TAPE CASSETTE

The invention relates to tape cassettes.

A typical tape cassette is disclosed, for example, in USA patent specification 4,672,498 and has a cassette housing formed of a lower half and an upper half each moulded of synthetic resin. Reel hubs are incorporated into the cassette housing to carry a wound magnetic tape. The upper half is moulded of an opaque synthetic resin such as a coloured or smoked synthetic resin except for window portions through which the reel hubs can be visually observed, which window portions are of transparent material.

The aforementioned conventional tape cassette has its housing moulded of a single layer structure. A tape cassette having a housing of a double layer structure is disclosed in Japanese Laid Open utility model application 60-12875 with the whole surface of the cassette half moulded of an inner wall material and an outer wall material of the same or different kind of plastics material by a laminate dichromatic moulding process as a unitary structure, thereby to form the cassette housing.

In the first mentioned tape cassette, only the base portion and the window portion of the cassette housing are distinguished from each other while in the latter mentioned cassette, the base portion of the cassette housing is formed of inner and outer walls which are laminated over the entire surface so that the tape cassette has a uniform colour. Thus, both of the tape cassettes described provide only two colour tones on the base portion and the window portion of the cassette housing so that such tape cassettes are unduly limited in terms of providing a visually attractive design.

According to the invention there is provided a tape cassette comprising a housing having an upper half and a lower half, wherein the upper half is formed mainly of a base member of opaque material with at least one window aperture in an upper wall thereof, but also includes a cover portion of a transparent material overlying on the outside part of the upper wall of the base member and overlying the

at least one window aperture in the base member to form at least one window, the cover portion comprising a single layer of the transparent material laminated to the base member so that portions of the upper wall of the upper half are formed by a double layer of the transparent material and the opaque material with the opaque material visible from the outside through the transparent material.

Such a cassette can present three colour tones while using only two kinds of materials, that is to say an opaque material and a transparent material, thus achieving an improved effect from a design standpoint.

By providing a raised peripheral edge on the cover portion, scratching of the face of the cover portion while the cassette is being transported on a belt conveyor on a production line can be avoided.

The tape cassette of the invention is particularly suitable for use with an 8 mm video tape recorder but can be used for other tape cassettes for apparatus for reproducing and recording audio signals.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a perspective view of an embodiment of a tape cassette according to the invention;

Figure 2 is a plan view of the tape cassette shown in Figure 1;

Figure 3 is a cross-sectional view taken on line III-III of Figure 2;

Figure 4 is a cross sectional view on line IV-IV of Figure 2; and

Figures 5A and 5B are enlarged, vertical sectional fragmentary views of upper and lower mould sections for manufacturing a tape cassette according to the invention.

Referring to the drawings, a tape cassette 1 is of the kind used for an 8 mm video tape recorder. As shown in Figure 1, a

cassette housing 2 comprises an upper half 2a and a lower half 2b each made at least mainly of opaque material, for example, an acrylonitrile- butadiene-styrene copolymer (ABS) and secured together by suitable means such as screws (not shown). A pair of reel hubs 3a and 3b are rotatably mounted in the cassette housing 2, and a magnetic tape 4 is wound on the reel hubs 3a and 3b for transport therebetween. Leaf springs 5a and 5b are provided to facilitate the rotation of the reel hubs 3a and 3b with limited axial travel. The magnetic tape 4 wound on the reel hubs 3a and 3b is drawn out to the front wall of the cassette housing 2 by means of tape guides (not shown). The front wall of the cassette housing 2 towards which the magnetic tape 4 is drawn is generally covered with a front lid 6 formed of two sections 6a and 6b . The front lid 6 is pivotably mounted on the front portion of the cassette housing 2 so as selectively to open or close the front access opening of the cassette housing 2. During use, the front lid 6 is rotated upwardly to bring the magnetic tape 4 to the front wall of the cassette housing 2. These structural features are substantially the same as those shown in USA patent specification 4,418,373 and therefore will not be described in detail.

A label area 7 of substantially rectangular configuration is formed approximately centrally in the longitudinal direction on the upper face of the upper half 2a and extends nearly over the entire width in the transverse direction of the upper half 2a, whereby a label with data concerning the recording may be put on the label area 7 by conventional means such as an adhesive agent.

Windows 8 are formed adjacent to the label area 7 in a portion of the upper wall of the upper half 2a . Each window 8 is composed of a transparent synthetic resin so that the amount of magnetic tape 4 wound on the reel hubs 3a and 3b can be visually observed through the transparent window 8. In the drawings, conventional transparent flanged tape reels integrally formed with the reel hubs 3a and 3b are not shown for purposes of clarity.

Within the cassette housing 2 there can be provided an optical member such as an end sensor for detecting the end of the tape, a base portion for mounting the leaf springs 5a and 5b, reel braking members and other conventional mechanisms found in a tape cassette. These members are all located at positions which are hidden by the base portion of the upper half 2a composed of opaque material so that they cannot be visually observed from the outside.

Referring to Figures 2 to 4, parts 10 of the upper wall of the upper half 2a are of laminated construction. Each laminated part 10 comprises a base member of the upper half 2a and a cover portion 9. In each laminated part 10 the cover portion 9 is a laminate of transparent material over a laminate of opaque material in a double layer. The transparent cover portion 9 is formed of a thin, lightly coloured or smoked plate of acrylic resin, as shown in Figure 3, overlying a portion of the base member of the upper half 2a, which base member has apertures therein to provided the windows 8 as shown in Figure 4.

Each window 8 is a circular window with a radius substantially the same as the maximum radius of the magnetic tape 4 which is to be wound on the reel hubs 3a and 3b . The cover portion 9 has a marginal edge portion 9a which projects upwardly to form a frame, with the plane of the cover portion forming the window 8 being at a recessed position from the reference plane of the top wall of the upper half 2a . Preferably, the plane of the window 8 is flush with the plane of the label area 7.

The upper half 2a is moulded by the injection of synthetic resin in a laminate dychromatic moulding process. This process will be described with reference to the enlarged, vertically-sectioned fragmentary cross-sectional views constituting Figures 5A and 5B. Figures 5A and 5B both correspond to Figure 3.

As shown in Figure 5A, a lower stationary mould section 11 and an upper mould section 12 are connected to provide a primary mould cavity 13 in which the base member of the upper half 2a is moulded. An opaque acrylonitrile-butadiene-styrene copolymer is injected

through a resin injection gate or runner R A into the primary mould cavity 13 to effect a primary moulding of the base member of the upper half 2a as illustrated in Figure 5A.

After the acrylonitrile-butadiene-styrene copolymer in the primary mould cavity 13 is quenched and solidified, the mould sections 11 and 12 are separated. Then the stationary mould section 11 carrying thereon the moulded base member of the upper half 2a formed by the primary moulding is moved beneath a mould section 14 for a secondary moulding operation and the sections 11 and 14 are combined to form a secondary mould cavity 15 to mould the cover portion 9. An acrylic resin which may be smoke coloured is injected through a resin injection gate or runner R B into the secondary mould cavity 15 to mould the cover portion 9 onto the base member of the upper half 2a in a laminated fashion and to form the windows 8.

Since the cover portion 9 formed of the smoked transparent material is laminated onto the base member of the upper half 2a of the cassette housing 2 comprised of opaque material, but the base member is only partially covered by the cover portion 9, and since the cover portion 9 alone forms the window portion 8, three colour tones can be presented by the base member of the cassette housing 2, the windows 8 and the laminated portion 10 at the periphery of the windows 8. Thus the base member of the cassette housing 2 presents the colour of the opaque material of which it is formed, the windows present a smoked transparent colour tone and, in addition, in the laminated portion 10 the colour of the base member of the upper half 2a is seen through the smoked cover portion 9 so that the laminated portion 10 presents a colour tone different from the above two colours whereby three different kinds of colour tones are presented in total. Thus the cassette 1 can achieve the same effect as would be achieved by using three materials of different colours through the use of only two materials comprising the opaque material and the smoke transparent material.

In the embodiment shown in the drawings, the cover portion 9 of the laminated portion 10 is composed of a hard acrylic resin and

has the edge portion 9a at the margin to form a frame-like portion, so that the plane of the windows 8 is separated therefrom by one small step. The windows 8 are thus prevented from being scratched by lateral forces while being transported on a belt conveyor on the production line. Thus, the quality of the tape cassette 1 can be protected from being degraded.

Furthermore, since the windows 8 are formed at the portions with a radius corresponding to the maximum radius of the magnetic tape 4 wound on the reel hubs 3a and 3b, the interface area between the base member of the upper half 2a and the cover portion 9 is comparatively large in the laminated portion 10, thus ensuring sufficient joint strength therebetween.

In the above-described embodiment, the cover portion 9 is tinted in a smoked colour, but it could be made of a transparent material otherwise tinted. Also, because of the reflection and refraction of light, the laminated portion 10 presents a colour tone different from the colours of the base member of the windows 8 of the cassette housing 2 so that three colour tones can be present similarly to the above described embodiment.

The invention is applicable to tape cassettes of not only the 8 mm video tape recorder variety but also to tape cassettes of recording and/or reproducing apparatus of other kind for recording and/or reproducing an audio signal.

CLAIMS

1. A tape cassette comprising a housing having an upper half and a lower half, wherein the upper half is formed mainly of a base member of opaque material with at least one window aperture in an upper wall thereof, but also includes a cover portion of a transparent material overlying on the outside a part of the upper wall of the base member and overlying the at least one window aperture in the base member to form at least one window, the cover portion comprising a single layer of the transparent material laminated to the base member so that portions of the upper wall of the upper half are formed by a double layer of the transparent material and the opaque material with the opaque material visible from the outside through the transparent material.

2. A tape cassette according to claim 1, wherein the opaque material of the base member is an acrylonitrile-butadiene-styrene copolymer, and the transparent material of the cover portion is composed of an acrylic resin.

3. A tape cassette according to claim 2, wherein the transparent material of the cover portion is tinted to provide a smoke colour.

4. A tape cassette according to claim 2, wherein the at least one window has an arc with a radius substantially equal to the maximum wound radius of a tape to be supported in the cassette.

5. A tape cassette according to claim 1, wherein the cover portion has a raised peripheral edge to protect the face of the transparent material of the cover portion in which the at least one window is provided from being scratched.

6. A tape cassette substantially as hereinbefore described and illustrated with reference to the accompanying drawings.

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