

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO HOLDERS FOR TAPE CASSETTES

(71) We, IDN INVENTIONS AND DEVELOPMENT OF NOVELTIES A.G., a Swiss Company, of CH-7078 Lenzersheide, Switzerland, 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 holders for tape cassettes, and especially to a holder of the type comprising a rectangular housing into which the cassette can be introduced and can be locked in the inserted position, and also, after the locking means is released, is brought into a convenient removal position by resilient ejector means.

Holders have been proposed which are constructed in the manner of a drawer, i.e. there is a slider in the housing, which accommodates the cassette.

Sliders require guides for the sliding movement and, if the permissible manufacturing tolerances are not accurately maintained, may stick or become loose. Furthermore, with the holder in certain positions they are not absolutely ideal for the removal of the cassette, for example when the holder (possibly connected with other holders to form a stack) is so arranged that the cassette is standing on a side edge parallel to the direction of movement of the slider.

The object of the invention is to create a holder which will allow wide manufacturing tolerances and from which the cassette is easily removed even when the holder or a holder stack is arranged in an unfavourable manner.

The present invention provides a holder for a tape cassette comprising a rectangular housing for receiving the cassette and into which the cassette is introducible via an entrance in one side of the housing, resilient ejector means for ejecting a cassette from the housing and locking means for

retaining the cassette in the housing once introduced therein, and in which the ejector means is so constructed and arranged that, in use, the cassette is ejected with pivotal movement from the housing into a cassette removal position, means being provided for bringing the cassette to rest in the removal position and for holding it in that position pending removal of the cassette from the holder.

Due to the pivoting, the cassette can be brought into a position in which it is easily grasped with one hand, preferably in such a way that it can be pushed directly into a playing apparatus without a change of grip. The cassette is prevented from being catapulted out or—if the holder is unfavourably arranged—from falling out, if holder and playing apparatus are used in a place which is subject to vibration, as for instance in a vehicle.

By way of example only, embodiments of the invention will now be described in more detail with reference to the accompanying drawings of which:

Figure 1 is a somewhat diagrammatic side view of a first embodiment of the invention,

Figure 2 shows a plan view of the holder shown in Figure 1 in the direction of the arrow II,

Figure 3 is a section along the line III-III in Figure 4 of a second embodiment,

Figure 4 is a section along the line IV-IV in Figure 3,

Figure 5 is a section of a third embodiment,

Figure 6 is a section along the line VI-VI in Figure 5,

Figure 7 is a section of a fourth embodiment of the invention, and

Figure 8 is a section along the line VIII-VIII in Figure 7.

The holder shown in Figures 1 and 2 has a substantially box-shaped housing 1, 90

the two side walls 8, 9 of which are provided with means for stacking several similar holders. For this purpose a rail 10 with dovetail-shaped cross-section is moulded on side wall 9, whilst the opposite side wall 8 is provided with a groove 11 corresponding to the rail 10. Rail 10 and groove 11 in each case allow holders to be stacked by fitting the rail of one holder into the groove of an adjacent holder.

In the housing 1, pivotally mounted on the housing by a stud 24, is a carrier 2 which is biased outwards by means of a spring 3. The carrier, like the housing, is a one-piece injection moulded part of a plastics material. It has a base wall 4, two side strips 6, 7, a supporting strip 12, and a hook strip 13. Moulded on the side strip 6 there are two tongues 14, 15 which have cams 16 formed on them and which in their rest positions, project outwards from the side strip 6 with the cams 16 directed towards the tape coil apertures of a cassette 5 placed in the carrier. When the carrier 2 is pivoted into the housing, an oblique surface of the cams 16 meets the edge 17 of wall 9, so that the cams are pushed inwards and secure the tape coils of the cassette.

It can be seen from Figure 1 that the wall 9 has a portion of reduced width as compared with the remainder of the wall and this reduced width portion is bounded along one edge by edge 17.

The hook strip 13 can be flexibly deflected inwards in relation to the remainder of the carrier because of lateral slots on each side of the strip (not shown), and is provided with a serrated surface 18 on the outside. In addition, a hook extension 19 with its locking surface projects outwards on the free end of the hook strip. A locking recess 21 corresponding to the hook extension 19 is provided on the inside of an end wall 20 of the housing 1.

To remove a cassette 5, pressure is exerted on the surface 18 with the finger, and the hook extension is thus released from the recess 21. Under the influence of the spring 3, the carrier 2 then pivots out of the housing 1, whilst stops (not shown) limit the pivoting movement to an arc of about 90°. On emerging from the housing 1, the cams 15 also return to their rest positions (indicated by dash-dot lines in Figure 2) and free the tape coils of the cassette 5. The cassette, which has been carried out of the housing on the support strip 12 of the carrier can therefore be removed from the carrier without difficulty. Hook strip 13, base strip 4, and side strips 6, 7 serve as stops which prevent the cassette 5 from tipping or falling out pending its removal.

To store the cassette, it is replaced in the carrier and the latter is pivoted back into the locking position, which is shown

by solid lines in Figure 2.

The embodiment shown in Figures 3 and 4 is also in two parts. Insofar as the individual elements correspond in function to those of the embodiment shown in Figures 1 and 2 they are provided with the same reference numbers.

The holder has three elements which are movable with respect to one another: the housing 101, the carrier 102, and the traction spring 103.

The housing 101 is in the shape of a box with an entrance on one long narrow side, with a base 104, end walls 106, 107 and side walls 108, 109. The side walls are provided with known means for the connection of several similar holders to form a stack; in the embodiment shown two or more rails 110 are provided which are moulded onto the side wall 109, run parallel to one another and to the base, and have a dovetail profile, whilst the other side wall 108 has grooves 111 corresponding to the rails 110, into which the rails 110 of a further holder can be pushed.

An elongated recess 119 is formed on the inside of the side wall 108.

The carrier consists of a front strip 113, an end strip 114, and a base plate 115 which are butted together at 90° in each case to form a one-piece injection-moulded part of a plastics material. The housing is also a one-piece plastics part. Between the free end edge 116 of the end strip 114 and an anchorage point 117 on the side wall 106 of the housing 101 there is tensioned a spring 103 (see Figure 4) which lies between the side wall 108 of the housing and the base-plate 115 of the carrier. There is room for the cassette 105 on the side of the base-plate 115 furthest from the spring 103; on the edge of the front strip 113 opposite the base-plate 115 a retaining strip 118 may also be formed if necessary, which then lies in a plane parallel to the base-plate 115 as indicated in Figure 4.

The base-plate 115 has moulded on it a projection 112 which fits into the elongated recess 119. In the closed state of the holder the tip 120 of the base-plate rests against the base 104 of the housing 101 and the projection 112 is in the position "B" in relation to the elongated recess 119. If the carrier is then freed from this position, it pivots under the influence of the spring 103 into the position shown by dash-dotted lines in Figure 3, and also executes a movement towards the outside in such a way that the projection 112 then assumes the position "A" in the elongated recess 119. It is of course possible for the projection to be provided on the side wall 108 and the elongated recess on the carrier; the positions "A" and "B" then interchange.

In addition, a locking lever 121 is moulded

ded on the baseplate 115. A slot 122 in the baseplate defines one side of the lever 121 and enables the latter to be flexibly deflected in the direction of the arrow in Figure 4 and thus free a mechanical locking means which is not shown in detail and which engages again when the container is closed.

Finally, tongues 123, 124 are formed on the base-plate by slots in the latter. Each tongue carries a cam 125 aligned with the tape coil aperture of the cassette 105. The cams 125 are semi-circular in shape as shown in Figure 4 so that when the cassette moves in relation to the carrier they can easily be pushed away and do not prevent either removal or insertion.

When the container is opened, the point 120 catches on a projection 127 which is moulded on the side wall 108 and limits the opening movement. The cassette is prevented from tipping or falling out by the side walls of the housing 101, the front strip 113 of the carrier, and the securing cams 125 for the tape coils.

The third embodiment of the invention shown in Figures 5 and 6 also consists of two main parts, i.e. the housing 201 and the carrier 202, both of which are one-piece injection moulded parts of plastics material.

The housing 201 has two side walls 208, 209, a base 204 and an end wall 206. The side walls 208, 209 are provided with means for stacking several similar containers: the wall 209 carrying two or more rails 210 with dovetail profile, whilst a corresponding number of matching grooves 211 is formed in the wall 208. Stacking is effected by pushing the rail or rails on one holder into the groove or grooves of the other holder.

The end wall 206 is provided with lateral slots along a length 212, to form a tongue 213 which can be flexibly deflected. The tongue carries at its free end a hook extension 214, and a serrated surface 215 is formed on the outside of the tongue 213.

The carrier 202 is pivotally mounted on the housing 201 by means of a stud 216. The carrier consists of three strips 217, 218 and 219 joined together in a U-shape, being connected to one another and stiffened by means of thin cross-plates 220. Outside the corner between the strips 217 and 218 there is an eye 221, to which is attached one end of a pre-tensioned traction spring 222, the other end of which is fixed at 223 in the corner between the base 204 and the end wall 206 of the housing 201. A helical spring is indicated here but a rubber band may also be used instead. Figure 6 shows that the space for the spring is provided by channels in the base 204 of the housing and the strip 217 of the carrier 202.

Cut into the free end of the strip 219 is an aperture 224 which is aligned with the hook extension 214 when the holder is closed (Figure 5), and has a locking step 225.

If it is required to secure the tape coil spools of the cassette 205 during storage it is possible—as shown in Figure 5 and 6—to provide slits 226 in one of the reinforcing cross-plates 220, so producing tongues 227, 228 which can be flexibly deflected and which have tape securing cams 229, 230 moulded on them. The shape of the cams 229, 230 is approximately semi-circular and they can be pushed away when the cassette is removed or inserted, and then drop into the tape coil apertures of the cassette.

The removal position of the parts is shown by dash-dotted lines in Figure 5. The cassette 205 cannot tip out, since it is supported laterally by the housing and the cross-plates; but it can easily be pulled out and removed in the direction of the projection of the strip 219. For storage, the cassette is then inserted as indicated by dash-dotted lines in Figure 5, and the carrier is pivoted about the stud 216, tensioning the spring 222, until the hook extension 214 enters the aperture 224, is deflected flexibly (a corresponding oblique surface 231 is moulded on the hook extension 214 for this purpose) and then springs back into the step 225. A slight pressure on the serrated surface 215 suffices to open the holder, so that the hook extension 214 is freed and the carrier springs open under the influence of the spring 222.

A special stop to limit the opening movement is not necessary, since in the opening state the stud 216 just lies on the line of traction of the spring 222. The carrier can indeed execute a certain pendulum movement about this position during opening, but, under the influence of the spring 222, finally comes to rest in the position shown (Figure 5, dash-dotted lines). This embodiment therefore produces very little strain on the material of housing, carrier and cassette, and furthermore offers the advantage that it is very space-saving; consequently the material consumption for housing and carrier is kept at a minimum.

The embodiment shown in Figures 7 and 8, however, is distinguished by its particular simplicity. In this case the holder is substantially box-shaped with a base 304, end walls 306, 307 and side walls 308, 309. The insertion and removal entrance is situated opposite the base 304.

The end wall 306 is cranked inwardly at 312 and has, in this region, an aperture 313. Opposite this a leaf spring 303 is attached to the inside of the end wall 307, and may be located in recesses or rivetted

on. The free end of the spring 303 is bent back inwards and in the stressed state has the shape indicated in Figure 7.

The distance between the side walls is calculated so that the thickened section 314 of the cassette 305 just fits between them.

The distance between the end walls 306, 307 is calculated so that the cassette 305 can still just be pushed through from the entrance between the edge 315 of the section 312 of the side wall 306 and the edge 316 of the side wall 307. Finally, the distance of these edges 315, 316 from the base 304 is several millimetres more than the corresponding dimension of the cassette.

If a cassette 305 is now introduced into the holder the spring 303 is deformed into the shape indicated in Figure 7 and thereby exerts a pressure on the adjacent narrow side edge of the cassette 305. This pressure is directed towards the side wall 306 so that the cassette is pushed towards the left (in Figure 7) by the spring 303 and is suspended by its corner 317 in the aperture 313. This is the storage position. In order to remove the cassette it is sufficient to exert a slight pressure on the corner 317, through the aperture 313, and the cassette comes free from the aperture 313, whereupon it is pivoted by the spring 303 into the removal position indicated by dash-dotted lines. This rotary movement of the cassette is made possible by the rounding 319 of the corner 320 of each cassette.

As in the other embodiments, the side walls 308, 309 are provided with means to connect several similar holders to form a stack by pushing them together and locking them. In this case rails 310 with dovetail-shaped cross-section are moulded on the wall 309, whilst the wall 308 has grooves 311 corresponding to the rails.

WHAT WE CLAIM IS:—

1. A holder for a tape cassette comprising a rectangular housing for receiving the cassette and into which the cassette is introducable via an entrance in one side of the housing, resilient ejector means for ejecting a cassette from the housing and locking means for retaining the cassette in the housing once introduced thereinto, and in which the ejector means is so constructed and arranged that, in use, the cassette is ejected with pivotal movement from the housing into a cassette removal position, means being provided for bringing the cassette to rest in the removal position and for holding it in that position pending re-

moval of the cassette from the holder. 65

2. A holder according to Claim 1, in which the housing is provided with rail and/or groove means engageable with corresponding means on another similar housing to enable the two housings to be stacked. 70

3. A holder according to Claim 1 or 2, in which securing means are provided for holding the tape coils of the cassette.

4. A holder according to one of the preceding claims, in which the means provided to hold the cassette in the removal position comprises a carrier for the cassette, which can be pivoted together with the cassette. 80

5. A holder according to claim 4, in which the ejector means is a helical spring which is anchored to the housing, and to the carrier.

6. A holder according to one of Claims 1 to 4, in which the ejector means is a leaf spring. 85

7. A holder according to Claim 6, in which the leaf spring acts directly on the cassette. 90

8. A holder according to Claim 7, in which the entrance is formed in a long narrow side of the housing, in which the ejector means is positioned to exert, on a short narrow side of the cassette, a force having a component acting at right-angles to the direction of insertion of the cassette, and in which, on the side of the housing opposite the spring, an aperture is provided towards which the inserted cassette is pushed by the ejector means whereby a corner of the inserted cassette projects through the aperture. 100

9. A holder according to Claim 4 or 5, in which the carrier is also subjected to a displacement movement in addition to the pivoting movement. 105

10. A holder according to Claim 5, in which the anchorage points of the spring and the pivot centre point lie in a straight line when the cassette is in the removal position. 110

11. A holder for a tape cassette substantially as herein described with reference to and as illustrated by Figures 1 and 2, or Figures 3 and 4, or Figures 5 and 6 or Figures 7 and 8 of the accompanying drawings. 115

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