

Description

The invention relates to a holder for a rigid information disc, comprising a rectangular frame which comprises a first disc-supporting section situated near a first peripheral side of the frame and a second disc-supporting section adjoining a second peripheral side located opposite the first peripheral side, the first and second disc-supporting sections are interconnected by at least one resilient connecting element, which is adapted for deflection of the first against the second peripheral side, in which deflected position the first and second peripheral sides extend at least substantially parallel to one another, which frame carries movable clamping members for retaining the information disc on or releasing it from the frame, which connecting element is capable of resiling from a deflected position to a flat position, the clamping members being situated near said connecting element.

A holder of this type is known from DE—A—3,135,795. In such a holder the information disc is enclosed in the frame so that it need not be touched when it is put onto the turntable. The clamping members of the known holder retain the disc with a clearance such that the disc can be played while contained in the holder. Therefore, these clamping members cannot be moved away from the disc by mechanical means in the disc-record player in order to remove the disc from the frame. The frame is resiliently deflexible to allow the disc to be manually withdrawn from or inserted underneath the clamping members after deflection of the frame, for example in order to replace it with another disc.

In disc-record players intended for playing optical information discs such as those of the "Compact Disc" type, it is desirable to remove the disc from the holder before playing and to bring the holder to a position at some distance from the turntable. However, it is desirable that these operations can be effected inside the disc-record player in a mechanically controlled manner. The above-mentioned known holder is not suitable for this purpose.

It is the object of the invention to construct a holder of the type specified in the opening paragraph in such a way that after deflection of the frame into the deflected position the disc can be transferred to or from the turntable while the frame is in this position.

To this end the invention is characterized in that the clamping members cooperate with the disc near the central portion of the connecting element for holding the disc against said central portion and are such that in the deflected position of the frame they are situated below a plane tangential to the bowed connecting element and still hold the disc and that the clamping members are each carried on a resiliently deflexible arm which is connected at one end to the frame.

Thus, the frame can be deflected into a bowed position at the location of the connecting element

approximately halfway between the first and second disc-supporting sections, the clamping members retaining the disc continuously on the frame during the deflection. By bending away the clamping members the disc can be released from the frame at a predetermined instant, suitably after the disc has been positioned on the turntable of a disc-record player. Subsequently, the frame resumes the flat position under the influence of its own resilience, so that the frame is situated at some distance from the turntable and does not impede playing of the disc. Thus, the holder in accordance with the invention not only constitutes a support for the information disc but also means for lowering the disc from a position above the turntable onto the turntable. Preferably, the various parts of the holder are injection moulded in one piece, so that the holder is particularly suitable for mass production.

A holder in accordance with a preferred embodiment of the invention, in which the clamping members are resiliently movable relative to the frame and in which the connecting element is arranged between the disc-supporting sections, is characterized in that there are two connecting elements which are arranged between the disc supporting sections and that there are two clamping members each carried on an arm, the two arms being situated adjacent those edges of the connecting elements which face a third and a fourth peripheral side, respectively, of the frame. By arranging the clamping members on the arms the clamping members are capable of retaining the disc continuously on the frame during deflection of the holder because they are situated near the connecting elements.

A holder in accordance with another preferred embodiment of the invention is characterized in that near its free end each arm carries both the respective clamping member and an actuating portion, and each arm carries a hook-shaped projection abutting in outward direction with a hook-shaped projection on the first disc-supporting section. Since both the clamping members and the actuating portions are situated near the free ends of the arms, the two arms merely have to be moved apart to release the disc from the holder.

The invention not only relates to said holder but also to an apparatus comprising a loading mechanism suitable for receiving a holder in accordance with Claim 1, said loading mechanism comprising supporting elements which are stationary relative to a chassis and which are arranged to support the frame of the holder near its first and second peripheral sides, and which mechanism includes control elements arranged to bear against the frame of the holder at the third and fourth peripheral sides thereof near the connecting elements and being movable in a downward direction relative to the chassis towards a plane containing the upper side of the turntable to bring the third and fourth peripheral sides of the frame into the deflected position, the loading mechanism includes control units for moving the

control elements downwards to bring the frame into the deflected position, and further the loading mechanism includes two release elements, being constituted by a two-armed pivotal release lever having a first arm which is cooperable with an associated one of the actuating portions of the clamping members of the holder and a second arm which is cooperable with the associated control unit to deflect the associated arm on which the associated clamping member is situated in an outward direction. This provides a loading system which can operate satisfactorily within a limited space, using a simple loading mechanism which comprises a small number of parts.

In this respect an apparatus in accordance with a further preferred embodiment of the invention is characterized in that the control elements comprise two channel-shaped lateral guides which are arranged to receive parts of lateral edges of the frame at the third and fourth peripheral sides thereof and which extend to the free ends of the resilient arms of the holder when the latter is inserted in the loading mechanism and which are pivotally connected to the chassis at points which, when the holder is inserted in the loading mechanism, are situated near the first peripheral side of the frame. Thus, the guides which guide the lateral edges of the frame during insertion merely have to be pivoted downwards to deflect the frame.

An apparatus in accordance with another preferred embodiment of the invention is characterized in that the downward movement of the control elements is controlled by two eccentrically journaled control cams which form parts of two control units which also control release elements for the clamping means of the holder. As the control elements control both the deflection of the frame and the actuation of the actuating portions of the clamping means, this part of the loading mechanism can be of compact construction and a correct timing of these functions of the loading mechanism is ensured. A centralized drive of the loading system is obtained if the two control units are arranged to be driven by a central drive means of the loading mechanism, which drive means is also adapted to drive a retraction element which brings the holder with the disc to a position above the turntable, the control units being disengaged from the drive means when the retraction element is being driven. Further, the disengagement of the control units from the drive means during retraction of the holder ensures that the holder is not deflected during retraction but only after retraction has been completed.

A holder in accordance with an embodiment of the invention will now be described in more detail, by way of example, with reference to the drawings. In the drawings:

Fig. 1 is a plan view of a holder in accordance with the invention and a disc accommodated in this holder,

Fig. 2 is a sectional view taken on the line II-II in Fig. 1,

Fig. 3 is a reduced-scale perspective view of the holder shown in Fig. 1,

Fig. 4 shows schematically the drive of a loading mechanism of a loading system in accordance with the invention,

Fig. 5 is a schematic plan view of a part of the holder during manual insertion of the holder into the loading mechanism,

Fig. 6 is a schematic plan view of a part of the holder after it has been inserted manually into the disc-record player and the loading mechanism has been started,

Fig. 7 is a schematic plan view of a part of the holder after it has been inserted fully by the loading mechanism,

Fig. 8 is a schematic side view, partly in section, of the holder in the inserted position shown in Fig. 7, in which position the disc is situated above the turntable,

Fig. 9 is a perspective view of the holder and the loading mechanism in the position shown in Fig. 8,

Fig. 10 is a view similar to Fig. 8 showing the holder in the deflected position when the disc has been lowered onto the turntable,

Fig. 11 is a perspective view of part of the holder and the loading mechanism in the position shown in Fig. 10,

Fig. 12 is a schematic plan view of a release element and associated control element for controlling the clamping means in the rest position,

Fig. 13 is a schematic plan view of the parts shown in Fig. 12 in the actuated position of the clamping means, and

Fig. 14 shows the holder in the flat position shown in Fig. 8 but after the disc has been lowered onto the turntable.

The holder shown in Figs. 1 to 3 comprises a rectangular frame 1 having four peripheral sides including a first peripheral side 1a, a second peripheral side 1b situated opposite the first side, a third peripheral side 1c and a fourth peripheral side 1d situated opposite the third side. A grip 2 extends along the first peripheral side 1a. The grip 2 is connected to a first disc-supporting section 3 of the frame. A second disc-supporting section 4 adjoins the second peripheral side 1b. Two substantially strip-shaped flat resilient connecting elements 5 and 6 extend between the two disc-supporting sections 3 and 4 in directions at least substantially perpendicular to the peripheral sides 1a and 1b, respectively. Between the connecting elements 5 and 6 and the disc-supporting section 3 and 4 the frame 1 has an opening 7 so that the frame is open between these elements. The connecting elements 5 and 6 are situated near the third peripheral side 1c and the fourth peripheral side 1d, respectively.

Clamping means for the holder are arranged between the outer edges of the connecting elements 5 and 6 and the adjacent peripheral sides 1c and 1d, respectively, which means comprise clamping members 8 and 9 which are resiliently movable relative to the frame and which are each carried on a resiliently deflexible arm 10 and 11, respectively. The arms 10 and 11 extend along the peripheral sides 1c and 1d, respectively. One end of each arm is connected to the holder near the grip 2. The free end of each arm is situated near a plane 12 which extends perpendicularly to the frame and parallel to the peripheral sides 1a and 1b thereof and which is spaced substantially equidistantly from the disc-supporting sections 3 and 4. It is to be noted that most parts of the frame are situated mirror-symmetrically relative to a plane 13 which extends parallel to and is spaced equidistantly from the peripheral sides 1c and 1d. At their free ends, adjacent the clamping members 8 and 9, the arms 10 and 11 also carry actuating portions 14 and 15, respectively. These actuating portions are situated near the peripheral sides 1c and 1d, respectively. Further, the arms 10 and 11 carry hook-shaped projections 16 and 17, respectively, which, when the arms are deflected in the outward direction, function as stops by abutment with hook-shaped projections 18 and 19, respectively, on the first disc-supporting section 3.

To facilitate insertion of the disc 20 into the holder the disc-supporting sections 3 and 4 comprise a conical centring wall 21 (see also Fig. 2), which is disposed substantially mirror-symmetrically relative to the plane 12 for the two disc-supporting sections. In the holder the disc 20 lies against a disc-supporting surface which is constituted by the surfaces of the disc-supporting sections 3 and 4 situated within the centring wall 21 and by the surfaces of the connecting elements 5 and 6. The clamping members 8 and 9 are situated at a distance from said disc-supporting surface near the peripheral sides 1c and 1d, respectively, and clamp the disc against the disc-supporting surface. The clamping members retain the disc 20 at its circumference, the resilience of the arms 10 and 11 providing the necessary clamping force.

It is to be noted that in a disc-record player the holder occupies the position shown in Fig. 2, in which the clamping members 8 and 9 are situated below the plane of the disc-supporting surface.

Near its second peripheral side 1b the frame 1 is formed with a hook 28 which in conjunction with a retraction element 31 of a loading mechanism, as shown in Figs. 5, 6 and 7, serves in the insertion of the holder into a disc-record player. Fig. 5 shows the holder partially inserted into the loading mechanism by hand. At the end of this partial insertion the retraction element 31 engages in a slot 32 in the frame 1, which slot is bounded partly by the hook 28 and opens out of the peripheral side 1b. When the holder has been inserted by hand through a given distance an electrical switch 22 of the loading mechanism is

closed (Fig. 6) to start the drive of the loading mechanism, as shown schematically in Fig. 4.

The loading mechanism, which together with the holder constitutes a loading system for transferring the disc to the turntable, comprises an electric motor 41 which is started by means of the switch 22. Via a belt 42 the electric motor drives a gear wheel 43. This gear wheel reduces the speed for driving the loading mechanism and meshes with a gear wheel 44. This gear wheel provides a further speed reduction and drives a toothed wheel 45. The wheel 45 and a further toothed wheel 47 are fixed on a spindle 46 so that the wheel 47 rotates with the wheel 45. The wheel 45 has teeth 45b which, in a manner to be described hereinafter, mesh with the teeth of a gear wheel 48 for a part of the time that the loading mechanism is operative, which gear wheel 48 in turn drives a gear wheel 49 for a specific time. The retraction element 31 is rigidly connected to the spindle of a toothed wheel 50 and is positioned in one or the other of two end positions by means of a bistable spring 51. The toothed wheel 50 carries a blocking cam 50a and has teeth 50b extending over an arc of substantially 180° for meshing with the teeth of the wheel 49. In the position shown in Fig. 4, when the loading mechanism is in a rest position, the blocking cam 50a acts against projecting flanks of two teeth 49a on the gear wheel 49 in a manner similar to the cam of a Geneva mechanism to lock the loading mechanism.

The manual insertion of the holder into the loading mechanism rotates the retraction element 31 and with it the toothed wheel 50 in the direction indicated by the arrow *a* through an angle 52 (see Figs. 4 and 6).

The blocking cam 50a is thereby disengaged from the teeth 49a and the teeth 50b of the wheel 50 mesh with the teeth of the gear wheel 49. It is to be noted that the two latching teeth 49a on the gear wheel 49 do not allow the loading mechanism to be driven by the motor 41 until the toothed wheel 50 has been rotated through the angle 52. This ensures that the element 31 is positioned correctly behind the hook 28 and that in this position the holder cannot be withdrawn by hand. This precludes the risk of an incorrect position of the holder in the loading mechanism. When the retraction element 31 has reached the position shown in Fig. 6 and the gear wheel 49 is in mesh with the teeth 50b of the wheel 50, the element 31 has closed the switch 22 and has thus started the motor 41. After starting of the motor 41 the toothed wheel 45 is rotated through an angle 53 in the direction indicated by the arrow *c* via the gear transmission 43 and 44, thereby rotating the gear wheel 48 in the direction indicated by the arrow *b*. Via the gear wheel 49 the gear wheel 48 drives the toothed wheel 50, which causes the element 31 to be pivoted further in the direction indicated by the arrow *a*, so that the holder is moved towards the end position shown in Fig. 7. The teeth 45b of the wheel 45 extend over an arc of substantially 90° and no further teeth on the wheel 45 cooperate with the gear

wheel 48. The gear wheel 48 is then blocked by a blocking cam 45a on the wheel 45 acting against projecting flanks of two teeth 48a on the gear wheel 48, so that the gear wheel 49 and the toothed wheel 50 are also blocked, as a result of which the position of the element 31 is no longer influenced by the further rotation of the toothed wheel 45. At this instant the holder is latched in the end position shown in Figs. 7, 8 and 9 and near its peripheral side 1b the frame 1 is supported by supports 33 in the disc-record player.

During the insertion movement the lateral edges of the frame at the third and fourth peripheral sides 1c and 1d thereof, respectively, engage in two channel-shaped lateral guides 54 (see Fig. 9) which are situated near a front wall 29 of the disc-record player, which guides are pivotally connected to the chassis of the record player by means of a resilient snap-in plate 54a and in the inserted position of the holder extend to the free ends of the resilient arms 10 and 11, respectively. In a manner to be described hereinafter the lateral guides 54 constitute control elements for the deflection of the frame 1. Further, when the holder is inserted the two actuating portions 14 and 15 of the arms 10 and 11, respectively, are coupled to release elements constituted by two two-armed release levers 34 which are pivotable about axes 34a (see Figs. 9, 11, 12 and 13). It is to be noted that the frame 1 preferably has asymmetrical side edges 38, 39, at its third and fourth peripheral sides 1c and 1d, respectively, in order to ensure that the holder occupies the correct position relative to the turntable 35 of the disc record player during insertion into the lateral guides 54, i.e. with the disc-supporting surface facing the turntable 35.

After the holder has been inserted and the frame 1 rests on the guides 54 and the supports 33 near the first and the second peripheral sides 1a, 1b, respectively, deflection of the holder begins. This is effected under the influence of the rotation of the toothed wheel 47, which is rigidly connected to the toothed wheel 45, in a direction as indicated by the arrow *c* in Fig. 4. This toothed wheel 47 rotates as long as the motor 41 is energized and has teeth 47b extending over an arc of approximately 240° outside the circumferential portion occupied by a blocking cam 47a. After rotation of the gear wheel 45 and hence the gear wheel 47 through the angle 53 the cam 47a moves away from two teeth 55a with projecting flanks on a gear wheel 55, so that the teeth 47b now begin to cause the gear wheel 55 to rotate in a direction as indicated by the arrow *d*. By means of a spindle 56 the gear wheel 55 is connected to two control units 57 (see also Figs. 12 and 13). These control units are arranged so as to be mirror-symmetrical relative to the plane of symmetry 13 of the inserted holder and to be positioned at equal distances from the peripheral sides 1c and 1d of the frame 1 of the inserted holder. As is shown in Figs. 9, 11, 12 and 13, the control units 57 each comprise a control cam 58,

which is eccentric relative to the spindle 56, and a cylindrical control member 59 which is rigidly connected to the control cam and which is coaxial with the spindle 56. The control cam 58 is situated between the adjacent lateral guide 54 and a hook 60 on the lateral guide 54. During the first part of the rotation of the gear wheel 55 the lateral guides 54 are pivoted downwardly by the control cams 58 in the direction indicated by the arrow *e* in Fig. 9. As a result of this, the parts of the edges 38, 39 near the free ends of the arms 10 and 11, respectively, are urged downwards (Fig. 11) in the direction indicated by the arrow *f*, the arrow *f* being oriented perpendicularly to a plane containing the upper side of the turntable 35. This results in the holder being deflected at the location of the connecting elements 5 and 6, during which deflection the peripheral sides 1b, 1a remain at least substantially parallel to each other because the frame 1 is situated on the supports 33 and the lateral guides 54. During this deflection the disc is slid onto a centring mandril 36 of the turntable 35 and is moved over an annular compression spring 37 at the circumference of the mandril 36, which spring 37, after the disc 20 has passed it, urges the disc onto the turntable 35 (Fig. 10). In the deflected position of the holder the clamping members 8 and 9 are situated below a plane 30 tangential to the bowed connecting elements 5 and 6 (see Fig. 10) and still hold the disc.

However, as soon as the disc has been pressed down correctly onto the turntable by the compression spring 37 the release elements 34 are actuated. This is achieved by means of the cylindrical control members 59, each of which has an endless control groove 62 in its circumferential wall (Figs. 12, 13), which groove operates as a cam track and is engaged by a pin 64 on an end portion of the second arm 63 of the adjacent lever 34. The first arm 65 of the release levers 34 is cooperable with the actuating portions 14 and 15 on the arms 10 and 11. During the first part of the rotation of the gear wheel 55 in the direction indicated by the arrow *d*, each pin 64 is guided in a first part 62a of the associated control groove 62, which first part extends in a plane perpendicular to the spindle 56 of the control units 57 (Fig. 12). Thus, the release levers 34 are not pivoted during this part of the rotation of the gear wheel 55. This corresponds to the period in which the lateral guides 54 have caused the holder to flex. After the cams 58 have reached the position shown in Fig. 11, each pin 64 is guided in a helically extending a second part 62b of the control groove 62 (Fig. 13), which second part 62b makes an acute angle with said plane which is perpendicular to the spindle 56. During this part of the rotation of the gear wheel 55 the two release levers are pivoted in opposite directions into respective positions of which one is shown in Fig. 13, so as to release the clamping members 8 and 9. The integration of each control cam 58 with the associated cylindrical control member 59 to form a control unit has the advantage that said functions, namely the deflection of the holder and

the release of the clamping members, are synchronized correctly. It is to be noted that the movements of the clamping members 8 and 9 in opposite directions by means of the release levers 34 are limited by the projections 16 and 17 on the arms 10 and 11. During the subsequent third stage of the rotation of the gear wheel 55 the release levers 34 remain in the pivoted position shown in Fig. 13 as the pins 64 are guided in a third part 62c of the control groove, which part 62c extends in a plane perpendicular to the spindle 56, as a result of which the clamping members 8 and 9 remain in their released positions. During this third stage the cans 58 rotate further to the position shown in Fig. 9, so that the lateral guides 54 return to their initial positions. As a result of this, the frame 1 resumes its flat position (Fig. 14). Now each pin 64 is guided in a helically extending fourth part 62d to the first part 62a of the associated control groove 62, which part 62d makes an acute angle with a plane perpendicular to the spindle 56, so that the release levers pivot back and the clamping members 8 and 9 also return to the rest positions, under the influence of the resilience of the arms 10 and 11. At this instant a cam, not shown, on the toothed wheel 45 switches off the motor 41. Now it is possible to play back the disc.

If the disc is to be removed from the turntable the operations described above should be performed in the reverse direction and sequence. The motor 41 begins to rotate in the opposite direction, so that the various movements described above are repeated in opposite directions. For example, the clamping members 8 and 9 are again moved apart, the holder is deflected and the disc 20 is then gripped again by the clamping members 8 and 9 when they spring back. Subsequently, the flat position of the holder is restored, after which the element 31 moves the holder partially out of the disc-record player, so that the holder can be removed by hand.

The loading system described in the foregoing can be of a particularly simple construction comprising a small number of parts and is particularly suitable for use in record players of a compact construction. An example of this is a disc-record player mounted in the dashboard of a car.

The holder described in the foregoing has the advantage that it can be manufactured integrally from a plastics material (such as a polycarbonate), so that the holder has a resilience at the location of the connecting elements 5 and 6 such that it can resume the flat condition after deflection. In this respect it is important that the deflection is sustained only briefly when the loading system in accordance with the invention is in operation, so that the risk of permanent distortion of the holder in accordance with the invention is substantially nil.

As the holder in accordance with the invention can be manufactured comparatively cheaply, it may be used as a universal holder both for the storage of discs in a storage system and for loading these discs into a disc-record player.

Manual insertion of the disc into the holder is easy because the disc simply snaps behind the clamping members 8 and 9. If necessary, the holder may be deflected slightly.

The holder described above is eminently suitable for use with optically readable discs of the "Compact-Disc" type, which have a comparatively small diameter and which can be stored effectively and also inserted readily into the disc-record player by means of the holder without the user having to touch the disc.

Apart from the embodiment shown, other constructions of the holder are possible. For example, instead of the two separate connecting elements 5 and 6 it is possible to employ one continuous connecting element. Further, it is possible to arrange the clamping members 8 and 9 at another location near the connecting elements.

Claims

1. A holder for a rigid information disc (20), comprising a rectangular frame (1) which comprises a first disc-supporting section (3) situated near a first peripheral side (1a) of the frame (1) and a second disc-supporting section (4) adjoining a second peripheral side (1b) located opposite the first peripheral side (1a), the first and second disc-supporting sections (3, 4) are interconnected by at least one resilient connecting element (5, 6), which is adapted for deflection of the first against the second peripheral side, in which deflected position the first and second peripheral sides (1a, 1b) extend at least substantially parallel to one another, which frame (1) carries movable clamping members (8, 9), for retaining the information disc (20) on or releasing it from the frame (1), which connecting element is capable of resiling from a deflected position to a flat position, the clamping members (8, 9) being situated near said connecting element (5, 6) characterized in that the clamping members (8, 9) cooperate with the disc near the central portion of the connecting element (5, 6) for holding the disc against said central portion and are such that in the deflected position of the frame (1) they are situated below a plane (30) tangential to the bowed connecting element (5, 6) and still hold the disc (20) and that the clamping members (8, 9) are each carried on a resiliently deflexible arm (10, 11) which is connected at one end to the frame (1).

2. A holder as claimed in Claim 1, in which the clamping members (8, 9) are resiliently movable relative to the frame (1) and in which the at least one connecting element (5, 6) is arranged between the disc supporting sections (3, 4), characterized in that there are two connecting elements (5, 6) which are arranged between the disc supporting sections (3, 4) and that there are two clamping members (8, 9) each carried on an arm (10, 11), the two arms being situated adjacent those edges of the connecting elements (5, 6) which face a third (1c) and a fourth (1d) peripheral side, respectively, of the frame (1).

3. A holder as claimed in Claim 2, characterized



the release of the clamping members, are synchronized correctly. It is to be noted that the movements of the clamping members 8 and 9 in opposite directions by means of the release levers 34 are limited by the projections 16 and 17 on the arms 10 and 11. During the subsequent third stage of the rotation of the gear wheel 55 the release levers 34 remain in the pivoted position shown in Fig. 13 as the pins 64 are guided in a third part 62c of the control groove, which part 62c extends in a plane perpendicular to the spindle 56, as a result of which the clamping members 8 and 9 remain in their released positions. During this third stage the cans 58 rotate further to the position shown in Fig. 9, so that the lateral guides 54 return to their initial positions. As a result of this, the frame 1 resumes its flat position (Fig. 14). Now each pin 64 is guided in a helically extending fourth part 62d to the first part 62a of the associated control groove 62, which part 62d makes an acute angle with a plane perpendicular to the spindle 56, so that the release levers pivot back and the clamping members 8 and 9 also return to the rest positions, under the influence of the resilience of the arms 10 and 11. At this instant a cam, not shown, on the toothed wheel 45 switches off the motor 41. Now it is possible to play back the disc.

If the disc is to be removed from the turntable the operations described above should be performed in the reverse direction and sequence. The motor 41 begins to rotate in the opposite direction, so that the various movements described above are repeated in opposite directions. For example, the clamping members 8 and 9 are again moved apart, the holder is deflected and the disc 20 is then gripped again by the clamping members 8 and 9 when they spring back. Subsequently, the flat position of the holder is restored, after which the element 31 moves the holder partially out of the disc-record player, so that the holder can be removed by hand.

The loading system described in the foregoing can be of a particularly simple construction comprising a small number of parts and is particularly suitable for use in record players of a compact construction. An example of this is a disc-record player mounted in the dashboard of a car.

The holder described in the foregoing has the advantage that it can be manufactured integrally from a plastics material (such as a polycarbonate), so that the holder has a resilience at the location of the connecting elements 5 and 6 such that it can resume the flat condition after deflection. In this respect it is important that the deflection is sustained only briefly when the loading system in accordance with the invention is in operation, so that the risk of permanent distortion of the holder in accordance with the invention is substantially nil.

As the holder in accordance with the invention can be manufactured comparatively cheaply, it may be used as a universal holder both for the storage of discs in a storage system and for loading these discs into a disc-record player.

Manual insertion of the disc into the holder is easy because the disc simply snaps behind the clamping members 8 and 9. If necessary, the holder may be deflected slightly.

The holder described above is eminently suitable for use with optically readable discs of the "Compact-Disc" type, which have a comparatively small diameter and which can be stored effectively and also inserted readily into the disc-record player by means of the holder without the user having to touch the disc.

Apart from the embodiment shown, other constructions of the holder are possible. For example, instead of the two separate connecting elements 5 and 6 it is possible to employ one continuous connecting element. Further, it is possible to arrange the clamping members 8 and 9 at another location near the connecting elements.

Claims

1. A holder for a rigid information disc (20), comprising a rectangular frame (1) which comprises a first disc-supporting section (3) situated near a first peripheral side (1a) of the frame (1) and a second disc-supporting section (4) adjoining a second peripheral side (1b) located opposite the first peripheral side (1a), the first and second disc-supporting sections (3, 4) are interconnected by at least one resilient connecting element (5, 6), which is adapted for deflection of the first against the second peripheral side, in which deflected position the first and second peripheral sides (1a, 1b) extend at least substantially parallel to one another, which frame (1) carries movable clamping members (8, 9), for retaining the information disc (20) on or releasing it from the frame (1), which connecting element is capable of resiling from a deflected position to a flat position, the clamping members (8, 9) being situated near said connecting element (5, 6) characterized in that the clamping members (8, 9) cooperate with the disc near the central portion of the connecting element (5, 6) for holding the disc against said central portion and are such that in the deflected position of the frame (1) they are situated below a plane (30) tangential to the bowed connecting element (5, 6) and still hold the disc (20) and that the clamping members (8, 9) are each carried on a resiliently deflexible arm (10, 11) which is connected at one end to the frame (1).

2. A holder as claimed in Claim 1, in which the clamping members (8, 9) are resiliently movable relative to the frame (1) and in which the at least one connecting element (5, 6) is arranged between the disc supporting sections (3, 4), characterized in that there are two connecting elements (5, 6) which are arranged between the disc supporting sections (3, 4) and that there are two clamping members (8, 9) each carried on an arm (10, 11), the two arms being situated adjacent those edges of the connecting elements (5, 6) which face a third (1c) and a fourth (1d) peripheral side, respectively, of the frame (1).

3. A holder as claimed in Claim 2, characterized



in that near its free end each arm (10, 11) carries both the respective clamping member (8, 9) and an actuating portion (14, 15) and each arm (10, 11) carries a hook-shaped projection (16, 17) abutting in outward direction with a hook-shaped projection (18, 19) on the first disc-supporting section (3).

4. A holder as claimed in Claim 3, characterized in that the free end of each arm (10, 11) is situated near a plane (12) which extends perpendicularly to the frame (1) at substantially equal distances from the disc-supporting sections (3, 4).

5. An apparatus comprising a loading mechanism suitable for receiving a holder in accordance with Claim 1, said loading mechanism comprising supporting elements (29, 33) which are stationary relative to a chassis and which are arranged to support the frame (1) of the holder near its first (1a) and second (1b) peripheral sides, and which mechanism includes control elements (54) arranged to bear against the frame (1) of the holder at the third (1c) and fourth (1d) peripheral sides thereof near the connecting elements (5, 6) and being movable in a downward direction relative to the chassis towards a plane containing the upper side of a turntable (35) to bring the third (1c) and fourth (1d) peripheral sides of the frame (1) into the deflected position, the loading mechanism includes control units (57) for moving the control elements (54) downwards to bring the frame (1) into the deflected position, and further the loading mechanism includes two release elements, being constituted by a two-armed pivotal release lever (34) having a first arm (65) which is cooperable with an associated one of the actuating portions (14, 15) of the clamping members (8, 9) of the holder and a second arm (63) which is cooperable with the associated control unit (57) to deflect the associated arm (10, 11) on which the associated clamping member (8, 9) is situated in an outward direction.

6. An apparatus as claimed in Claim 5, characterized in that the control elements (54) comprise two channel-chaped lateral guides which are arranged to receive parts of lateral edges of the frame at the third (1c) and fourth (1d) peripheral sides thereof and which extend to the free ends of the resilient arms (10, 11) of the holder when the latter is inserted in the loading mechanism and which are pivotally connected to the chassis at points which, when the holder is inserted in the loading mechanism, are situated near the first peripheral side (1a) of the frame (1).

7. An apparatus as claimed in Claim 5 or 6, characterized in that the downward movement of the control elements (54) is controlled by two eccentrically journaled control cams (58) which form parts of two control units (57) which also control the release elements for the clamping members (8, 9) of the holder.

8. An apparatus as claimed in Claim 7, characterized in that each control unit (57) comprises a cylindrical control member (59) which is rigidly connected to the control cam (58) and is rotatable therewith about the same axis (56) and which has

a control groove (62) in its circumferential wall, which control groove (62) is cooperable with the first arm (65) of the associated release lever (34) to control the respective release lever (34).

9. An apparatus as claimed in Claim 8, characterized in that the control groove (62) in each cylindrical control member (59) has a first part (62a) which extends in a plane perpendicular to the axis of rotation of the control unit (57) and a helically extending second part (62b) which makes an acute angle with said plane, each release lever (34) being pivotable by cooperation with the second part (62b) of the respective control groove (62), and the second part (62b) of each control groove (62) being so situated relative to the profile of the associated cam (58) that the associated release lever (34) is not pivoted until the cam (58) has moved the associated control element (54) in a downward direction.

10. An apparatus as claimed in Claim 9 characterized in that the two control units (57) are mirror-symmetrical relative to a plane of symmetry of the holder which is situated at equal distances from the third (1c) and fourth (1d) peripheral sides of the frame (1) of the holder.

11. An apparatus as claimed in any one of the Claims 7—10, characterized in that the two control units (57) are arranged to be driven by a central drive means of the loading mechanism, which drive means is also adapted to drive a retraction element which brings the holder with the disc to a position above the turntable, the control units (57) being disengaged from the drive means when the retraction element is being driven.

Patentansprüche

1. Halter für eine starre Informationsscheibe (20) mit einem rechteckigen Rahmen (1), der einen ersten die Scheibe tragenden Teil (3) in der Nähe einer ersten Randseite (1a) des Rahmens (1) aufweist und einen zweiten die Scheibe tragenden Teil (4), anschliessend an eine zweite Randseite (1b) gegenüber der ersten Randseite (1a), wobei der erste und zweite die Scheibe tragende Teile (3, 4) durch wenigstens ein federndes Verbindungselement (5, 6) miteinander verbunden sind, wobei dieses Element angepasst ist zum Auslenken der ersten gegen die zweite Randseite, wobei in der ausgelenkten Lage die erste und zweite Randseite (1a, 1b) sich im wesentlichen parallel zueinander erstrecken, wobei der Rahmen (1) bewegliche Klemmelemente (8, 9) aufweist, und zwar zum Festhalten der Informationsscheibe (20) auf oder zum Entfernen derselben von dem Rahmen (1), wobei das Verbindungselement aus einer ausgelenkten Lage in eine flache Lage zurückfedern kann, wobei die Klemmelemente (8, 9) in der Nähe des genannten Verbindungselements (5, 6) liegen, dadurch gekennzeichnet, dass zum Halten der Scheibe gegen den genannten zentralen Teil die Klemmelemente (8, 9) in der Nähe des zentralen Teils des Verbindungselements (5, 6) mit der Scheibe zusammenarbeiten, und dass sie derart sind, dass sie in der



ausgelenkten Lage des Rahmens (1) unterhalb einer Ebene (30) tangentiell zu dem gekrümmten Verbindungselement (5, 6) liegen und dennoch die Scheibe (20) halten, und dass die Klemmelemente (8, 9) je auf einem elastisch federnden Arm (10, 11) angeordnet sind, der an einem Ende an dem Rahmen (1) befestigt ist.

2. Halter nach Anspruch 1, bei dem die Klemmelemente (8, 9) gegenüber dem Rahmen (1) federnd beweglich sind und die dem wenigstens ein Verbindungselement (5, 6) zwischen den Scheibetrage teilen (3, 4) angeordnet ist, dadurch gekennzeichnet, dass es zwei Verbindungselemente (5, 6) gibt, die zwischen den Scheibetrage teilen (3, 4) angeordnet sind, und dass es zwei Klemmelemente (8, 9) gibt, die je auf einem Arm (10, 11) angeordnet sind, wobei die beiden Arme grenzend an diejenigen Ränder der Verbindungselemente (5, 6) vorgesehen sind, die einer dritten (1c) bzw. einer vierten (1d) Randseite des Rahmens (1) zugewandt sind.

3. Halter nach Anspruch 2, dadurch gekennzeichnet, dass jeder Arm (10, 11) an seinem freien Ende das Klemmelement (8, 9) sowie einen Bedienungsteil (14, 15) aufweist und jeder Arm (10, 11) einen hakenförmigen Vorsprung (16, 17) aufweist, der in der Auswärtsrichtung gegen einen hakenförmigen Vorsprung (18, 19) auf dem ersten Scheibentrage teil (3) stösst.

4. Halter nach Anspruch 3, dadurch gekennzeichnet, dass das freie Ende jedes Arms (10, 11) in der Nähe einer Ebene (12) liegt, die sich senkrecht zu dem Rahmen (1) erstreckt, und zwar in einem im wesentlichen gleichen Abstand von den Scheibentrage teilen (3, 4).

5. Gerät mit einem Lademechanismus zum Aufnehmen eines Halters nach Anspruch 1, wobei dieser Lademechanismus Tragelement (29, 33) aufweist, die gegenüber einem Chassis ortsfest sind und den Rahmen (1) des Halters in der Nähe der ersten (1a) und der zweiten (1b) Randseite tragen, und wobei dieser Mechanismus Steuerelemente (54) aufweisen, die bei der dritten (1c) und der vierten (1d) Randseite in der Nähe der Verbindungselemente (5, 6) gegen den Rahmen (1) des Halters drücken und in einer Abwärtsrichtung gegenüber dem Chassis in Richtung einer Ebene, in der sich die Oberseite eines Plattentellers (35) befindet, beweglich sind um die dritte (1c) und vierte (1d) Randseite des Rahmens (1) in die ausgelenkte Lage zu bringen, wobei der Lademechanismus Steuereinheiten (57) aufweist zum Bewegen der Steuerelemente (54) in Anwärtsrichtung um den Rahmen (1) in die ausgelenkte Lage zu bringen und wobei weiterhin der Lademechanismus zwei Freigabelemente aufweist, die durch einen zweiar migen, schwenkbaren Freigabehebel (34) gebildet ist, von dem ein erster Arm (65) mit einem zugeordneten Bedienungsteil (14, 15) der Klemmelemente (8, 9) des Halters zusammenarbeit und von dem ein zweiter Arm (63) mit

der zugeordneten Steuereinheit (57) zusammenarbeitet zum in Auswärtsrichtung Auslenken des zugeordneten Arms (10, 11), auf dem das zugeordnete Klemmelement (8, 9) angeordnet ist.

6. Gerät nach Anspruch 5, dadurch gekennzeichnet, dass die Steuerelemente (54) zwei kanalförmige Führungen aufweisen, die Teile von Seitenrändern des Rahmens an der dritten (1c) und vierten (1d) Randseite enthalten und die sich zu den freien Enden der Federarme (10, 11) des Halters erstrecken, wenn dieser in den Lademechanismus eingegeben ist und die mit dem Chassis an Stellen schwenkbar verbunden sind, die, wenn der Halter in den Lademechanismus eingegeben ist, in der Nähe der ersten Randseite (1a) des Rahmens (1) liegen.

7. Gerät nach Anspruch 5 oder 6, dadurch gekennzeichnet, dass die Abwärtsbewegung der Steuerelemente (54) durch zwei exzentrisch gelagerte Steuernocken (58) gesteuert wird, die einen Teil zweier Steuereinheiten (57) bilden, die ebenfalls die Freigabelemente für die Klemmelemente (8, 9) des Halters steuern.

8. Gerät nach Anspruch 7, dadurch gekennzeichnet, dass jede Steuereinheit (57) ein zylinderförmiges Steuerelement (59) aufweist, das mit den Steuernocken (58) ortsfest verbunden und mit demselben um dieselbe Achse (56) drehbar ist und eine Steuernut (62) in der umlaufenden Wand aufweist, wobei diese Steuernut (62) mit dem ersten Arm (65) des zugeordneten Freigabehebels (34) zusammenarbeitet, und zwar zum Steuern des betreffenden Freigabehebels (34).

9. Gerät nach Anspruch 8, dadurch gekennzeichnet, dass die Steuernut (62) in jedem zylinderförmigen Steuerelement (59) einen ersten Teil (62a) aufweist, der sich in einer Ebene senkrecht zu der Drehungsachse der Steuereinheit (57) erstreckt sowie einen spiralförmigen zweiten Teil (62b), der mit der genannten Ebene einen spitzen Winkel einschliesst, wobei jeder Freigabehebel (34) durch Zusammenarbeit mit dem zweiten Teil (62b) der betreffenden Steuernut (62) schwenkbar ist und wobei die Lage des zweiten Teils (62b) jeder Steuernut (62) gegenüber dem Profil des zugeordneten Nockens (58) derart ist, dass der zugeordnete Freigabehebel (34) nicht geschwenkt wird, bis der Nocken (58) das zugeordnete Steuerelement (54) in Abwärtsrichtung bewegt hat.

10. Gerät nach Anspruch 9, dadurch gekennzeichnet, dass die zwei Steuereinheiten (57) gegenüber einer Symmetrieebene des Halters spiegelsymmetrisch sind, wobei diese Ebene sich in gleichen Abständen von der dritten (1c) und der vierten (1d) Randseite des Rahmens (1) des Halters erstreckt.

11. Gerät nach einem der Ansprüche 7 bis 10, dadurch gekennzeichnet, dass die zwei Steuereinheiten (57) von zentralen Antriebsmitteln des Lademechanismus angetrieben werden, wobei diese Antriebsmittel ebenfalls ein Rückzieh-

element antreiben, das den Halter mit der Scheibe in eine Lage über dem Plattenteller bringt, wobei die Steuereinheiten (57) gegenüber den Antriebsmitteln entkuppelt sind, wenn das Rückzielement angetrieben wird.

Revendications

1. Support pour un disque dur d'information (20), comprenant un cadre rectangulaire (1) qui comprend une première section de support de disque (3) située près d'un premier côté périphérique (1a) du cadre (1) et une seconde section de support de disque (4) adjacente à un second côté périphérique (1b) opposé au premier (1a), la première et la seconde section de support de disque (3, 4) étant reliées l'une à l'autre par au moins un élément de liaison élastique (5, 6), qui est à même de faire fléchir le premier côté périphérique vers le second, le premier et le second côté périphérique (1a, 1b) s'étendant au moins en substance parallèlement l'un à l'autre dans la position fléchie, le cadre (1) portant des organes de serrage mobiles (8, 9) pour retenir le disque d'information (20) en place sur le cadre (1) ou pour le libérer de celui-ci, l'élément de liaison étant à même de revenir élastiquement d'une position fléchie à une position à plat, les organes de serrage (8, 9) étant situés près de l'élément de liaison (5, 6), caractérisé en ce que les organes de serrage (8, 9) coopèrent avec le disque près de la partie centrale de l'élément de liaison (5, 6) pour retenir le disque contre la partie centrale et sont tels que, dans la position fléchie du cadre (1), ils soient situés en dessous d'un plan (30) tangentiel à l'élément de liaison arqué (5, 6) et retiennent encore le disque (20) et que les organes de serrage (8, 9) sont chacun montés sur un bras élastiquement flexible (10, 11) qui est relié à une extrémité au cadre (1).

2. Support suivant la revendication 1, dans lequel les organes de serrage (8, 9) sont élastiquement mobiles par rapport au cadre (1) et dans lequel le, au moins un, élément de liaison (5, 6) est disposé entre les sections de support de disque (3, 4), caractérisé en ce que deux éléments de liaison (5, 6) sont prévus et sont disposés entre les sections de support de disque et que deux organes de serrage (8, 9) sont montés chacun sur un bras (10, 11), les deux bras étant situés près des bords des éléments de liaison (5, 6) qui font face à un troisième (1c) et à un quatrième côté périphérique (1d) respectif du cadre (1).

3. Support suivant la revendication 2, caractérisé en ce que près de son extrémité libre, chaque bras (10, 11) porte l'organe de serrage (8, 9) correspondant et une partie d'actionnement (14, 15), et chaque bras (10, 11) porte une saillie crochue (16, 17) venant en butée, vers l'extérieur, avec une saillie crochue (18, 19) prévue sur la première section de support de disque (3).

4. Support suivant la revendication 3, caractérisé en ce que l'extrémité libre de chaque bras (10, 11) est située près d'un plan (12) qui s'étend perpendiculairement au cadre (1) en substance à

la même distance des sections de support de disque (3, 4).

5. Appareil comprenant un mécanisme de chargement propre à recevoir un support suivant la revendication 1, lequel mécanisme de chargement comprend des éléments de support (29, 33) qui sont immobiles par rapport à un châssis et qui sont destinés à supporter le cadre (1) du support près de son premier (1a) et de son second côté périphérique (1b), ce mécanisme comprenant des éléments de commande (54) propres à appuyer contre le cadre (1) du support au troisième (1c) et au quatrième côté périphérique (1d) de celui-ci près des éléments de liaison (5, 6) et mobiles vers le bas par rapport au châssis en direction d'un plan contenant le côté supérieur d'un plateau tourne-disque (35) en vue d'amener le troisième (1c) et le quatrième côté périphérique (1d) du cadre (1) dans la position fléchie, le mécanisme de chargement comprenant des unités de commande (57) pour déplacer les éléments de commande (54) vers le bas en vue d'amener le cadre (1) dans la position fléchie, et le mécanisme de chargement comprenant, en outre, deux éléments de libération, constitués par un levier de libération pivotant à deux bras (34), dont un premier bras (65) peut coopérer avec l'une des parties d'actionnement (14, 15) des organes de serrage (8, 9) du support qui y est associée et un second bras (63) peut coopérer avec l'unité de commande (57) associée pour faire fléchir vers l'extérieur le bras (10, 11) associé sur lequel l'élément de serrage (8, 9) associé est situé.

6. Appareil suivant la revendication 5, caractérisé en ce que les éléments de commande (54) comprennent deux guides latéraux profilés en U qui sont destinés à recevoir des parties de bords latéraux du cadre au niveau de ses troisième (1c) et quatrième côtés périphériques (1d) et qui s'étendent jusqu'aux extrémités libres des bras élastiques (10, 11) du support lorsque ce dernier est introduit dans le mécanisme de chargement et sont articulés au châssis en des points qui, lorsque le support est introduit dans le mécanisme de chargement, sont situés près du premier côté périphérique (1a) du cadre.

7. Appareil suivant la revendication 5 ou 6, caractérisé en ce que le déplacement vers le bas des éléments de commande (54) est régi par deux cames de commande (58) tourillonnant de manière excentrique qui font partie de deux unités de commande (57) qui commandent également les éléments de libération pour les moyens de serrage (8, 9) du support.

8. Appareil suivant la revendication 7, caractérisé en ce que chaque unité de commande (57) comprend un organe de commande cylindrique (59) qui est relié rigidement à la came de commande (58) et qui peut tourner avec celle-ci autour du même axe (56) et qui présente une gorge de commande (62) dans sa paroi circonférentielle, cette gorge de commande (62) pouvant coopérer avec le premier bras (65) du levier de libération (34) associé pour commander le levier de libération (34) respectif.





9. Appareil suivant la revendication 8, caractérisé en ce que la gorge de commande (62) dans chaque organe de commande cylindrique (59) comporte une première partie (62a) qui s'étend dans un plan perpendiculaire à l'axe de rotation de l'unité de commande (57) et une deuxième partie hélicoïdale (62b) qui forme un angle aigu avec ce plan, chaque levier de libération (34) pouvant pivoter par coopération avec la deuxième partie (62b) de la gorge de commande respective (62) et la deuxième partie (62b) de chaque gorge de commande (62) étant située par rapport au profil de la came (58) associée d'une manière telle que le levier de libération (34) associé ne pivote que lorsque la came (58) a déplacé l'élément de commande associé (54) vers le bas.

10. Appareil suivant la revendication 9, caractérisé en ce que les deux unités de commande (57) sont énantiomorphes par rapport à un plan de symétrie du support qui est équidistant du troisième (1c) et du quatrième côté périphérique (1d) du cadre (1) du support.

11. Appareil suivant l'une quelconque des revendications 7 à 10, caractérisé en ce que les deux unités de commande (57) sont entraînées par un dispositif d'entraînement central du mécanisme de chargement, ce dispositif d'entraînement étant également à même d'entraîner un élément de retrait qui amène le support avec le disque dans une position située au-dessus du plateau tourne-disque, les unités de commande (57) étant dégagées du dispositif d'entraînement lorsque l'élément de retrait est entraîné.

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