*Translator's note: The title is taken from the U.K. Patent Register and is not the responsibility of the Applicant.

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Patent Claims

1. Device for storing recording media, such as magnetic tape cassettes, diskettes and audio or video discs, having
- a substantially rectangular housing part (30),
- a transport slider member (34) which is guided in the housing part, is designed to accommodate the recording media and which conveys the recording media from a storage position in which they are completely enclosed in the housing part into a removal position in which they can be easily grasped,
- a spring arrangement (46) which biases the transport slider member into the outer removal position, and
- a locking arrangement (56) which comprises elements that, in the storage position of the transport slider member, engage in one another so that they are positively locked, and which can be locked by pushing in the transport slider member from its removal position and can be unlocked by pushing the transport slider member in again,
wherein the locking arrangement comprises
(a) a coupling part (60) which is movably arranged on the housing part (or transport slider member), but is supported in the direction of movement of the slider member,
(b) control surfaces (82, 84, 88, 106, 110) on the transport slider member (or housing part) for guiding the coupling part along a first path when locking and along a second path when unlocking,
characterized in that the path of movement of the coupling part (60) has two components perpendicular to one another, of which at least one is perpendicular to the direction of movement of the slider member, and the coupling part is spring biased (86) in the direction of

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at least one of the components into the locking or unlocking position.

2. Device according to claim 1, characterized in that the locking arrangement is arranged at a position at which the lever arm on which the spring arrangement (46) acts is short with respect to the locking arrangement and in comparison with the dimensions of the housing and the transport slider member.

3. Device according to claim 1, in which the housing part has a rear wall opposite an opening forming an aperture for the transport slider member, and in which the transport slider member has a rear wall parallel to the rear wall of the housing, characterized in that the coupling part (60) is arranged in one of the rear walls.

4. Device according to claim 3, characterized in that the control surfaces are formed on components connected to the other rear wall.

5. Device according to claim 3, characterized in that the control surfaces are formed on a side wall (402) running perpendicularly to the other rear wall.

6. Device according to claim 3, characterized in that the control surfaces are formed on a base wall running perpendicularly to the other rear wall.

7. Device according to claim 1, characterized in that the coupling part and the control surfaces are provided in walls, which are parallel to one another and to the direction of movement of the transport slider member, of the two parts.

8. Device according to claim 1, characterized by

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three control surfaces which enter in succession into effective connection with the coupling part.

9. Device according to claim 1, characterized in that there is provided on the coupling part a locking projection (80, 226) that positively locks on the other part.

10. Device according to claim 9, characterized in that the locking projection is guided in translatory manner in one directional component.

11. Device according to claim 10, characterized in that the locking projection is guided in rotary manner in the other directional component.

12. Device according to claim 9, characterized in that the locking projection is guided along two circular arcs having axes that are perpendicular to one another.

13. Device according to claim 9, characterized in that the locking projection (226) has an undercut (228) which is associated with a complementary undercut (238) on the other part.

14. Device according to claim 1, characterized in that the coupling part is inserted into a cage-like catch guide.

15. Device according to claim 12, characterized in that the coupling part is substantially in the form of a circular disc and is inserted so that it can rotate into a complementary aperture in a wall of one of the two parts.

16. Device according to claim 15, characterized in

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that the coupling part is arranged for pivotal movement in a first direction of rotation through a limited angle for locking and is arranged for pivotal movement in the other direction of rotation through a limited angle for unlocking.

17. Device according to claim 16, characterized in that the coupling part is arranged for pivotal movement firstly in the first and then in the other direction of rotation through a limited angle.

18. Device according to claim 17, characterized in that the locking projection (226) is formed on a leaf spring that extends away from the centre of the coupling part like a radial spoke and can be deflected out of the plane of the wall.

19. Device according to claim 11, characterized in that the coupling part has bearing pins (68, 70) which are displaceable in an elongate hole (98) and about which the coupling part can be swivelled.

20. Device according to claim 19, characterized by stops (96) for limiting the displacement and swivelling movements.

21. Device according to claim 1, characterized in that the coupling part has a separate guide edge or guide surface for each guide surface.

22. Device according to claim 1, characterized in that the slider member has a front wall provided with an actuating bar.

23. Device according to claim 1, characterized in that the slider member has a front wall constructed as

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an actuating button.

24. Device according to claim 23, characterized in that the front wall has a rounded contour which covers over, in protective manner, the edges of a housing opening covered by it.

25. Device according to claim 1, characterized in that the housing part, the transport slider member and the coupling part consist substantially of plastics material.

26. Device according to claim 25, characterized in that the parts are injection-moulded from heat-deformable plastics material.

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The invention relates to a device for storing recording media, such as magnetic tape cassettes, diskettes and audio or video discs.

A device that has the features of the pre-characterizing clause of patent claim 1 is known from US-A-4 216 857. This device is used for storing compact cassettes. Grooves that are approximately semicircular in cross-section are machined into opposing faces of the housing part and transport slider member; in the housing there is a short, straight groove perpendicular to the direction of movement of the slider member, while the latter has an elongate groove with a forked end, the prongs of which terminate in an angled holding member. Between housing and slider member there is inserted in the grooves a free-running steel ball, which serves as coupling part. It is supported by the groove walls of the groove in the housing and guided along the groove in the slider member. This guide system fails, however, if the device is used in an unfavourable position, in which gravity prevents the ball following the desired path.

The problem of the invention is further to develop the device in such a manner that it functions reliably in any position.

This problem is solved by the features mentioned in the characterizing part of patent claim 1.

Devices with locking mechanisms, which are alternately locked and unlocked by moving an insertion part in the same direction, are additionally known from other publications.

A device for storing compact cassettes is known from US-A-4 046 255. It comprises a slider member which is guided in the housing and has a hook-like locking element. This element is resiliently deformed during locking and remains biased in its locked position so that during unlocking it can spring back into a

release position. Such a locking element is, if it is manufactured from plastics material as is customary, unreliable since, on the one hand, the plastics material tends to cold flow and the spring bias is thus lost and, on the other hand, at relatively high temperatures the lock fails completely. Temperatures of the order of 80°C and more must, however, be taken into consideration, especially in motor vehicles.

A further storage device for compact cassettes is shown in Figs. 5 to 8 of US-A-3 995 921. This device does not have a slider member, but the spring arrangement, which directly biases the cassette in the direction of removal, is locked at a guide projection of the housing and remains biased towards an unlocked position.

In that case, the cassette is only inadequately protected and the spring arrangement is complicated and, therefore, expensive. As a result of the very small surface areas interlocking positively, the lock is also unreliable, and is, especially, not resistant to vibration.

Finally, a device for storing compact cassettes is known from US-A-3 836 222 which has a complicated locking mechanism which is also unreliable since, whether it is locked or unlocked depends on the insertion travel. In this case, therefore, locking and unlocking do not automatically follow alternately one after the other as required in the pre-characterizing clause of patent claim 1.

Embodiments of the subject of the invention are explained in detail below with reference to the accompanying drawings.

Fig. 1 shows in a plan view of the slider member, the housing being cut away, a container for a compact cassette.

Fig. 2 shows, analogously to Fig. 1, a similar

container having a modified design of the locking mechanism,

Fig. 3 shows, analogously to Figs 1 and 2, a container having a third method of construction of the locking mechanism,

Fig. 4 shows, in an embodiment according to Fig. 1, an exploded perspective view of the locking components and their interaction,

Fig. 5 shows a perspective view of a part of the cage for the catch from the side facing the camming plate,

Fig. 6 is a plan view of the camming plate in which the path of the catch is shown schematically,

Fig. 7 shows an enlargement from below of the locking mechanism of Fig. 2 without the camming plate,

Fig. 8 shows, from above, the same locking mechanism, in the unlocked position,

Fig. 9 is a cross-section along the line 9-9 of Fig. 8,

Fig. 10 is an enlargement of Fig. 9,

Fig. 11 shows in a plan view of a partially opened slider member, the housing being cut away, a container for a plurality of microcassettes,

Fig. 12 is a partial plan view analogous to Fig. 11, the locking mechanism having a different position,

Fig. 13 is a partial internal view in the direction of the arrow 13 in Fig. 12,

Fig. 14 is a sectional view of the catch arrangement of Fig. 12,

Fig. 15 is a vertical section through a container for compact discs, one of the two slider

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members being partially open,

Fig. 16 is a plan view of a horizontal section of Fig. 15,

Fig. 17 shows, in a view of the rear wall of the housing from inside Fig. 15, the arrangement of the camming plates,

Fig. 18 is a partial vertical section perpendicular to the direction of movement of the slider member of the container according to Figs 15 to 17,

Fig. 19 shows a perspective view of a container having eight slider members for compact cassettes similar to Figs 1 to 3, and

Fig. 20 shows a partial view related to Fig. 19.

Fig. 1 shows a container for compact cassettes having a substantially cuboid housing 30 which at its side opposed to a rear wall 32 is open for the passage of a slider member 34. The slider member is guided along rails, which are formed on the inside integrally with the base 36 of the housing by one, or, as shown here, three parallel base plates 38, 40 and 42. The central base plate has retaining projections 44 which are resiliently displaceable towards the side for the winding hubs of the cassette so that the hubs can be held in position after a cassette has been inserted. A helical pressure spring 46 biases the slider member towards an opened position which is defined by stops 48 and in which the slider member assumes a position in which the end edges 52 of the guide plates 54, which edges run along the side walls 50 of the housing, are approximately flush with the housing opening.

When it is in the pushed in position (shown in Fig. 1) the slider member is locked by means of a locking device 56 in such a manner that it can be manually released.

The locking device comprises the following components:

- a catch 60,
- a catch guide 62,
- a camming plate 64,
- a control projection 66.

These components, shown only in outline in Fig. 1, are shown in detail in Figs 4 to 6 and reference is made to them below.

The two components catch 60 and catch guide 62 are arranged on the slider member, and the camming plate 64 and control projection are arranged on the housing; this may, however, be reversed without altering the function if this appears structurally advantageous.

In Fig. 1, the catch guide is constructed in a rear end wall 58 of the slider member; this is also not imperative, as will become clear from the explanation of further embodiments. The configuration of Fig. 1 is, however, to form the basis for Figs 4 to 6.

The catch 60 is an injection-moulded plastics part having a substantially flat, rectangular basic shape. It has integrally formed coaxial pins 68, 70 which can be displaced in an elongate hole 72 of the catch guide 62 along this elongate hole; the catch is also able to pivot about the axis of the pins.

The catch guide comprises two congruent guide plates 74, of which only the plate facing the camming plate is shown in Fig. 4, and a top bar 76.

The catch guide accordingly forms a "cage" in which the catch is loosely suspended on its pins 68, 70.

Let it be assumed that the catch takes up a position in the cage in which its pin is located close to the left-hand end (in Fig. 4) of the elongate hole 72 provided in the cage. From this position the slider member is pushed in the direction of the camming plate.

First of all, the edge 78 of a projection 80 of

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the catch meets the camming plate 64 and the angular position thereof relative to the displacement direction of the slider member is so dimensioned, taking into account the friction coefficients, that the catch is able to slide along the oblique surface 82. As this happens, the pins 68, 70 also slide along the elongate holes 72. At the end of the oblique surface 82, the camming plate has a ramp 84 up which the catch projection 80 slides, wherein an integrally moulded restoring spring 86 of the catch is braced against the top bar 76. The catch thereby pivots about its pins, which are located close to the right-hand end (in Fig. 4) of the elongate hole 72. In the slider member direction of the slider member behind the ramp 84 there is a further oblique surface 88 behind which the projection 80 is downwardly pivoted again by the restoring spring 86. At the same time, the slider member runs up against a stop and the user lets go. The spring 46 now presses the slider member in the ejection direction, and the edge 90 of the catch projection is able to slide along the oblique surface 88 until the stop face 92 of the projection lies against the counter stop face 94 of the camming plate. The slider member is now locked. The downward pivoting path of the catch is limited by a stop projection 96 which runs in a further elongate hole 98 of the cage; the upward deflection is limited by the distance between the restoring spring 86 and the rest of the catch body.

Above and laterally off-set from the camming plate 64 there is provided the control projection 66 which, however, cannot hinder the movements of the catch described hitherto since it can engage a slot 100 extending the elongate hole 98 and also a congruent slot 102 of the catch.

If the slider member assumes its locked position, as described, and the slider member is again pressed up

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to the stop, a control edge 104 of the catch 60, which control edge is located above the pins 68, 70 in extension of their slot 102 (shown most clearly in Fig. 5), strikes the oblique surface 106 of the control projection 66 and is displaced by the latter further towards the left (in Fig. 4) until the edge 108 of the projection comes to rest in front of the second ramp 110 of the camming plate 64. The catch reaches this position if the slider member has been pressed in up to its stop. If the slider member is then released, the catch is again pivoted upwards about its pins because its projection runs over the ramp 110, and the slider member can be pushed completely out of the housing.

There can be seen in the top ledge two recesses 112, matched to the abutment projection 114 of the restoring spring 86. These recesses are arranged where this projection is positioned when the catch is in the locked or unlocked position, so that the restoring spring is not biased; in this manner, there is no danger of cold flowing of the restoring spring which is also made of plastics material.

The locking system described has a number of advantages.

A permanently tensioned spring for biasing any one of the components in a preferred position is not necessary. All the parts can therefore be manufactured at a favourable cost from plastics material.

Despite the relatively short travel required for locking and unlocking, a relatively large surface area of the catch projection holding the slider member in position can be engaged. Finally, it will also be appreciated that if, for example as a result of shaking, the catch has already been partially or completely laterally displaced when the slider member is open, the locking device will still engage when the slider member is pushed in. It is characteristic that each

displacement movement of the catch is associated with its own control surface (on the camming plate or control projection) and also its own control edge on the catch.

The container according to Fig. 2 corresponds substantially to the design according to Fig. 1 but differs with regard to the locking mechanism. Two locking devices 200 are provided which are to be described in detail below with reference to Figs 7 to 10.

There is provided in the base 202 of the slider member a circular aperture 204 into which is inserted a catch 206 which can be rotated through a limited angle. Three claws 208 are integrally formed on the upper side of the catch 206, which claws are off-set by 120° from one another, project outwards from the circumference and, when the catch is inserted into the aperture, can be sprung inwards, the slots 210 being provided for this purpose, and then each claw anchors in a recess 212 on the upper side of the slider member; the angular extension of these recesses is determined by the maximum angle of rotation of the catch. On the inside, the catch is supported at the inwardly projecting circumference portions of the aperture which are between the recesses 212. On the underside of the slider member there is a further recess 214, the depth of which is adapted to the height of a camming plate 216 and a control projection 218 provided at the base of the housing, and the length and width of which can be seen in Fig. 7.

Finally, the base of the slider member has also a recess 220, extending right through its thickness, in the region between the two recesses 212 that are one each side of the central plane 222 of the slider member adjacent the camming plate 216.

In this region the catch has two cutout portions 224 which define a resilient catch projection 226 which

is undercut at 228 and under which there is a free space 230 corresponding to the height of the camming plate 216 and the control projection 218. This free space is limited by the step 232. In addition, a control lug 234 is integrally formed with the underside of the catch, which control lug has a control edge 236.

The camming plate 216 and the control projection 218 co-operate with the control edges of the catch projection 226 and the control edge 236 of the control lug 234, respectively, in entirely the same manner as was described above for the slideable and pivotable catch of Figs 4 to 6; in this case, however, the catch turns firstly in clockwise direction (shown in Fig. 8) and then in anti-clockwise direction and the catch projection is deflected in the direction of this axis of rotation when it runs over the ramps of the camming plate.

The undercut 228 of the catch projection is associated with a complementary undercut 238 of the camming plate so that the projection cannot slide off or gradually, as a result of the torque acting on it, deform owing to cold flow.

It can be seen that the manner of construction described does not require any additional space in the container and can be manufactured from moulded plastics parts at very low cost.

Fig. 11 shows a further embodiment of a container according to the invention.

In a housing 330 there is arranged so that it can slide a slider member 302 in which small magnetic tape cassettes, so-called microcassettes, can be accommodated, standing next to one another on their faces which oppose the tape head, in individual receiving compartments. The slider member 302 can be transported completely out of the housing; for this purpose, lateral rails 304 are arranged in the housing

which can be pulled out by approximately half the depth of the housing and on which the slider member is mounted which, in its turn, can be pulled out by approximately the same distance. Two helical pressure springs 306 pass through the rails 304 and are braced on the one hand at the rear wall 308 of the housing and on the other hand at the rear wall 310 of the slider member, so that the slider member is biased in the ejection position. Two pegs 312 extend from the rear wall of the housing into the slider member, passing through the rear wall thereof and through the separating walls 314 between the individual receiving compartments, and by means of a fin 316 lock the tape winding hubs of inserted cassettes 318.

The locking system corresponds to the locking system according to Fig. 1 and Figs 4 to 6: the cage 320 provided in the rear wall of the slider member for the catch, the camming plate 322 at the base 324 of the housing and the control projection 326 at the rear wall of the housing can be identified.

Figs 12 to 14 show how the locking system can be constructed in an alternative form. This manner of construction is explained with reference to a microcassette container similar to that of Fig. 11; it is also used, however, for the cassette container for compact cassettes according to Fig. 3.

The camming plate 400 with its oblique surfaces and ramps corresponds to the embodiments explained hitherto; in this case, however, it is constructed on the side wall 402 of the housing while the control projections with its oblique surfaces is formed integrally with the rear wall 404 of the housing. A cage 408 for the catch is formed in the rear wall 406 of the slider member and on the elongate hole 410 of the cage a catch 412 is pivotally mounted so that it can be displaced. The catch is supported by means of an

integrally formed leaf spring 414 at the end wall 416 of the cage and with its catch projections 418 it co-operates with the camming plate, while the oblique surface 420 of the control projection 422, engaging through an opening (not shown) of the cage for the catch, co-operates, when the container is opened, with a catch control edge 424 provided at an aperture 426 of the catch. The operating sequence corresponds in all other respects to the operations described in detail with reference to Figs 4 to 6.

The next embodiment, shown in Figs 15 to 18, relates to a container for compact discs.

The housing 500 accommodates two slider members arranged one on top of the other. Each slider member 502 is arranged in the housing so that it can slide via telescopic rails 504, in the manner similar to that of the slider member in Fig. 11. Likewise in a manner analogous to Fig. 11, ejection springs 506 are provided which bias the slider member into its open position. A lid 508 is hinged to the slider member by means of bolts 510 and a coiled torsion spring 512 with projecting ends on one of the bolts biases the lid towards the opening position, that is to say, towards a position in which it moves away from the slider member. Pockets, which open in the manner of a concertina when the lid moves upwards, can then be suspended between the base of the slider member and the lid.

The locking of the two slider members in the housing is effected by means of the locking systems according to Figs 4 to 6. It will be seen, however, that there is no housing base underneath the upper slider member so that the camming plate 514 associated therewith is attached at the rear wall 516 of the housing at the corresponding height, the camming plate being supported by two arms 518 laterally attached thereto. Underneath the cage 520 for the catch, the

base 522 of the slider member has a recess that is adapted to the camming plate 514 and also leaves room for the arms 518. The arrangement of the lower camming plate 524 and the arrangement of the two control projections 526 correspond to Figs 4 to 6.

Fig. 19 is a perspective view of two positively locked containers, each having a housing containing four slider members. This is a container for compact cassettes. In the front wall of the slider member openings 600 may be provided behind which, for example, an identifying label appears when a cassette is in the container. The front walls each have a rounded contour which, on the one hand, is comfortable to use and, on the other hand, reduces the danger of injury which may occur as a result of striking a sharp edge of the housing if the container were conveyed in a motor vehicle. As can be seen from the partial view according to Fig. 20, when in the pushed in and locked position the slider members project by a distance beyond the front edge of the housing which corresponds to the release travel of the locking device.

In the locked position of the slider member, the spring arrangement provided in each case acts on the slider member and biases it to its removal position. The force exerted by the spring arrangement produces torques acting, on the one hand, on the housing part and, on the other hand, on the transport slider member with respect to the point of rotation which is defined by the positive locking of the locking device. In the arrangement of this position, therefore, a lever arm that is as short as possible should be selected so that the torques do not result, owing to cold flow of the plastics material, especially at relatively high temperatures, in permanent deformations of the parts consisting of plastics material.