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[Name of Document] SPECIFICATION

[Title of the Invention]

Recording Medium Loading Mechanism

[Claims]

[Claim 1]

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A recording medium loading mechanism comprising:

a chassis section having a recording medium loading section provided therein;

a recording medium holder for housing and holding a recording medium, the recording medium holder being supported movably in parallel to the chassis section, the recording medium holder being movable in directions toward and away from the recording medium loading section perpendicularly to the chassis section when the recording medium holder is at a position to cause the recording medium held therein to face the recording medium loading section;

a chucking slider arranged movably with respect to the chassis section, the chucking slider being moved to move the recording medium holder causing the recording medium to face the recording medium loading section in a direction perpendicular to the chassis section;

a rotary body rotated substantially 360 degrees; and

a movement pin provided on the rotary body and inserted and engaged with an engagement slit of the recording medium holder;

the movement pin moving the recording medium holder in parallel to the chassis section toward the recording medium loading

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section up to a position where the recording medium held by the recording medium holder faces the recording medium loading section when the rotary body is moved substantially 180 degrees from an initial position, the movement pin passing through an arc-shaped slit interlinked to the engagement slit thereby to be engaged with an engagement section of the chucking slider without moving the recording medium holder so as to move the chucking slider when the rotary body is further moved substantially 180 degrees, so that the recording medium holder is moved in a direction toward the recording medium loading section to load the recording medium in the recording medium loading section.

[Claim 2]

The recording medium loading mechanism as claimed in claim 1, wherein the chucking slider moves the recording medium holder causing the recording medium to face the recording medium loading section in the direction perpendicular to the chassis section so as to load the recording medium in the recording medium loading section and is then moved further in the same direction to move a magnetic head in directions toward and away from the recording medium.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Utilization]

This invention relates to a recording medium loading mechanism for loading a recording medium, such as, an optical disc, in a

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recording medium loading section of a recording/reproducing apparatus.

[0002]

[Prior Art]

Conventionally, a recording/reproducing apparatus employing a so-called optical disc, a magneto-optical disc or a magnetic disk as a recording medium is proposed.

[0003]

Such a recording/reproducing apparatus has a recording medium loading section in which the recording medium is positioned and loaded. The recording medium loading section has a positioning member for positioning the recording medium, and an optical pickup device and a magnetic head for writing and reading information signals in and from the recording medium. The recording medium loading section is arranged on a chassis plate of the recording/reproducing apparatus.

[0004]

The recording/reproducing apparatus also has a recording medium loading mechanism for transporting the recording medium inserted from outside the apparatus to the recording medium loading section and loading the recording medium in the recording medium loading section.

[0005]

The recording medium loading mechanism has a recording medium holder for housing and holding the recording medium therein, and

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a movement mechanism for moving the recording medium holder on a predetermined path.

[0006]

That is, the recording medium is inserted into an outer casing of the recording/reproducing apparatus via a insertion hole for the recording medium provided in the outer casing, and is thus housed and held by the recording medium holder. The recording medium is moved together with the recording medium holder and transported to the recording medium loading section.

[0007]

The recording medium is first transported in a direction parallel to the chassis plate. That is, the recording medium is transported from the recording medium insertion hole up to a position above the recording medium loading section to face this loading section. Then, the recording medium is moved in a direction toward the chassis plate perpendicularly to the chassis plate, and is loaded in the recording medium loading section.

[0008]

For ejecting the recording medium from the recording/reproducing apparatus, the recording medium loading mechanism first releases the recording medium from the recording medium loading section in the direction perpendicular to the chassis plate, and then transports the recording medium to the vicinity of the recording medium insertion hole in the direction parallel to the chassis plate.

[0009]

[Problem to be Solved by the Invention]

Meanwhile, with the recording medium loading mechanism as described above, when the recording medium is to be ejected from the recording/reproducing apparatus, the recording medium must be transported sufficiently to a distance from the position where the recording medium is loaded in the recording medium loading section to a position where at least a part of the recording medium is projected outward from the recording medium insertion hole.

[0010]

To transport the recording medium sufficiently to the distance, the recording medium holder for housing and holding the recording medium must be moved sufficiently to a distance corresponding to the transport distance of the recording medium. However, if the recording medium holder is to be moved sufficiently to the distance, the structure of the apparatus is complicated and enlarged.

[0011]

As the recording medium loading mechanism, there is a structure for projecting the recording medium outward from the recording medium insertion hole using the force of spring. That is, the recording medium holder is stopped at a predetermined position inside the recording medium insertion hole, and the recording medium is thrust out of the recording medium holder by the force of spring. In the recording medium loading mechanism of

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this structure, the movement distance of the recording medium holder can be shortened in relation to the transport distance of the recording medium.

[0012]

However, when the recording medium is thrust out by the force of spring, the amount of projection of the recording medium from the recording medium insertion hole depends upon the surface state of the recording medium and even slight dimensional errors, and is therefore unstable. For this reason, in such a recording medium loading mechanism, the recording medium may not be sufficiently projected from the recording medium insertion hole in ejection, and conversely, the recording medium may be jumped out in the air via the recording medium insertion hole.

[0013]

In view of the foregoing, it is an object of the present invention to provide a recording medium loading mechanism which is capable of stably transporting the recording medium to a sufficient distance, with its structure simplified and reduced in size.

[0014]

[Means to Solve the Problem]

According to the present invention, there is provided a recording medium loading mechanism comprising: a chassis section having a recording medium loading section provided therein; a recording medium holder for housing and holding a recording medium, the recording medium holder being supported movably in parallel to

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the chassis section, the recording medium holder being movable in directions toward and away from the recording medium loading section perpendicularly to the chassis section when the recording medium holder is at a position to cause the recording medium held therein to face the recording medium loading section; a chucking slider arranged movably with respect to the chassis section, the chucking slider being moved to move the recording medium holder causing the recording medium to face the recording medium loading section in a direction perpendicular to the chassis section; a rotary body rotated substantially 360 degrees; and a movement pin provided on the rotary body and inserted and engaged with an engagement slit of the recording medium holder; the movement pin moving the recording medium holder in parallel to the chassis section toward the recording medium loading section up to a position where the recording medium held by the recording medium holder faces the recording medium loading section when the rotary body is moved substantially 180 degrees from an initial position, the movement pin passing through an arc-shaped slit interlinked to the engagement slit thereby to be engaged with an engagement section of the chucking slider without moving the recording medium holder so as to move the chucking slider when the rotary body is further moved substantially 180 degrees, so that the recording medium holder is moved in a direction toward the recording medium loading section to load the recording medium in the recording medium loading section.

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[0015]

In the recording medium loading mechanism of the present invention, the chucking slider moves the recording medium holder causing the recording medium to face the recording medium loading section in the direction perpendicular to the chassis section so as to load the recording medium in the recording medium loading section and is then moved further in the same direction to move a magnetic head in directions toward and away from the recording medium.

[0016]

[Operation]

In the recording medium loading mechanism of this invention, the movement pin, which is provided on the rotary body moved substantially 360 degrees and is inserted and engaged with the engagement slit of the recording holder, moves the recording medium holder in parallel to the chassis section toward the recording medium loading section up to the position where the recording medium held by the recording medium holder faces the recording medium loading section, when the rotary body is moved substantially 180 degrees from the initial position. The movement pin passes through the arc-shaped slit interlinked to the engagement slit thereby to be engaged with the engagement section of the chucking slider without moving the recording medium holder so as to move the chucking slider, when the rotary body is further moved substantially 180 degrees. Thus, the recording medium holder is

moved in the direction toward the recording medium loading section to load the recording medium in the recording medium loading section. Therefore, the movement (loading) of the recording medium in parallel to the chassis section and the movement (chucking) of the recording medium perpendicular to the chassis section can be sequentially carried out by continuous driving operation in a predetermined direction by a single drive source. The recording medium can be thus stably transported to the sufficient distance.

[0017]

Also, in the recording medium loading mechanism of the present invention, the chucking slider moves the recording medium holder causing the recording medium to face the recording medium loading section in the direction perpendicular to the chassis section so as to load the recording medium in the recording medium loading section and is then moved further in the same direction to move a magnetic head in directions toward and away from the recording medium. In this case, loading, chucking and mode selection can be sequentially carried out by continuous driving operation in a predetermined direction by a single drive source, and the structure of the apparatus can be simplified.

[0018]

[Embodiments]

Preferred embodiments of the present invention will now be described with reference to the drawings.

[0019]

In this embodiment, the recording medium loading mechanism of this invention is constituted as a disc cartridge loading mechanism in a recording/reproducing apparatus using a recording disc as a recording medium housed in a cartridge. The disc cartridge loading mechanism is housed in an outer casing which constitutes the recording/reproducing apparatus. The embodiment is described in the following order.

[0020]

[1] Structure of Disc Cartridge (FIGS. 31 to 34)

[2] Structure of Disc Cartridge Loading Mechanism (FIGS. 1 to 30)

(2-1) Structure of Chassis Section

(2-2) Structure of Cartridge Holder

(2-3) Structure of Chucking Slider

(2-4) Structure of Rotary Body (Drive)

(2-5) Structure of Ejection Lever

(2-6) Structure of Cover

[3] Operation of Disc Cartridge Loading Mechanism (FIGS. 7 to 23)

(3-1) Initial State (FIGS. 7 and 8)

(3-2) Loading (FIGS. 9 to 14)

(3-3) Chucking (FIGS. 15 to 18)

(3-4) Recording Mode (FIGS. 18 and 20)

(3-5) Ejection (FIGS. 21 to 23)

[1] Structure of Disc Cartridge (FIGS. 31 to 34)

As the recording disc to be the recording medium in the recording/reproducing apparatus, a magneto-optical disc or an optical disc is used. The magneto-optical disc is of a structure in which a signal recording layer made of a magnetic material is deposited and formed on a disc substrate made of transparent synthetic resin material like polycarbonate having, e.g., diameter of about 64 mm.

[0021]

This signal recording layer is locally heated by means of irradiation with focused laser beams to temperatures not lower than the Curie temperature. When an external magnetic field is applied to the heated portion, recording of information signals is carried out. The information signals recorded in this way may be read out by radiating linearly polarized laser beams onto the signal recording layer to detect rotation of polarization direction by the Kerr effect of return light reflected from the signal recording layer.

[0022]

On the other hand, the optical disc is of a structure in which a reflection layer made of a metallic material such as aluminum is deposited and formed on a disc substrate similar to the disc substrate of the magneto-optical disc. Fine pit trains corresponding to information signals are formed in the disc substrate of the optical disc by means of injection molding.

[0023]

The information signals recorded on the optical disc are read out by irradiating the pit trains with a coherent light beams like laser beams to detect changes in light amount on the signal recording layer due to diffusion or interference of the return light beams.

[0024]

Further, the magneto-optical disc and the optical disc are respectively rotatably accommodated into cartridges 205, 216 as shown in FIGS. 31 to 34 to constitute disc cartridges. The cartridge 205 constituting the disc cartridge 220 for recording and reproduction housing the magneto-optical disc is formed as a thin casing having rectangular major surfaces with one side thereof substantially corresponding to the diameter of the magneto-optical disc. On the upper major surface of the cartridge 205, as shown in FIG. 31, there is formed an opening portion 223 for magnetic head which allows a portion of the signal recording area of the magneto-optical disc to be exposed outward. Moreover, at a position facing the opening portion 223 for magnetic head on the lower major surface of the cartridge 205, as shown in FIG. 32, there is formed an opening portion 222 for optical pick-up. Further, at the central portion of the lower major surface, there is formed an opening portion 213 for chucking. The disc cartridge 220 for recording and reproduction is inserted forward and loaded in the recording and reproducing apparatus having the disc table, as indicated by an arrow J in FIGS. 31 and 32.

[0025]

In the cartridge 205 of the disc cartridge 220 for recording and reproduction, the opening portion for magnetic head 223 and the opening portion for optical pick-up 222 can be opened/closed by a shutter member 206. This shutter member 206 is made of a synthetic resin material or a metallic material and is composed integrally of shutter plates corresponding to the opening portions 223, 222 and facing each other and a connecting portion which connects end portions of these shutter plates. The shutter member 206 has the connecting portion slidably supported in a supporting groove 207 formed on one lateral side of the cartridge 205. That is, the shutter member 206 is slid rearward on one lateral side of the cartridge 205 to open the opening portions 223, 222, and is slid forward from the rear side to the initial position to close the opening portions 223, 222 with the shutter plates.

On the other hand, the cartridge 216 constituting the disc cartridge 221 for reproduction only is formed as a thin casing having rectangular major surfaces with one side substantially corresponding to the diameter of the optical disc. The cartridge 216 does not have an opening portion on the upper major surface, as shown in FIG. 33. On the lower major surface of the cartridge 216, there is formed opening portion 222 for optical pick-up, as shown in FIG. 34. Further, at the central portion of the lower major surface of the cartridge 216, there is formed a central opening portion 213 for chucking. The reproduction-only disc

cartridge 221 is inserted forward and loaded in the recording and reproducing apparatus, as indicated by an arrow J in FIGS. 33 and 34.

[0026]

In the cartridge 216 of the reproduction-only disc cartridge 221, the opening portion 222 for optical pick-up may be opened/closed by a shutter member 217. This shutter member 217 is made of a synthetic resin material or a metallic material, and is integrally composed of a shutter plate corresponding to the opening portion 222 for optical pick-up and a supporting portion provided on one end of the shutter plate. This shutter member 217 has the supporting portion slidably supported in a supporting groove 207 formed on one lateral side of the cartridge 216. That is, the shutter member 217 is slid rearward on one lateral side of the cartridge 216 to open the opening portion 222, and is slid forward from the rear side to the initial position to close the opening portion 222 for optical pick-up with the shutter plate.

[0027]

Substantially at the central portions of the connecting portion of the shutter member 206 and the supporting portion of the shutter member 217, a shutter closing hole 208 is opened toward the lateral side. The shutter closing hole 208 is for members for closing the shutter members 206, 217 to be engaged with in the recording and reproducing apparatus.

[0028]

The positioning hole 204 for chucking provided at the center of the magneto-optical disc and the optical disc is formed as a circular through-hole. The positioning hole 204 for chucking is closed from the upper side by a chucking plate 202. This chucking plate 202 is made of a magnetic metallic material like iron or stainless steel, and is formed in a disc shape of a diameter corresponding substantially to the positioning hole 204 for chucking. The positioning hole 204 for chucking and the chucking plate 202 are exposed outside the cartridges 215, 216 via the opening portion 213 for chucking. The positioning hole 204 for chucking has a reference value of diameter of 11.0 mm and tolerance of $[+0.1 \text{ mm}, -0.0 \text{ mm}]$.

[0029]

On the lower major surfaces of the cartridges 205, 216, a pair of front and rear positioning holes 209, 210 are formed. The front positioning hole 209 is located near the rim of the major surface on the forward side of the opening portion 222 for optical pick-up, and is formed in an elliptic shape with a longer diameter representing the front and rear direction. The rear positioning hole 210 is located near the rim of the major surface on the rear side of the opening hole 222 for optical pick-up, and is formed circularly.

[0030]

Near the rim on the other side of the rear side of the lower major surface of the cartridges 205, 216, plural discrimination

holes 224 are formed. These discrimination holes 224 are to discriminate the type and state of a disc accommodated within the cartridge 205, 216, e.g., whether or not recording of information signals can be made. On the rear lateral side within the cartridge 205 of the disc cartridge 220 for recording and reproduction, a save notch 214 corresponding to the discrimination hole 224 is provided. The save notch 214 is moved to go in and out of one of the discrimination holes 224, and the discriminated state of the recording of information signals is switched by changing the depth of the discrimination hole 224. In addition, on the rim of the other side of the front side of the lower major surface of the cartridges 205, 216, an engagement recess portion 212 is formed.

[0031]

On the front rim of the lower major surface of the cartridge 205 of the disc cartridge 220 for recording and reproduction, a magneto-optical disc discrimination recess portion 221 is formed. On the front rim of the lower major surface of the cartridge 216 of the reproduction-only disc cartridge 221, an optical disc discrimination recess portion 218 is formed. The magneto-optical disc discrimination recess portion 221 and the optical disc discrimination recess portion 218 differ from each other in depth from the lower major surface. This difference in depth enables discrimination between the magneto-optical disc and the optical disc.

[0032]

[2] Structure of Disc Cartridge Loading Mechanism (FIGS. 1 to 30)

(2-1) Structure of Chassis Section

The recording medium loading mechanism of this invention has a chassis section in which a cartridge loading section as a recording medium loading section is provided, as shown in FIGS. 1 and 3. This chassis section is composed of a main chassis block 2 including a chassis plate 15 made of a metallic material in a flat shape and a frame 16 to which the chassis plate 15 is attached, and a top plate 3 as described above.

[0033]

The frame 16 is made of a synthetic resin material and integrally formed having a frame portion surrounding the chassis plate 15 and a flat portion located on the rear side of the chassis plate 15.

[0034]

The cartridge loading section is constituted on the chassis plate 15. In the cartridge loading section, the disc cartridges 220, 221 are positioned and loaded, so that the writing of information signals on the magneto-optical disc of the loaded disc cartridge 220 or reading of information signals from the optical disc of the disc cartridge 221 is carried out.

[0035]

That is, the cartridge loading section has a pair of positioning pins 17, 18 which are provided upright on the chassis plate 15 and are fitted in the positioning holes 209, 210 of the

cartridges 205, 216 to position the cartridges 205, 216. These positioning pins 17, 18 are made of synthetic resin, and are arranged on the chassis plate 15 by so-called outsert molding.

[0036]

The cartridge loading section has a disc table 19 for retaining and rotating the magneto-optical disc or the optical disc. The disc table 19 is attached to a driving shaft of a spindle motor 20 attached on the lower side of a substantially central portion of the chassis plate 15. The driving shaft is projected to the upper side of the chassis plate 15 via the through-hole provided in the chassis plate 15.

[0037]

The disc table 19 is formed substantially in a disc shape, and has a conical projection for positioning at the center portion thereof. This projection is fitted in the positioning hole 204 for chucking of the magneto-optical disc and the optical disc so as to position and retain the magneto-optical disc and the optical disc. The disc table 19 is rotated together with the magneto-optical disc or the optical disc by the spindle motor 20.

[0038]

The cartridge loading section has an optical pick-up 21. This optical pick-up device 21 is composed of a semiconductor laser as a light source, optical devices such as a beam splitter and an objective lens, and a photodetector which are accommodated in an optical axis block. The optical pick-up device 21 irradiates the

magneto-optical disc and the optical disc with converged light beams, so as to read out information signals from the magneto-optical disc and the optical disc.

[0039]

The optical pick-up device 21 is arranged in the through-hole provided in the chassis plate 15 and is supported by a guide shaft 22 attached to the lower side of the chassis plate 15 and a guide member 23 attached to the rim of the through-hole, so as to be movable in directions toward and away from the disc table 19.

[0040]

The optical pick-up device 21 has its objective lens facing upward so as to radiate light beams in parallel to the driving shaft of the spindle motor 20. That is, the optical pick-up device 21 is capable of causing the objective lens to face the rotating magneto-optical disc or optical disc held by the disc table 19 between the inner and outer circles of the disc, and is capable of irradiating the entire range of the magneto-optical disc or optical disc with light beams.

[0041]

The optical pick-up device 21 is moved along the guide shaft 22 via a transmission gear 25 by a pick-up feed motor 24 attached on the lower side of the chassis plate 15.

[0042]

A magnetic head 29 is attached to the optical pick-up device 21 via a head arm 28. That is, on the rear end portion of the

optical pick-up device 21, a magnetic head supporting section 27 extended rearward from the rear end of the chassis plate 15 and projected upward from the upper surface of the chassis plate 15 is provided. On the upper side of the magnetic head supporting section 27, the proximal end of the head arm 28 having the magnetic head 29 attached on the distal end thereof is attached. The head arm 28 is located above the chassis plate 15.

[0043]

The head arm 28 is made of synthetic resin molded with a pair of thin metal foils inserted therein. At an intermediate portion of the head arm 28, a hinge portion 30 formed by the metal foils being exposed from separated synthetic resin is provided. The head arm 28 is capable of moving its distal end via the hinge portion 30 in directions toward and away from the chassis plate 15, that is, in up and down directions. The magnetic head 29 is attached on the distal end of the head arm 28 via the metal foils. The magnetic head 29 is supplied with electrical signals via the metal foils.

[0044]

The magnetic head 29 is located above the objective lens of the optical pick-up device 21 so as to face the objective lens, and generates, in cooperation with the light beams radiated from the objective lens, a magnetic field for writing information signals on the magneto-optical disc.

[0045]

An operation arm 31 extended rearward from the rear end of the head arm 28 is integrally formed on the distal end of the head arm 28. The operation arm 31 is pressed downward to move the magnetic head 29 upward, and is moved upward to move the magnetic head 29 downward. The head arm 28 in the initial state causes the magnetic head 29 to be at a lower position to slide on the magneto-optical disc held by the disc table 19, as indicated by an arrow B in FIG. 3.

On the frame 16, a head lift plate 32 for moving the operation arm 31 of the head arm 28 is rotatably attached on the rear side of the chassis plate 15. The head lift plate 32 has a supporting section 33 on the rear end thereof rotatably supported to a supporting column provided on the frame 16, and the front end of the head lift plate is movable upward and downward. The head lift plate 32 is located above the operation arm 31. That is, by pressing the operation arm 31 downward from the upper side via the head lift plate 32, the magnetic head 29 can be located at an upper position away from the magneto-optical disc or optical disc held by the disc table 19.

[0046]

The frame 16 has leg portions at four corners thereof, each having a mounting hole 51. These leg portions are attached to a base chassis 1 via dampers 10, respectively, as shown in FIGS. 1, 2, 24 and 25.

[0047]

The base chassis 1 is made of a metallic material in a shape for the frame. The base chassis 1 has screw holes 9 at four corners thereof, with which supporting screws 11 constituting the dampers 10 are engaged. The damper 10 is composed of the supporting screw 11, a sleeve 12 externally fitted with the supporting screw 11, a rubber bush 13 externally fitted with the sleeve 12, and a coil spring 14 externally fitted with the rubber bush 13. The frame 16 is attached on the upper end of the rubber bush 13 by externally fitting the mounting hole 51 of the frame 16 with the rubber bush 13.

[0048]

At left and right portions on the upper side of the base chassis 1, a pair of front and rear float lock legs 7, 7, and 7, 7 are provided upright. Each of these float lock legs 7 has a groove 8 with which a float lock piece 155 of the chucking slider 5 is fitted and engaged.

[0049]

Mounting portions 6 are provided at four corners on the lower end of the base chassis 1. These mounting portions 6 are fixed on the bottom of an outer casing, not shown, of the recording/reproducing apparatus.

[0050]

The outer casing has, on its front side, cartridge insertion holes as recording medium insertion holes through which the disc cartridges 220, 221 are inserted and ejected. The cartridge

insertion hole is of a long slit shape corresponding to the front side of the disc cartridges 220, 221, and is opened and closed by a cover 157, as shown in FIG. 27. The cover 157 is flat-shaped and rotatably supported to the outer casing via a pair of left and right supporting shafts 158 projected above the both lateral ends.

[0051]

On the upper side of the frame 16, a top plate 3 is amounted, as shown in FIG. 1. The top plate 3 is made of a metallic material in substantially flat shape, as shown in FIG. 5. The top plate 3 has mounting holes 79 and positioning holes 80 at four corners thereof. This top plate 3 is mounted on the frame 16 by inserting mounting screws, not shown, interlinked to the mounting holes 79 into the screw holes provided at four corners on the upper side of the frame 16. The positioning projections 53 projected near the screw holes 52 on the upper side of the frame 16 are fitted with the positioning holes 80, so that the top plate 3 is positioned in relation to the frame 16.

[0052]

On the top plate 3, a guide member 84 is rotatably mounted via a supporting shaft hole 83 provided in the top plate 3. The guide member 84 is rotationally biased in a direction to turn the rear portion reverting to the initial position toward the center of the top plate 3 by a tensile coil spring 87 as biasing means, as indicated by an arrow D in FIG. 5. The guide member 84 is abutted to an engagement piece 90 projected on the upper side of the top

plate 3 by the biasing force of the tensile coil spring 87, and is positioned at the initial position. The tensile coil spring 87 is tensioned between a spring engagement hole 86 provided in the guide member 84 and a spring engagement piece 89 projected on the upper side of the top plate 3.

[0053]

The guide member 84 has the lower side, on which a guide projection 88 is formed, exposed below the top plate 3 via a through-hole 82 opened in the top plate 3.

[0054]

At a substantially central position on the rear end of the top plate 3, there is provided an abutment section 81 to which an operation pin 125 of an ejection detection lever 123 attached to the cartridge holder 4 is abutted.

[0055]

(2-2) Structure of Cartridge Holder

This disc cartridge loading mechanism has a cartridge holder 4 as a recording medium holder for housing and retaining the disc cartridges 220, 221.

[0056]

The cartridge holder 4 is made of a metallic material in a substantially flat plate, as shown in FIGS. 1, 4 and 25. This cartridge holder 4 has its both lateral sides bent downward in a U-shape, thus forming a pair of left and right cartridge holding sections 96, 96. Between these cartridge holding sections 96, 96,

the disc cartridges 220, 221 are inserted and housed from the front side thereof.

[0057]

In this cartridge holder 4, positioning pieces 139, 107 are provided between the cartridge holding sections 96, 96, for positioning the disc cartridges 220, 221 in front and rear directions when the disc cartridges 220, 221 are inserted between the cartridge holding sections 96, 96 from the front side.

In addition, in the cartridge holder 4, a shutter opening piece 156 is provided on the lateral side between the cartridge holding sections 96, 96, for opening the shutter members 206, 217 by being abutted to the front ends of the shutter members 206, 217 of the disc cartridges 220, 221 when the disc cartridges 220, 221 are inserted between the cartridge holding sections 96, 96.

Also, in the cartridge holder 4, a shutter closing lever 132 is attached for closing the shutter members 206, 217 when the disc cartridges 220, 221 are ejected forward. The shutter closing lever 132 is arranged on the outer lateral side of the cartridge holder 4, and is movable in relation to the cartridge holder 4.

[0058]

That is, the shutter closing lever 132 is attached to the cartridge holder 4 by inserting, in supporting holes 133, 133 on the rear end, a supporting shaft 136 supported to a supporting shaft supporting section 140 provided on the lateral rim of the cartridge holder 4. The shutter closing lever 132 is rotationally

biased in a direction to turn the distal end thereof toward inside of the cartridge holder 4 by a torsion coil spring 137 having a coil section externally fitted with the supporting shaft 136.

[0059]

On the distal end of the shutter closing lever 132, a shutter closing projection 128 is projected toward inside of the cartridge holder 4. The shutter closing projection 128 is introduced into the cartridge holder 4 via a cut-out section 141 provided on the front end of the sidewall of the cartridge holder 4.

[0060]

The shutter closing projection 128 is fitted in a shutter closing hole 208 of the shutter members 206, 217 when the disc cartridges 220, 221 are inserted between the cartridge holding sections 96, 96 so that the shutter opening piece 156 is abutted to the front end of the shutter members 206, 217. The shutter closing lever 132 closes the shutter members 206, 217 when the disc cartridges 220, 221 are ejected forward from the cartridge holder 4, and then the shutter closing lever 132 is rotated outward to eject the shutter closing projection 128 from the shutter closing hole 208.

[0061]

A pair of front and rear supporting pins 95 are provided upright on both lateral sides of the cartridge holder 4.

[0062]

The cartridge holder 4 is arranged between the chassis plate

15 and the top plate 3 and in parallel to the chassis plate 15. The cartridge holder 4 is supported movably in parallel to the chassis plate 15 between an ejection position for moving the front end toward the cartridge insertion hole and a loading position for causing the disc cartridges 220, 221 to face the cartridge loading section within the outer casing.

[0063]

That is, supporting pins 95, 95, and 95, 95 of the cartridge holder 4 are set and supported on both sidewalls of the frame 16, corresponding to pairs of front and rear guide portions 49, 49, and 49, 49 formed in parallel to the chassis plate 15. These guide portions 49 form spaces with a width corresponding to the thickness of the supporting pin 95, between the lower side of the top plate 3 and the guide portions. The length of the guide portions 49 in the fore-and-aft direction corresponds to the distance from the ejection position to the loading position.. The guide portions 49 guide movement of the cartridge holder 4 in parallel to the chassis plate 15 by supporting the supporting pins 95.

[0064]

The cartridge holder 4 at the loading position is movable in directions toward and away from the cartridge loading section perpendicularly to the chassis plate 15.

[0065]

That is, on the rear side of the guide portion 49, vertical groove-like position limiting sections 50 facing toward the chassis

plate 15, that is, downward, is provided. The position limiting section 50 is moved to the end, that is, the rear end of the guide portion 49 and further rearward, so as to be movable below the supporting pin 95 away from the guide portion 49. The position limiting section 50 limits the position of the supporting pin 95 in parallel to the chassis plate 15.

[0066]

The cartridge holder 4 has a through-hole for avoiding abutment to the head arm 28.

[0067]

A cartridge insertion detection lever 119 is rotatably attached to the cartridge holder 4. This cartridge insertion detection lever 119 is adapted so that a support shaft 104 provided so as to hang down toward the lower side of the cartridge holder 4 is inserted into a supporting hole 120 on the proximal end so that it is rotatably supported. Further, the cartridge insertion detection lever 119 is rotationally biased by a torsional coil spring, not shown, in a direction to move the distal end forward as indicated by arrow F in FIG. 4 with an abutment section 122 on the distal end turned toward the lateral side of the cartridge holder 4. The detection lever 119 is thus abutted to the positioning piece 107 and positioned. On the front end of the cartridge insertion detection lever 119, a cartridge abutment projection 121 is provided. That is, as shown in FIG. 9, when the disc cartridges 220, 221 are inserted in the cartridge holder 4,

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the cartridge insertion detection lever 119 has the cartridge abutment projection 121 pressed and is rotated against the biasing force of the torsion coil spring.

[0068]

An erroneous insertion prevention lever 114 is rotatably attached to the cartridge holder 4. The erroneous insertion prevention lever 114 is rotatably supported by inserting a support shaft 113 hanging down from the lower side of the cartridge holder 4 into a supporting hole 115 on the proximal end of the lever 114. The erroneous insertion prevention lever 114 turns an engagement projection 117 on the distal end toward the front side of the cartridge holder 4, and is rotationally biased by a torsion coil spring, not shown, in a direction to move the distal end toward the cartridge insertion detection lever 119 inside the cartridge holder 4. The erroneous insertion prevention lever 114 has an abutment projection 118 on the lateral side thereof, and is positioned by abutting the abutment projection 118 to the abutment section 112 of the cartridge insertion detection lever 119. The erroneous insertion prevention lever 114 has an erroneous insertion prevention projection 116 on the lateral rim as the outer side of the cartridge holder 4.

When the cartridge holder 4 is to be moved to the rear side behind the ejection position in a state that the disc cartridges 220, 221 are not inserted in the cartridge holder 4, the erroneous insertion prevention lever 114 abuts the erroneous insertion

prevention projection 116 to an erroneous insertion prevention piece 165 projected inward on the sidewall of the frame 16, so as to prevent rearward movement of the cartridge holder 4.

[0069]

When the disc cartridges 220, 221 are inserted in the cartridge holder 4 thus rotating the cartridge insertion detection lever 119, the erroneous insertion prevention lever 114 has its positioning by the abutment section 122 released, and is rotated toward inside of the cartridge holder 4. At this point, the erroneous insertion prevention lever 114 causes the engagement projection 117 to be fitted in an engagement recess 212 of the disc cartridges 220, 221, as shown in FIG. 9, and moves the erroneous insertion prevention projection 116 to a position not to be abutted to the erroneous insertion prevention piece 165.

[0070]

Holding levers 65 are rotatably arranged near the rear ends of the guide portions 49. These holding levers 65 are made rotatable by inserting, in supporting holes 70 on the rear end, pairs of front and rear supporting shafts 71, 71 and 71, 71 projected outward on both lateral sides of the frame 16. The holding lever 65 has on the front end thereof an engagement holding section 67 for holding the supporting pin 95. The engagement holding section 76 is formed as a recess opened toward the front end of the holding lever 65.

[0071]

The holding lever 65 is rotationally biased in a direction with the front end facing downward by a torsion coil spring 66, as indicated by an arrow A in FIG. 3. The torsion coil spring 66 has its coil section externally fitted with the supporting shaft 71. Also, the torsion coil spring 66 has one arm engaged with an engagement pawl 72 projected on the lateral side of the frame 16 and has the other arm engaged with an engagement projection 59 projected on the holding lever 65.

[0072]

(2-3) Structure of Chucking Slider

A chucking slider 5 is mounted on the frame 16 slidably in the fore-and-aft direction, as shown in FIGS. 1, 6, 25 and 26. The chucking slider 5 is made of a metallic material in a flat shape with both lateral sides bent downward as sidewalls.

[0073]

The chucking slider 5 has pairs of front and rear supporting pieces 153 bent inward on the lower rims of both sidewalls. The chucking slider 5 is mounted movably in relation to the frame 16 by introducing the supporting pieces 153 onto the lower side of the frame 16.

[0074]

The chucking slider 5 has, on both sidewalls, pairs of front and rear apertures 151 through which operation pins 68 provided on the holding levers 65 are inserted. The front rim of each of the aperture 151 is an inclined cam portion 152 inclined rearward.

[0075]

That is, the chucking slider 5 is moved in relation to the frame 16 so as to rotate the holding levers 65 via the operation pins 68, thus moving the cartridge holder 4 at the loading position in a direction perpendicular to the chassis plate 15.

[0076]

The chucking slider 5 is moved to a release position as a rear side position so as to rotate the holding levers 65 upward by the inclined cam portions 152, as shown in FIG. 8, thus moving the cartridge holder 4 at the loading position in a direction away from the chassis plate 15.

[0077]

The chucking slider 5 at the release position causes pairs of front and rear float lock pieces 155 bent outward on the lower rims of the sidewalls to be fitted and engaged with grooves 8 of the float lock legs 7, 7 and 7, 7 of the base chassis 1, thus fixing the frame 16 to the base chassis 1, as shown in FIG. 8.

[0078]

The chucking slider 5 is moved to a chucking position (playback mode position) as a forward position so as to move the inclined cam portions 152 away from the operation pins 68 of the holding levers 65, as shown in FIG. 18, thus enabling movement of the cartridge holder 4 at the loading position into the direction toward the chassis plate 15.

[0079]

Thus, as the chucking slider 5 is slid forward to the chucking position (playback mode position) when the cartridge holder 4 is at the loading position, the cartridge holder 4 is moved toward the chassis plate 15 by the biasing force of the torsion coil springs 66 for rotationally biasing the holding levers 65, and supporting by pressing the disc cartridges 220, 221 to the cartridge loading section.

[0080]

The chucking slider 5 at the chucking position (playback mode position) causes the float lock pieces 155 to be ejected out of the grooves 8 of the float lock legs 7 of the base chassis 1, as shown in FIG. 18, so that the frame 16 is in a so-called float supporting state that the frame may be moved in relation to the base chassis 1 by displacement of the damper 10.

[0081]

When moved to a recording mode position, as a position further before the chucking the chucking position, the chucking slider 5 enables downward displacement of the distal end of the head arm 28, as shown in FIGS. 19 and 20, so as to sliding the magnetic head 29 on the magneto-optical disc held on the disc table 19.

[0082]

That is, the chucking slider 5 has a head lift projection 145 for pressing and supporting the head lift plate 32 downward. The head lift projection 145 is projected downward on the lower side of the chucking slider 5, and supports the head lift plate 32 by

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pressing downward when the chucking slider 5 is at a position between the release position and the chucking position. When the chucking slider 5 is at the recording mode position, the heat lift projection 145 moved forward before the head lift plate 32 and away from the head lift plate 32, thus to release the pressing support of the head lift plate 32.

[0083]

(2-4) Structure of Rotary Body (Drive)

On the rear side of the frame 16, a rotary body 45 rotated substantially 360 degrees is rotatably arranged via a support shaft 46. This rotary body 45 is rotated with a loading motor 34 attached on the frame 16 as a drive source.

[0084]

A drive pulley 35 is attached to the drive shaft of the loading motor 34. An endless belt 36 is wound and laid on the drive pulley 35 between the drive pulley 35 and a driven pulley 37 rotatably attached on the frame 16 through a support shaft 39. A first transmission gear 38 is integrally formed on the driven pulley 37. This first transmission gear 38 is meshed with a second transmission gear 40 rotatably attached to the frame 16 through a support shaft 41. A third transmission gear is integrally formed on the second transmission gear 40. This third transmission gear is meshed with a fourth transmission gear 42 rotatably attached to the frame 16 through a support shaft 44. A fifth transmission gear 43 is integrally formed on the fourth transmission gear 42. This

fifth transmission gear 43 is meshed with a gear portion 47 formed on the outer circumferential portion of the rotary body 45.

[0085]

On the principal surface portion of the rotary body 45, a movement operation pin 48 interlinked and engaged with an engagement slit 112 provided on the cartridge holder 4 is vertically provided. The engagement slit 112 is formed substantially in a semi-circular shape.

[0086]

In addition, in the initial state that the cartridge holder 4 is in the ejection position, the movement operation pin 48 is placed on the forward side of the rotary body 45 so as to be interlinked to the rear side of the engagement slit 112.

[0087]

The rotary body 45 is actuated in the following manner. When the disc cartridge 220 or 221 is inserted into the cartridge holder 4 to cause the loading motor 34 to start rotational drive so that loading operation is started, the rotary body 45 is rotated in such a direction that the movement operation pin 48 moves on an arc-shaped locus opposite to the arc formed by the engagement slit 112, as shown in FIGS. 9 to 13. In this case, the cartridge holder 4 is moved rearward toward the loading position.

[0088]

Further, when the rotary body 45 is rotated by 180 degrees from the initial state so that the movement operation pin 48 is

located on the rear side of the rotary body 45, the cartridge holder 4 is at the loading position as shown in FIG. 13. Then, as the rotary body 45 is further rotated in the same direction, the movement operation pin 48 moves on the locus coinciding with the arc-shaped portion of the engagement slit 112 as shown in FIGS. 13 to 19, so that the cartridge holder 4 is not moved.

[0089]

When the cartridge holder 4 is moved to the loading position, that is, to the rear side of the rotary body 45, the movement operation pin 48 is engaged with an engagement portion 146 of the chucking slider 5. At this point, the chucking slider 5 is at the release position to rotate the holding levers 65 upward and hold the levers 65. The engagement portion 146 is constituted as a gap between a pair of front and rear engagement pawls 147, 148 caused to hang downward on the rear side of the chucking slider 5.

[0090]

After the cartridge holder 4 is moved to the loading position, the rotary body 45 is further rotated in the same direction, and the movement operation pin 48 moves along the locus coinciding with the arc-shaped portion of the engagement slit 112. At this point, the movement operation pin 48 moves the chucking slider 5 forward through the engagement portion 146 as shown in FIGS. 13 to 19.

[0091]

In this disc cartridge loading mechanism, the cartridge holder 4 and the chucking slider 5 are moved by receiving driving force

transmission by the loading motor 34 as a common drive source.

[0092]

Moreover, in this disc cartridge loading mechanism, the direction in which the cartridge holder 4 is moved toward the loading position and the direction in which the chucking slider 5 rotates the holding levers 65 to move the cartridge holder 4 toward the chassis plate 15 are opposite to each other.

[0093]

On the rear side portion of the frame 16, a slider lock lever 56 is rotatably disposed through a support shaft 54 vertically provided on the rear side portion of the frame 16. This slider lock lever 56 includes an operation pin 57 facing the rear end of the cartridge holder 4, and an engagement portion 59 for being engaged with the chucking slider 5 at the rear side position. This slider lock lever 56 is rotationally biased in a direction to move the operation pin 57 forward by a torsion coil spring 55.

[0094]

When the cartridge holder 4 is located forward before the loading position, since the rear end of the cartridge holder 4 is away from the operation pin 57, the slider lock lever 56 is rotated by the biasing force of the torsion coil spring 55 so as to be at the initial position. The engagement portion 59 of the lock lever 56 holds an engagement pin 154 caused to hang down from the lower surface of the rear side of the chucking slider 5 to prevent movement toward the front side of the chucking slider 5 and thus

to hold the chucking slider 5 at the release position..

[0095]

When the cartridge holder 4 reaches the loading position, the operation pin 57 is pressed by the rear end of the cartridge holder 4. Thus, the slider lock lever 56 is rotated against the biasing force of the torsion coil spring 55. At this point, the engagement portion 59 of the lock lever 56 releases engagement with respect to the engagement pin 154 of the chucking slider 5 thus to permit forward movement of the chucking slider 5.

[0096]

Moreover, on the rear side of the frame 16, first to third position detection switches 62, 63, 64 are attached through a printed board 61.

[0097]

The first and second position detection switches 62, 63 serve to detect the position of the chucking slider 5, and are disposed in the state arranged before and after with their pressing elements directed upward.

[0098]

When the chucking slider 5 is located at the release position, neither one of the first and second position detection switches 62, 63 is pressed as shown in FIGS. 15 and 16.

[0099]

Further, when the chucking slider 5 is at the chucking position, the first position detection switch 62 positioned at the

rear side of the first and second position detection switches 62, 63 is pressed by a switch pressing projection 144 provided on the rear side of the chucking slider 5 as shown in FIGS. 17 and 18. This switch pressing projection 144 is projected downward on the lower side of the chucking slider 5.

[0100]

Further, both of the first and second position detection switches 62, 63 are adapted as shown in FIGS. 19 and 20 so that when the chucking slider 5 is at the recording mode position, both switches are pressed by the switch pressing projection 144.

[0101]

Moreover, the third position detection switch 64 serves to detect the position of the cartridge holder 4, with the pressing element directed rearward.

[0102]

This third position detection switch 64 is not pressed when the cartridge holder 4 is positioned on the rear side behind the ejection position as shown in FIGS. 10 to 12.

[0103]

Further, this third position detection switch 64 is pressed by a switch pressing piece 94 provided on the rear side of the cartridge holder 4, as shown in FIGS. 7 and 9, when the cartridge holder 4 is located at the ejection position. This switch pressing piece 94 is formed in such a manner that a portion of the rear end of the cartridge holder 4 is bent toward the lateral side.

[0104]

Further, on the cartridge holder 4, an ejection detection lever 123 is rotatably attached. This ejection detection lever 123 is rotatably supported by inserting a support shaft 105 provided to hang down from the lower side of the cartridge holder 4 into a supporting hole 124 at the central portion thereof. This ejection detection lever 123 is rotationally biased by a tensile spring, not shown, in a direction indicated by an arrow G in FIG. 4 such that the abutment section 126 is on the rear side by directing the abutment section 126 toward the rear side of the cartridge holder 4, and is positioned by abutting the operation pin 125 to the front end of a through-hole 110 provided in the cartridge holder 4. This ejection detection lever 123 is rotated against the biasing force of the tensile spring with the operation pin 125 abutted to an abutment section 81 of the top plate 3 when the cartridge holder 4 is at the ejection position.

[0105]

Moreover, on the cartridge holder 4, a movement operation pin guide lever 128 is rotatably attached. This movement operation pin guide lever 128 is rotatably supported by inserting a support shaft 106 provided to hang down from the lower side of the cartridge holder 4 into a support hole 129 on the proximal end. This movement operation pin guide lever 128 is rotationally biased by a torsion coil spring, not shown, in a direction indicated by an arrow H in FIG. 4 such that the distal end thereof is moved toward

the engagement slit 112 as the rear side of the cartridge holder 4, by directing the distal end toward the lateral side of the cartridge holder 4 and directing a abutment projection 131 provided on the lateral edge toward the front side of the cartridge holder 4. This movement operation pin guide lever 128 is positioned on the lower side of a cut-out portion 113 provided on the front end of the lateral rear portion of the engagement slit 112, and is positioned at the position where the cut-out portion 113 is covered by the rear end portion. The movement operation pin guide lever 128 causes the abutment projection 131 to face the abutment section 126 of the ejection detection lever 123.

[0106]

The movement operation pin guide lever 128 is rotatable forward since the ejection detection lever 123 is rotated when the cartridge holder 4 is located at the ejection position. Accordingly, at this point, when the disc cartridge 220 or 221 is inserted into the cartridge holder 4 so that the cartridge holder 4 is to be moved rearward, the movement operation pin guide lever 128 is abutted to the movement operation pin 48 so that it is rotated forward with respect to the cartridge holder 4. Thus, the movement operation pin 48 can be introduced into the cut-out portion 113, thereby permitting rearward movement of the cartridge holder 4.

[0107]

By the rearward movement of the cartridge holder 4 by

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introduction of the movement operation pin 48 into the cut-out portion 113, pressing operation with respect to the third position detection switch 64 is released. By releasing of the pressing operation with respect to the third position detection switch 64, loading operation is started.

[0108]

Further, this movement operation pin guide lever 128 is prevented from being rotated forward since the ejection detection lever 123 is returned to the initial position when the cartridge holder 4 is located rearward behind the ejection position. Accordingly, at this point, the movement operation pin guide lever 128 prevents introduction of the movement operation pin 48 into the cut-out portion 113.

[0109]

(2-5) Structure of Ejection lever

An ejection lever 98 as an ejection lever having a drive pin 100 and an abutment pin 101 as an abutment section to the disc cartridge 220 or 221 held by the cartridge holder 4 is rotatably attached on the upper side of the cartridge holder 4 via a support hole 102. When this eject lever 98 is rotated in the direction such that the abutment pin 101 is caused to be the front side, it pushes out forward the disc cartridge 220 or 221 held by the cartridge holder 4 by the abutment pin 101.

[0110]

The guide member 84 attached at the top plate 3 rotates the

ejection lever 98 through the drive pin 100 with respect to the cartridge holder 4 in accordance with movement of the cartridge holder 4 between the ejection position and the loading position.

[0111]

When the cartridge holder 4 moves toward the loading position, as shown in FIGS. 9 and 13, the drive pin 100 is passed through a first path with respect to the guide member 84 and moves without being moved by the guide member 84.

[0112]

When the drive pin 100 is passed through the first path with respect to the guide member 84, one side of the projection 88 is pushed by the drive pin 100 so that the guide member 84 is rotated against the biasing force of the tensile coil spring 87. When the cartridge holder 4 reaches the loading position, the drive pin 100 is away from the projection 88 so that the guide member 84 is returned to the initial position by the biasing force of the tensile coil spring 87.

[0113]

Further, as shown in FIGS. 13 and 21 to 23, when the cartridge holder 4 moves toward the ejection position, the drive pin 100 is passed through a second path with respect to the guide member 84. Thus, the drive pin 100 is moved by the guide member 84 to eject the disc cartridge 220 or 221 via the ejection lever 98.

[0114]

Namely, when the drive pin 100 is passed through the second

path with respect to the guide member 84, the drive pin 100 is moved with respect to the cartridge holder 4 following the other side of the guide projection 88 of the guide member 84 moved to the initial position.

[0115]

(2-6) Structure of Cover

On the frame 16, there is rotatably provided an interlocking lever member 73 moved by the supporting pins 95 of the cartridge holder 4 in accordance with the position of the cartridge holder 4.

[0116]

That is, the interlocking lever member 73 has its center rotatably supported to the frame 16 via a support shaft 74 vertically provided on the lower side of the guide section 49.

[0117]

The upper side on the rear end of the interlocking lever member 73 which is on the rear side of the frame 16 is caused to be a cam surface 78, and the interlocking lever member 73 has an engagement recess 75 on the upper edge of the front end thereof as the front side of the frame 16. The interlocking lever member 73 is rotationally biased in the direction indicated by an arrow B in FIG. 2 so that the rear end is moved upward, by a compression coil spring 77 disposed between the frame 16 and the rear end. The interlocking lever member 73 is thus positioned at the initial position.

[0118]

Moreover, the cam surface 78 has the middle portion of its upper surface swollen, and is projected upward from the guide section 49 at the initial position. When the supporting pin 95 is passed on the cam surface 78, the interlocking lever member 73 is rotated against the biasing force of the compression coil spring 77 as indicated by an arrow W in FIG. 30, only by an angle w so that the cam surface 78 follows the upper surface of the guide section 49.

[0119]

The engagement recess 75 is opened rearward, and has a width corresponding to the outside diameter of the supporting pin 95. At the initial position, the lower end is positioned below the guide section 49. When the supporting pin 95 is fitted into the engagement recess 75, the interlocking lever member 73 is rotated against the biasing force of the compression coil spring 77 as indicated by arrow V in FIG. 30, only by an angle v so that the lower end of the engagement recess 75 follows the upper surface of the guide section 49.

[0120]

The angle w is greater than the angle v .

[0121]

The portion near the front end of the interlocking lever member 73 is caused to be an interlocking projection 76. This interlocking projection 76 is engaged with an operation pin 162

provided on the rear side of a link member 160. This link member 160 has its center portion rotatably arranged through a support shaft 161 within the outer casing. The link member 160 is rotated in accordance with the rotational angle of the interlocking lever member 73.

[0122]

The link member 160 has, on the front side thereof, a lock piece 163 which is abutted to and engaged with an operation projection 159 provided on the lower end of the cover 157 to prevent the cover 157 from being opened, and an operation piece 164 for pressing the operation projection 159 to open the cover 157.

[0123]

When the cartridge holder 4 is at the ejection position, the interlocking lever member 73 is rotated by the angle ν from the initial position, and the link member 160 is rotated so that the operation projection 159 is located at the intermediate position between the lock piece 163 and the operation piece 164 as shown in FIG. 28.

[0124]

Accordingly, at this point, the cover 157 may be opened by an external force as indicated by an arrow S in FIG. 28, with the operation projection 159 being passed between the lock piece 163 and the operation piece 164.

[0125]

That is, when the disc cartridge 220 or 221 is inserted into

the cartridge insertion hole, the cover 157 is pressed by the disc cartridge 220 or 221 so as to be rotated toward inside of the outer casing and opened.

[0126]

When the cartridge holder 4 is at the loading position, the interlocking lever member 73 is at the initial position, and the link member 160 is rotated as indicated by an arrow U in FIG. 29 so that the lock piece 163 is abutted to the operation projection 159.

[0127]

Thus, the cover 157 is prevented from being opened by the external force.

[0128]

That is, even when the disc cartridge 220 or 221 is to be inserted into the cartridge insertion hole, the cover 157 is prevented by the lock piece 163 from being opened.

[0129]

Moreover, when the cartridge holder 4 moves between the ejection position and the loading position, the interlocking lever member 73 is rotated only the angle w from the initial position, and the link member 160 is rotated as indicated by an arrow T in FIG. 28 to pull up the operation projection 159 by the operation piece 164.

[0130]

Accordingly, at this time, the cover 157 is opened by the

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operation piece 164 as indicated by arrow S in FIG. 28. Thus, the cover 157 does not contact the disc cartridge 220 or 221 passing through the cartridge insertion.

[0131]

[3] Operation of Disc Cartridge Loading Mechanism (FIGS. 7 to 23)

(3-1) Initial State (FIGS. 7 and 8)

In the disc cartridge loading mechanism in the initial state, as shown in FIGS. 7 and 8, the cartridge holder 4 is at the ejection position and the chucking slider 5 is at the release position.

[0132]

In this initial state, the prevention of rotation of the interlocking lever member 73 with respect to the cover 157 is released, so that the cover 157 may be opened/closed by the external force.

[0133]

In this case, the frame 16 is fixed to the base chassis 1 via the chucking slider 5 as the chucking slider 5 has the float lock pieces 155 with the grooves 8 of the float lock legs 7, 7 and 7, 7 of the base chassis 1.

[0134]

By inserting the disc cartridge 220 or 221 from the cartridge insertion hole by pressing and opening the cover 157 with the disc cartridge 200 or 221, the disc cartridge 220 or 221 is inserted and held in the cartridge holder 4.

[0135]

(3-2) Loading (FIGS. 9 to 14)

Then, the disc cartridge 220 or 221 is inserted in the cartridge holder 4 until the front end thereof is abutted to the positioning pieces 139, 107, and is further pressed rearward as indicated by an arrow J in FIG. 9, the cartridge holder 4 is moved rearward as the movement operation pin 48 is introduced into the cut-out portion 113.

[0136]

At this point, the pressing the third position detection switch 64 in the initial state is released. By releasing the pressing of the third position detection switch 64, the loading motor 34 is driven by a control circuit, not shown. Then, the rotary body 45 is rotated in a direction such that the movement operation pin 48 moves along the semi-circular locus on the opposite side to the semi-circle of the engagement slit 112, as indicated by an arrow K in FIG. 9.

[0137]

The cartridge holder 4 is moved toward the cartridge loading section, that is, toward the loading position, in parallel to the chassis plate 15 while holding the disc cartridge 220 or 221.

[0138]

When the rotary body 45 is rotated substantially 180 degrees from the initial position as indicated by an arrow L in FIGS. 10 to 14, the movement operation pin 48 moves the cartridge holder 4

toward the loading portion in parallel to the chassis plate 15 until the cartridge holder 4 reaches the loading position.

[0139]

When the cartridge holder 4 is moved toward the loading position, the drive pin 100 is passed through the first path with respect to the guide member 84 and moves without being operated by the guide member 84.

[0140]

Namely, when the drive pin 100 is passed through the first path with respect to the guide member 84, one side portion of the guide projection 88 is pressed by the drive pin 100 so that the guide member 84 is rotationally operated against the biasing force of the tensile coil spring 87. When the cartridge holder 4 reaches the loading position, the guide member 84 is returned to the initial position by the biasing force of the tensile coil spring 87 because the drive pin 100 is away from the guide projection 88.

[0141]

In addition, when the cartridge holder 4 is substantially at the intermediate position between the ejection position and the loading position, that is, when the disc cartridge 220 or 221 is in the cartridge insertion hole, the interlocking lever member 73 rotates the cover 157 via the link member 160 to open the cover 157.

[0142]

(3-3) Chucking (FIGS. 15 to 18)

When the cartridge holder 4 reaches the loading position, the supporting pins 95 which have reached between end of the guide portions 49 and the position limiting section 50 are supported to engagement holding sections 67 of the holding levers 65.

[0143]

As the rotary body 45 is further rotated in the same direction, the chucking slider 5 is moved forward as indicated by an arrow N in FIGS. 15 to 18 so as to rotate the holding levers 65 downward.

[0144]

At this point, the cartridge holder 4 is moved in the direction toward the cartridge loading section, as shown in FIGS. 17 and 18, so that the disc cartridge 220 or 221 held therein is loaded on the cartridge loading section.

[0145]

Thus, when the rotary body 45 is rotated substantially 180 degrees from the initial state and is further rotated substantially 180 degrees, the movement operation pin 48 passes through the arc-shaped portion interlinked to the engagement slit 112, so as to prevent the cartridge holder 4 from being moved.

[0146]

The movement operation pin 48 is engaged with the engagement section 146 of the chucking slider 5 to move the chucking slider 5 forward to the chucking position (playback mode position), thereby moving the cartridge holder 4 in the direction toward the

cartridge loading section.

[0147]

At this point, the frame 16 is supported only through the dampers 10, that is, in a so-called float supporting state, as the chucking slider 5 extracts the float lock pieces 155 from the grooves 8 of the float lock legs 7, 7 and 7, 7 of the base chassis 1.

[0148]

As the cartridge holder 4 has reached the loading position, the interlocking lever member 73 prevents the cover 157 from rotating from the closing position, so as to maintain the closed state of the cover 157.

[0149]

In this state, information signals may be read out from the magneto-optical disc or the optical disc by the optical pick-up device 21. By driving the optical pick-up device 21 and the spindle motor 20, the playback mode may be executed.

[0150]

(3-4) Recording Mode (FIGS. 19 and 20)

As the chucking slider 5 loads the recording/reproduction disc cartridge 220 in the cartridge loading section and is then moved further in the same direction, that is, in the forward direction to the recording mode direction, as shown in FIGS. 19 and 20, the chucking slider 5 moves the magnetic head 29 to the position to slide on the magneto-optical disc 201 in the recording/reproduction

disc cartridge 220.

[0151]

In this state, information signals may be written on the magneto-optical disc 201 by the optical pick-up device 21 and the magnetic head 29. By driving the optical pick-up device 21, the magnetic head 29 and the spindle motor 20, the recording mode may be executed.

[0152]

The position of the chucking slider 5 is detected by the first and second position detection switches 62 and 63, and is discriminated by the control circuit. This control circuit discriminates via a detection switch, not shown, whether the disc cartridge loaded on the cartridge loading section is the recording/reproduction disc cartridge 220 or the reproduction-only disc cartridge 221. When the disc cartridge loaded on the cartridge loading section is the reproduction-only disc cartridge 221, the control circuit moves the chucking slider 5 to the chucking position (playback position), but does not move it to the recording position.

[0153]

(3-5) Ejection (FIGS. 21 to 23)

In order to eject the disc cartridge 220 or 221 from the disc cartridge loading mechanism, the loading motor 34 is rotationally driven in the direction reverse to the direction of loading and chucking.

[0154]

Thus, as indicated by an arrow M in FIGS. 15 to 19, the chucking slider 5 is moved rearward to return to the release position. At this point, the cartridge holder 4 is moved away from the cartridge loading section in the direction perpendicular to the chassis plate 15. The frame 16 is fixed to the base chassis 1 via the chucking slider 5.

[0155]

Then, as indicated by an arrow O in FIGS. 21 to 23, the cartridge holder 4 is moved forward toward the ejection position.

[0156]

At this point, the drive pin 100 of the ejection lever 98 passes through the second path with respect to the guide member 84 and is moved by the guide member 84, so as to eject the disc cartridge 220 or 221 forward from the cartridge holder 4 via the ejection lever 98, as indicated by an arrow P in FIGS. 21 to 23.

[0157]

That is, when the drive pin 100 passes through the second path with respect to the guide member 84, the drive pin 100 follows the other side portion of the guide projection 88 of the guide member 84 at the initial position so as to be moved with respect to the cartridge holder 4.

[0158]

When the cartridge holder 4 is substantially at the intermediate position between the ejection position and the loading

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position, the interlocking lever member 73 rotates the cover 157 via the link member 160 to cause the cover 157 to be in the open state, so that the cover 157 is not abutted to the disc cartridge 220 or 221.

[0159]

The disc cartridge loading mechanism is then returned to the initial state as shown in FIGS. 7 and 8.

[0160]

[Effect of the Invention]

As is described above, in the recording medium loading mechanism of this invention, the movement pin, which is provided on the rotary body moved substantially 360 degrees and is inserted and engaged with the engagement slit of the recording holder, moves the recording medium holder in parallel to the chassis section toward the recording medium loading section up to the position where the recording medium held by the recording medium holder faces the recording medium loading section, when the rotary body is moved substantially 180 degrees from the initial position. The movement pin passes through the arc-shaped slit interlinked to the engagement slit thereby to be engaged with the engagement section of the chucking slider without moving the recording medium holder so as to move the chucking slider, when the rotary body is further moved substantially 180 degrees. Thus, the recording medium holder is moved in the direction toward the recording medium loading section to load the recording medium in the recording medium

loading section.

[0161]

Therefore, in this recording medium loading mechanism, the movement (loading) of the recording medium in parallel to the chassis section and the movement (chucking) of the recording medium perpendicular to the chassis section can be sequentially carried out by continuous driving operation in a predetermined direction by a single drive source. The recording medium can be thus stably transported to the sufficient distance.

[0162]

Also, in the recording medium loading mechanism of the present invention, the chucking slider moves the recording medium holder causing the recording medium to face the recording medium loading section in the direction perpendicular to the chassis section so as to load the recording medium in the recording medium loading section and is then moved further in the same direction to move a magnetic head in directions toward and away from the recording medium. In this case, loading, chucking and mode selection can be sequentially carried out by continuous driving operation in a predetermined direction by a single drive source, and the structure of the apparatus can be simplified.

[0163]

Thus, the present invention provides the recording medium loading mechanism which is capable of stably transporting the recording medium to the sufficient distance, with simplified device

structure and reduced size.

[Brief Description of the Drawings]

FIG. 1 is an exploded perspective view showing the structure of a recording medium loading mechanism of the present invention.

FIG. 2 is a perspective view showing the structure of a base chassis section of the recording medium loading mechanism.

FIG. 3 is an exploded perspective view showing a part of the structure of a main chassis section block of the recording medium loading mechanism.

FIG. 4 is an exploded perspective view showing the structure of a cartridge holder of the recording medium loading mechanism.

FIG. 5 is an exploded perspective view showing the structure of a top plate of the recording medium loading mechanism.

FIG. 6 is a perspective view showing the structure of a chucking slider of the recording medium loading mechanism.

FIG. 7 is a perspective plan view showing the structure in an initial state of the recording medium loading mechanism.

FIG. 8 is a perspective side view showing the structure in the initial state of the recording medium loading mechanism.

FIG. 9 is a perspective plan view showing the structure in a state that a disc cartridge of the recording medium loading mechanism is inserted.

FIG. 10 is a plan view showing the structure in a loading start state of the recording medium loading mechanism.

FIG. 11 is a perspective plan view showing the structure in

a state after loading start of the recording medium loading mechanism.

FIG. 12 is a perspective plan view showing the structure in a state during loading of the recording medium loading mechanism.

FIG. 13 is a perspective plan view showing the structure in a loading complete state of the recording medium loading mechanism.

FIG. 14 is a perspective side view showing the structure in the loading complete state of the recording medium loading mechanism.

FIG. 15 is a perspective plan view showing the structure in a state during chucking of the recording medium loading mechanism.

FIG. 16 is a perspective side view showing the structure in the state during chucking of the recording medium loading mechanism.

FIG. 17 is a perspective plan view showing the structure in a chucking complete state (playback mode) of the recording medium loading mechanism.

FIG. 18 is a perspective side view showing the structure in the chucking complete state (playback mode) of the recording medium loading mechanism.

FIG. 19 is a perspective plan view showing the structure in a recording mode of the recording medium loading mechanism.

FIG. 20 is a perspective side view showing the structure in the recording mode of the recording medium loading mechanism.

FIG. 21 is a perspective plan view showing the structure in

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a ejection start state of the recording medium loading mechanism.

FIG. 22 is a perspective plan view showing the structure in a state during ejection of the recording medium loading mechanism.

FIG. 23 is a perspective plan view showing the structure in a state that ejection is substantially completed in the recording medium loading mechanism.

FIG. 24 is a perspective side view showing the structure of the recording medium loading mechanism.

FIG. 25 is a perspective front view showing the structure of the recording medium loading mechanism with a part thereof broken away.

FIG. 26 is a perspective front view showing the structure of essential portions of the recording medium loading mechanism with a part thereof broken away.

FIG. 27 is a perspective view showing the structure of a cover of the recording medium loading mechanism.

FIG. 28 is a side view showing the structure in a state that the cover of the recording medium loading mechanism may be opened.

FIG. 29 is a side view showing the structure in a state that the cover of the recording medium loading mechanism is maintained at a closing position.

FIG. 30 is a side view showing the structure of an interlocking lever for opening/closing the cover of the recording medium loading mechanism.

FIG. 31 is a perspective view showing the structure of a

reproduction-only disc cartridge used in the recording medium loading mechanism.

FIG. 32 is a perspective view, from the bottom, showing the structure of the reproduction-only disc cartridge used in the recording medium loading mechanism.

FIG. 33 is a perspective view showing the structure of a recording/reproduction disc cartridge used in the recording medium loading mechanism.

FIG. 34 is a perspective view, from the bottom, showing the structure of the recording/reproduction disc cartridge used in the recording medium loading mechanism.

[Description of the Numerals]

- 2 main chassis block
- 3 top plate
- 4 cartridge holder
- 5 chucking slider
- 15 chassis section
- 16 frame
- 29 magnetic head
- 45 rotary body
- 48 movement operation pin
- 112 engagement slit
- 146 engagement section
- 220 recording/reproduction disc cartridge
- 221 reproduction-only disc cartridge