁, 9₂ is made thinner than the thickness of the
10 upper and lower half casing walls a preferred stream of resin is obtained at the time of moulding. Accordingly, a tape cassette having less residual strain, accurate dimensions and excellent heat resistance can be obtained.

It is preferable to locate each of the tape guide
15 members 5 near a support pin 6. The support pins 6 each support a roller 16 as may be best seen in Figure 4. The rollers 16 which guide the tape 4 and the pins 6 are formed in either the upper or the lower half casing. Preferably, some of the tape guide members 5 are removable. It is
20 further preferable that the tape guide members 5 are located at both corner portions 7, 7 in each half casing so that a plurality of the tape guide members 5 are used and they are disposed at both sides of a plurality of supporting pins 6.

It is preferable that the wall thickness of the upper
25 and lower half casings is as thin as possible, whilst maintaining sufficient strength. For this purpose, partition walls 9₃ are formed together with connecting bosses 11, 17 at each of the corner portions 7.

Each of the upper and lower half casings 1, 2 are
30 provided with windows 12, 12 between the circular walls 8, 8 and the linear ribs 9, 9₁, thereby allowing an amount of the tape around the hubs to be visible. In this case, the cassette casing body may be opaque and the window may be transparent. In this way, a tape cassette having a unique
35 design is provided.

Finger touch portions 13 are provided on both side surfaces of the upper and lower half casings 1, 2 at positions near the head house 14.

The head house 14 is a section in the cassette in which the tape contacts the reproducing/recording apparatus of a cassette player. The head house 14 comprises an insertion hole, supporting walls and an opening. In Figure 5 1, reference numerals 15 designate supporting pin 6 bearing portions.

With reference to Figure 3, the tape cassette of the instant invention is shown as assembled for use.

Figure 4 is an exploded view of a second embodiment 10 of the instant invention. In this embodiment, at least one of the linear ribs 9, 9, on each half casing is provided with shoulder portions 19 at each end. The shoulder portions 19 support a tape movement controlling sheet 18 which further limits the movement of the cassette tape 4, 15 thereby enabling easy assembly and excellent operation.

In the above-mentioned embodiments of the tape cassette having the construction described above, the thickness of the flat surface wall portions and the outer peripheral wall portions of the upper and lower half casings 20 are respectively formed to be substantially uniform and in the range 0.8-1.2mm, whereby a scatter in the wall thickness of each of the wall portions can be small, moulding property is remarkably improved to reduce occurrence of strains or deformation, accuracy in dimensions, and reliability on heat 25 resistance can be increased. Further, a tape cassette having thin upper and lower half casings, a low manufacturing cost and suitable for a large-scale production can be provided.

It will be understood, of course, that the invention 30 has been described above purely by way of example and that modifications may be made within the scope of the appended claims.

**CLAIMS**

1. A tape cassette comprising:
 - (a) a cassette casing comprised of an upper half casing and a lower half casing, said upper half casing and said lower half casing having a flat surface wall portion and an outer peripheral wall portion of uniform thickness;
 - (b) a pair of hubs around which a tape is wound;
 - (c) circular wall portions formed in said cassette casing, said hubs being rotatably fitted in said circular wall portions; and
 - (d) tape guide members formed in the cassette casing at positions through which the tape travels; said cassette being characterised in that:
 - (e) said flat surface wall portion and said outer peripheral wall portion have a thickness of 0.8 to 1.2mm; and
 - (f) rib means are provided for strengthening the cassette casing.
2. The tape cassette according to claim 1, wherein said flat surface portion and said outer peripheral portion have a scatter in thickness of 20% or less.
3. The tape cassette according to claim 1 or claim 2 wherein said rib means comprises:
 - (a) a center rib provided on a line that connects said circular wall portions and said outer peripheral wall portion;
 - (b) a plurality of side ribs formed parallel to and spaced from said center rib; and
 - (c) a plurality of partition walls, each being formed at a corner portion of said cassette casing.
4. The tape cassette according to any preceding claim wherein at least one of said rib means is provided with a shoulder portion at each end for supporting a tape movement controlling sheet.