A case for a recordable medium disc, comprising a case bottom, a case lid pivotally connected to the case bottom, and a pivotal tray for the disc; the pivotal tray mounted for pivotal rotation from a first position substantially parallel to the case bottom, to a second position at an angle to the case bottom; and wherein the pivotal rotation is urged by pivotal rotation of the lid relative to the case bottom. Also disclosed is a hub for releasably engaging a central aperture of at least one recordable medium disc; the hub comprising a projection from an upper surface of a disc tray; the projection including a rear portion and a front portion separated by a transverse gap.
CASE FOR A RECORDABLE MEDIUM DISC

TECHNICAL FIELD

[0001] The present invention relates to a case for a recordable medium disc.

[0002] The invention has been primarily developed for use with 5-inch Compact Discs (CDs) which are stored within various standard sized cases, known as Jewel cases, and will be described with reference to this application. CD's are common in audio, computer and audio visual applications. However, it will be appreciated that the invention is not limited to this particular application and is also suitable for use with discs of smaller (eg. Minidisces) and larger (eg. Laserdiscs) sizes.

BACKGROUND TO THE INVENTION

[0003] Several different arrangements of CD cases and other CD cases are known that hold one or more CD discs.

[0004] The most common form of CD case is the 10 mm thick case (Jewel case) which has a base portion that locks into the bottom of the case. The base portion has an annular recess complimentary to the CD and an inner cylindrical protruberance (hub) which is a circumferential interference or sprung fit with the central hole of the CD to retain the CD adjacent the base portion.

[0005] Other known cases are 5 mm thick jewel cases which comprise only a bottom and a lid; the bottom having moulded into it an annular recess complimentary to the CD and an inner cylindrical protruberance which is an interference or sprung fit with the central hole of the CD to retain the CD.

[0006] A disadvantage of these known types of CD cases is gripping access to the disc is limited as the disc sits flush with the base portion which makes removal difficult. This problem of removal is even more difficult with the slimmer 5 mm thick jewel cases.

[0007] Other known cases attempt to incorporate swing out or lift up base portions (trays) to improve access to the disc. The known forms of this type have various pivotal or moveable bottom trays that allow for upward movement of the disc for easier gripping. However these known types have the disadvantage of being excessively complicated, problematic to manufacture and assemble and are mechanically unreliable.

[0008] Additionally, common to the aforesaid known CD cases is the use of the afore described hub to releaseably attach the CD to the bottom portion or to a moveable tray of the case. The known hubs exacerbate the difficulties of removing a CD from a CD case.

[0009] Known hubs require a downward pressing force to attach the CD to the hub and upward pulling force to detach the CD. The circumferential interference or sprung fit of known hubs leave little tolerance for precise adjustment of the mechanical and frictional forces exerted to retain the CD satisfactory. More often than not known hubs fit much too tightly within the centre hole of the CD. This makes it difficult to remove a CD and causes bending of the CD across it’s diameter. Bending the laminate structure of a CD is a common cause of micro delamination which destroys the data storage structure and results in permanent failure of the CD. Advances in CD technology (increased data capacity, higher speeds, enhanced read/write capabilities etc.) is producing CD's with increasingly sophisticated laminate structures which are increasingly susceptible to bending induced micro delamination and disc failure.

[0010] Known hubs also negate the advantage of known cases with moveable or lift up bottom portions (trays). Moveable portions are by there very nature less rigidly located in space than cases where the known hubs are fixed to a rigid case bottom. Pulling a CD off a known hub causes the tray to flex or move forward in the direction of force frustrating it's removal; conversely pushing the CD down over the hub is even more problematic as the tray will move or flex away from the CD.

OBJECTIVES OF THE INVENTION

[0011] It is the object of the present invention to substantially overcome or at least ameliorate the afore described disadvantages of known forms; to provide a CD case that simply and reliably allows for the disc to be elevated clear of the case for ease of gripping and also provides for easy removal (and reattachment) from a hub when the tray is at the elevated access position.

SUMMARY OF THE INVENTION

[0012] Accordingly, in one broad form of the invention there is provided a case for a recordable medium disc, comprising a case bottom, a case lid pivotally connected to the case bottom, and a pivotal tray for the disc; the pivotal tray mounted for pivotal rotation from a first position substantially parallel to the case bottom, to a second position at an angle to the case bottom; and wherein the pivotal rotation is urged by pivotal rotation of the lid relative to the case bottom.

[0013] Preferably, the case bottom comprises a substantially planar bottom, and opposing short appendages providing pivot support side portions; and wherein the pivot support side portions extend outwardly beyond a rear edge of the planar bottom.

[0014] Preferably, the pivot support side portions provide first pivotal support elements for the case lid; the first pivotal support elements defining a first line of rotation for the case lid; the first line of rotation lying beyond the rear edge.

[0015] Preferably, the pivot support side portions provide second pivotal support elements for the pivotal tray; the second pivotal support elements defining a second line of rotation lying between the rear edge and the first line of rotation.

[0016] Preferably, the case lid comprises a substantially planar cover provided with opposing downwardly depending side portions and a downwardly depending rear portion having a side surface substantially normal to the planar cover portion and a lower edge; the lower edge of the rear portion forming a cam like portion relative to the second line of rotation.

[0017] Preferably, the side portions of the case lid are provided with case lid pivot elements for engagement with the first pivotal support elements so as to provide for pivotal rotation of the lid about the first line of rotation.
Preferably, the pivotal tray comprises a substantially planar component having a rear portion provided with pivotal tray pivot elements at each outer end of the rear portion, and a front portion; the rear portion extending adjacent the rear edge or the case bottom between the pivot support side portions of the case bottom; and wherein the front portion extends to the middle of the case bottom.

Preferably, the pivotal tray pivot elements engage with the second pivotal support elements so as to provide for pivotal rotation of the pivotal tray about the second line of rotation.

Preferably, the rear portion of the pivotal tray is provided with at least one extension portion; said extension portion a continuation of the substantially planar component and projecting beyond the second line of rotation to abut the cam like portion.

Preferably, rotation of the case lid from a first closed position substantially parallel with the case bottom, to an open position at an angle to the case bottom causes the cam like portion to depress the extension portion so as to rotate the pivotal tray from the first position parallel to the case bottom, to an angle relative to the case bottom proportional to the angle of the case lid.

Preferably, rotation of the case lid reaches a first detent angle at which the side surface substantially normal to the substantially planar cover of the case lid is in parallel contact with the extension portion so as to provide a releasable stop position retaining the case lid and the pivotal tray in a stable configuration.

Preferably, the pivotal tray is provided with an approximately cylindrical protuberance from an upper surface of the pivotal tray; the cylindrical protuberance divided into a front portion and a rear portion; the front portion and rear portion arranged for releasable engagement with a central aperture of the disc.

Preferably, each of the rear portion and front portion is separately and resiliently attached to the pivotal tray.

Preferably, each of the rear portion and the front portion approximate one half of an inverted frustum so as to each present an undercut outer face; the rear portion and the front portion separated by a gap; and wherein the rear portion and the front portion projecting above the upper surface of the pivotal tray sufficient to project through the aperture of the disc.

The case of claim 14 wherein the diameter of the base of the frustum is slightly larger than the diameter of the central aperture of the disc.

Preferably, the rear portion and the front portion are reduced in width adjacent the gap so that the width is slightly less than the diameter of the central aperture of the disc.

Preferably, the rear portion and the front portion are disposed in a circular aperture within the pivotal tray; the diameter of the circular aperture larger than the diameter of the frustum; and wherein each of the rear portion and the front portion is connected to the periphery of the circular aperture by a pair of flexible lugs.

In a further broad form of the invention there is provided a hub for releasably engaging a central aperture of at least one recordable medium disc; the hub comprising a projection from an upper surface of a disc tray; the projection including a rear portion and a front portion separated by a transverse gap.

Preferably, the projection is sufficient to pass through the central aperture of the at least one recordable medium disc and extend above an upper surface of the, or the uppermost disc when the at least one disc is seated on the disc tray.

Preferably, the projection approximates an inverted frustum of an oval based cone; a major axis of the oval based cone disposed at right angles to the gap; and wherein the frustum provides undercut outward facing surfaces of the rear portion and front portion.

Preferably, the major axis of the oval based cone is slightly larger than the diameter of the central aperture.

Preferably, a minor axis of the oval based cone is slightly smaller that the diameter of the central aperture.

Preferably, the rear portion and the front portion are disposed in a circular aperture within the disc tray; the diameter of the circular aperture larger than the major axis of the oval based cone; and wherein each of the rear portion and the front portion is resiliently connected to the periphery of the circular aperture by a pair of flexible lugs.

Preferably, the pair of flexible lugs of the rear portion and of the front portion are disposed along a line parallel to the gap.

Preferably, the pair of flexible lugs of the rear portions and of the front portion are and connected to the rear portion and to the front portion adjacent to the gap.

Preferably, the at least one recordable medium disc may be engaged with the hub by application of a portion of an inner edge of the central aperture to the undercut outward facing surfaces of the rear portion or the front portion, so as to cause deflection of the front portion or the rear portion respectively, inwards towards the gap thereby reducing the major axis to equal to or less than the diameter of the central aperture.

Preferably, the at least one disc may be disengaged from the hub by the application of vertically upward pressure on the disc, so as to force engagement between the central aperture and the undercut outward facing surfaces, to reduce the major axis sufficient for the central aperture of the disc to disengage from the hub.

Preferably, the disc tray is pivotally attached to a bottom portion of a disc case so as to permit rotation between a first position substantially parallel to the bottom portion and a second position at an angle to the bottom portion.

Preferably, the disc case is provided with a pivotally connected lid.

Preferably, pivotal rotation of the lid is arranged to apply pivotal rotation to the disc tray.

Accordingly, the present invention provides a case for a recordable medium disc; the case including

a case bottom;

a disc tray adapted for pivotal movement or integrally formed for pivotal movement with the case bottom
and adapted to releasably retain a disc adjacent thereto and having pivotal means and a rear projection, the disc tray adapted for movement relative to the case bottom between a storage position substantially parallel and adjacent to the bottom and an access position angled with respect to the bottom;

0045 a lid having a cam-like projection and adapted mounted for movement with respect to the case bottom between a closed position substantially parallel and adjacent to the bottom and an open position angled with respect to the bottom;

0046 whereby, when the lid is in the closed position, the cam-like extension of the lid and the disc tray are in an engaged abutting relationship and initial movement of the lid towards the open position depresses the rear projection of the disc tray and moves the disc tray to the access position at which continued movement of the lid causes an area on the cam-like extension of the lid to abut an area of the rear projection of the disc tray to effect a positive but releasable stop position which retains the lid in the open position and the disc tray in the elevated access position and where continued movement of the lid will retain the disc tray in an elevated access position.

0047 and when the lid is in the open position, movement of the lid through to the closed position.

0048 returns the lid and the disc tray to closed positions respectively.

0049 Preferably the disc tray desirably includes a hub like protrusion to releasably retain a disc adjacent thereto, said hub being formed to engage the central hole of a CD disc and includes:

0050 a front portion, resiliently sprung and having an undercut on its forward facing edge such that will accommodate a little more than CD disc thickness;

0051 a rear portion, resiliently sprung and having a vertical or an undercut rearward facing edge such that will accommodate a little more than CD disc thickness;

0052 wherein the front and back portions are diametrically opposed at a distance a little more than the diameter of the CD disc central hole and their side to side dimension a little less than CD disc hole diameter.

0053 whereby, when disc is pressed vertically over the hub at least the front resiliently sprung portion will flex inward to allow the hub to pass through the hole to become securely releasably engaged by the undercut, but such that light lifting force will effect disengagement, and

0054 whereby a disc may also be engaged with the hub by moving the disc toward the hub in a dive bombing like action to cause the inner edge of the hole to abut and press against the undercut edge of either the front or back resiliently sprung portion to cause it to flex in the direction of movement decreasing the hub diameter to allow the disc hole edge to slide down the undercut face to pass over the hub to become releasably engaged;

0055 and whereby a lightly forced reverse dive bomb- ing action will deflect the resiliently sprung portion of the hub in the direction of movement to decrease the diameter of the hub whilst flexing the contacted portion such that its edge is rotated beyond parallel to the central axis of the hub such that the edge of the disc hole may slide up to become free of the hub.

A PREFERRED FORM OF THE INVENTION

0056 In a preferred form of the invention a case bottom is moulded in rigid but resilient plastic and forms a shallow open top container to accept a disc, said case bottom includes;

0057 an integral pivotal base portion;

0058 comprising a front tray portion adapted to support a disc and having on it’s upper surface a cylindrical protuberance sized to releasably engage with the centre hole of a CD to retain the CD adjacent to the pivotal base portion and having a shorter opposite reward facing portion. The pivotal base portion is substantially planar and is integrally connected to the case bottom at it’s sides toward the rear of the tray portion through a pair of short axially aligned beams having cross sections which allow torsion so that a downward force applied to the rear portion results in the upward movement of the tray portion;

0059 and having a lid;

0060 a lid pivotally is mounted at its sides toward the rear of the case bottom such that a short reward cam like portion of the lid bottom extends beyond the pivot point and is caused to abut and depress the rearward portion of the base when the lid is opened to elevate the tray portion for easy grasping of the CD. Conversely, when the lid is pivoted back to the close position the short rearward portion of the base is allowed to resiliently return to it’s rest position returning the tray portion (with attached disc) back to it’s former position substantially flush within the closed case.

0061 and having a protuberance;

0062 a protuberance a protuberance which is an interference or sprung fit with the central hole of the CD disc; said protuberance having a resiliently mounted front portion with an undercut front face and a resiliently mounted rear portion having a vertical or undercut rear face and being sized such that the front to back diameter of the protrusion is a little greater than the diameter of a CD disc centre hole and the side to side diameter is a little less than the diameter of a CD disc hole, such that CD disc hole may be lightly force over the protrusion to become releasably engaged at the front and back undercut area; and whereby a disc may be loaded onto the protrusion by pressing the disc centre hole down over the protrusion or by pressing the disc hole in a front to back movement over the protruberance.

A SECOND EMBODIMENT OF THE INVENTION

0063 In another form of the invention the pivotal portion of the base is a separate piece; having a forward tray portion adapted to retain a disc and a short rearward portion adapted to co act with the lid and in the manner of the first embodiment described. However, in this second embodiment the pivotal movement of the pivotal base portion within the case base is effected by means of a pair of opposite outward facing spigots located at the sides of the pivotal base portion toward its rear, said spigots engage within reciprocal open top channels sections which are
resiliently biased at the top edges of their walls to accept
forceful entry of the spigots which become pivotally cap-
tured in the wider bottom area of the channels.

BRIEF DESCRIPTION DRAWINGS

[0064] Preferred embodiments of the invention will now be described, by way of examples only, with reference to the accompanying drawings in which;

[0065] FIG. 1 is a perspective view of a CD case according to
a first embodiment of the invention showing the case lid
open and the tray being elevated

[0066] FIG. 2 is a top view of the CD case of FIG. 1
showing the case closed and the CD and lid shown in
phantom line.

[0067] FIG. 3 is a partial section view of FIG. 2.

[0068] FIG. 4 is a partial section view of FIG. 2 showing
the lid partially opened and the tray elevated.

[0069] FIG. 5 is a partial section view of FIG. 2 showing
the lid at the stop position holding the tray at the access
position.

[0070] FIG. 6 is a partial section view of FIG. 2 showing
the lid opened through 180°

[0071] FIG. 7 is a partial perspective view of a top tray
showing a cylindrical protuberance for releasable attach-
ment of a CD

[0072] FIG. 8 is a partial top view of the tray of FIGS. 1
and 2 showing a cylindrical protuberance for releasable
attachment of a CD

[0073] FIG. 9 is a section view of FIG. 7

[0074] FIG. 10 is a top view of a second embodiment
of the invention shown with the case closed and a CD and lid
shown in phantom line.

[0075] FIG. 11 is a partial section view of FIG. 9

[0076] FIG. 12 is a top view of a third embodiment of the
invention shown with the case closed and a CD and lid
shown in phantom line.

[0077] FIG. 13 is a partial section view of FIG. 11

DETAILED DESCRIPTION OF PREFERRED
EMBODIMENTS

[0078] FIGS. 1 to 6 show a first embodiment 100 accord-
ing to the present invention which includes a case bottom 10
having an integral pivotal tray 20, comprising a tray front
portion 21 and a tray rear portion 22 and a lid 30 pivotally
mounted at the rear of the case bottom 10.

[0079] As best shown in FIGS. 7 and 8 and 9, the tray front
22 has on its top surface a short cylindrical protuberance
23 having a resiliently flexible front portion 24 with an under-
cut outer front face 26 and having a resiliently flexible rear
portion 25 with an undercut outer rearward facing face 27.
The protuberance is centrally disposed in a hole in the tray
front and each front and rear portions is supported by a pair
of resilient lugs connecting the portions to the periphery of
the hole and parallel to a gap between the portions. Said
cylindrical protuberance having a front to back diameter a
little more than a CD hole diameter and a side to side
diameter a little less than a CD disc hole diameter.

[0080] The case bottom 10 is substantially planer with
short walls to increase rigidity. The rear of the case bottom
10 has a pair of short appendages 11 extending reward at
each side having an opposed pair of short inward facing
spigots 12 to engage reciprocally holes 31 in each side of the
rear of the lid 30 to effect a hinge point 12, 31 for the lid 30.

[0081] The tray 20 is connected to the case bottom 10 near
its outer edges toward its rear by a pair of short axially
tioned torsion members 28. The tray rear 22 extends below
and rearward past the case bottom and lid pivot point 12, 31.

[0082] The lid 30 includes a short rearward cam like
extension 32 extending past the hinge pivot point 12, 31.

[0083] The operation of this preferred form of the inven-
tion will now be described. As shown in FIGS. 1 and 2, a
disc 40 is contained substantially flush with the case bottom
10 within the case 100 when the lid 30 is closed. When the
lid 30 is opened the rearward cam like extension 32 depresses
the tray rear 22 and elevates the tray front 21. As
best shown in FIGS. 1 and 5, when the lid 30 is rotated
through approximately 110° the flat rear facet 33 of the cam
like extension 32 comes into parallel contact with the upper
surface of the tray rear 22 and effects a lid stop to prevent
the lid from snapping closed and to hold the tray 20 in the
elevated access position. Continued rotation of the lid 30
through its full travel of 180° brings the upper rear surface
of the lid into parallel contact with the upper surface of the
tray rear 22. Closure of the lid 30 effects the return of the tray
20 and disc 40 to a substantially flush position within the
case bottom 10.

A SECOND EMBODIMENT

[0084] FIGS. 10 and 11 show a second embodiment 200 in
accordance with the invention which is similar to case 100
and like reference numerals have been used to indicate like
features. However in the case 200 the pivotal tray 220
includes a pair of outward facing spigots 223 which are
captured in a reciprocal pair of holes 211 formed into
resiliently biased appendages 212 projecting from the rear of
the case base 210. The invention otherwise being in accord
with embodiment 100.

A THIRD EMBODIMENT

[0085] FIGS. 12 and 13 show a third embodiment 300 in
accordance with the invention which is similar to cases 100
and 200 and like reference numerals have been used to
indicate like features. However in the case 300 the pivotal
tray 320 includes a pair of outward facing spigots 323 which
are captured in a reciprocal pair of slots 311 formed into
the side walls 312, each slot 311 has resiliently biased side walls
313 position a distance apart less than the diameter of the
spigots 323 such that the spigots when forced past the top
entry way of the lots 311 become permanently captured for
pivotal movement at the bottom of the slot. The invention
otherwise being in accord with embodiments 100 and 200.

[0086] Although the above description and the drawings have made reference to a disc case and hub for carrying a single disc, it will be appreciated that for a disc case dimensionally equivalent to a standard 10 mm case, the hub may be extended in length so as to accommodate thereon at least two discs.
What is claimed is:

1. A case for a recordable medium disc, comprising a case bottom, a case lid pivotally connected to the case bottom, and a pivotal tray for the disc; the pivotal tray mounted for pivotal rotation from a first position substantially parallel to the case bottom, to a second position at an angle to the case bottom; and wherein the pivotal rotation is urged by pivotal rotation of the lid relative to the case bottom.

2. The case of claim 1 wherein the case bottom comprises a substantially planar bottom, and opposing short appendages providing pivot support side portions; and wherein the pivot support side portions extend outwardly beyond a rear edge of the planar bottom.

3. The case of claim 2 wherein the pivot support side portions provide first pivotal support elements for the case lid; the first pivotal support elements defining a first line of rotation for the case lid; the first line of rotation lying beyond the rear edge.

4. The case of claim 2 wherein the pivot support side portions provide second pivotal support elements for the pivotal tray; the second pivotal support elements defining a second line of rotation lying between the rear edge and the first line of rotation.

5. The case of claim 4 wherein the case lid comprises a substantially planar cover with opposing downwardly depending side portions and a downwardly depending rear portion having a side surface substantially normal to the planar cover portion and a lower edge; the lower edge of the rear portion forming a cam like portion relative to the second line of rotation.

6. The case of claim 4 wherein the side portions of the case lid are provided with case lid pivot elements for engagement with the first pivotal support elements so as to provide for pivotal rotation of the lid about the first line of rotation.

7. The case of claim 3 wherein the pivotal tray comprises a substantially planar component having a rear portion provided with pivotal tray pivot elements at each outer end of the rear portion, and a front portion; the rear portion extending adjacent the rear edge of the case bottom between the pivot support side portions of the case bottom; and wherein the front portion extends to the middle of the case bottom.

8. The case of claim 7 wherein the pivotal tray pivot elements engage with the second pivotal support elements so as to provide for pivotal rotation of the pivotal tray about the second line of rotation.

9. The case of claim 7 wherein the rear portion of the pivotal tray is provided with at least one extension portion; said extension portion a continuation of the substantially planar component and projecting beyond the second line of rotation to abut the cam like portion.

10. The case of claim 9 wherein rotation of the case lid from a first closed position substantially parallel with the case bottom, to an open position at an angle to the case bottom causes the cam like portion to depress the extension portion so as to rotate the pivotal tray from the first position parallel to the case bottom, to an angle relative to the case bottom proportional to the angle of the case lid.

11. The case of claim 9 wherein rotation of the case lid reaches a first detent angle at which the side surface substantially normal to the substantially planar cover of the case lid is in parallel contact with the extension portion so as to provide a releasable stop position retaining the case lid and the pivotal tray in a stable configuration.

12. The case of claim 1 wherein the pivotal tray is provided with an approximately cylindrical protuberance from an upper surface of the pivotal tray; the cylindrical protuberance divided into a front portion and a rear portion; the front portion and rear portion arranged for releasable engagement with a central aperture of the disc.

13. The case of claim 12 wherein each of the rear portion and front portion is separately and resiliently attached to the pivotal tray.

14. The case of claim 12 wherein each of the rear portion and the front portion approximate one half of an inverted frustum so as to each present an undercut outer face; the rear portion and the front portion separated by a gap; and wherein the rear portion and the front portion projecting above the upper surface of the pivotal tray sufficient to project through the aperture of the disc.

15. The case of claim 14 wherein the diameter of the base of the frustum is slightly larger than the diameter of the central aperture of the disc.

16. The case of claim 12 wherein the rear portion and the front portion are reduced in width adjacent the gap so that the width is slightly less than the diameter of the central aperture of the disc.

17. The case of claim 14 wherein the rear portion and the front portion are disposed in a circular aperture within the pivotal tray; the diameter of the circular aperture larger than the diameter of the frustum; and wherein each of the rear portion and the front portion is connected to the periphery of the circular aperture by a pair of flexible lugs.

18-38. (canceled)

39. A case for at least one recordable medium disc, the case including:

a case bottom;

incorporating a tray adapted for pivotal movement or integrally formed for pivotal movement with the case bottom and adapted to releasably retain the at least one disc adjacent thereto and having pivotal means and a rear projection, the disc tray adapted for movement relative to the case bottom between a storage position substantially parallel and adjacent to the bottom and an access position angled with respect to the bottom;

a lid having a cam like projection and adapted mounted for movement with respect to the case bottom between a closed position substantially parallel and adjacent to the bottom and an open position angled with respect to the bottom;

whereby, when the lid is in the closed position, the cam like extension of the lid and the disc tray are in an engaged abutting relationship and initial movement of the lid towards the open position depresses the rear projection of the disc tray and moves the disc tray to the access position at which continued movement of the lid causes an area on the cam like extension of the lid to abut an area of the rear projection of the disc tray to effect a positive but releasable stop position which retains the lid in the open position and the disc tray in the elevated access
position and where continued movement of the lid will retain the disc tray in an elevated access position, and when the lid is in the open position, movement of the lid through to the closed position returns the lid and the disc tray to closed positions respectively.

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