

DISK CARTRIDGE

Technical Field

5 The present invention relates to a disk cartridge for protecting a recording surface of an accommodated disk that is an information recording/reproduction medium from contaminants such as dust or finger print.

10 Background Art

 In general, a disk cartridge accommodates a disk that is an information recording/reproduction medium and is installed in a disk drive.

 As shown in FIG. 1, a conventional disk cartridge 100 includes a case 101 for accommodating a disk D, a shutter 110 installed in the case 101 to be capable of rotating for selectively opening or shutting an opening hole 102 formed in the case 101 so that a pickup (not shown) of a disk drive can access the disk D, and a cover 103 fixed to the upper portion of the case 101. Reference numeral 103b denotes an open hole formed in the cover 103 for disk exchange and clamping. Reference numeral 103a denotes an escape prevention lever installed at the cover 103 to be capable of sliding to prevent the disk D from escaping through the open hole 103b. Thus, when the disk D is installed, the escape prevention lever 103a is pulled back not to interfere with the disk D. After the disk installation is completed, the escape prevention lever 103a is push forward so that an end portion of the escape prevention lever 103a prevents the disk D from escaping through the open hole 103b.

 When the disk cartridge 100 accommodating the disk D is inserted into a disk drive, as shown in FIG. 2A, an opening lever 120 installed at the disk drive pushes a locking piece 111a so that a protrusion 111c of the shutter 110 is unlocked from a groove 101a of the case 101. Then, the opening lever 120 pushes an interference piece 111b to have the shutter 110 pivot around left and right pivot axes 110a. The shutter 110

is formed of first and second shutter portions 111 and 112 respectively installed to be capable of pivoting around left and right pivot axes 110a and engaged through an engagement gear portion 113. As the first shutter portion 111 incorporated with the interference piece 111b rotates
5 clockwise, the second shutter portion 112 rotates counterclockwise so that the first and second shutter portions 111 and 112 are separated apart from each other and the opening hole 102 opens. Then, a turntable (not shown) and a clammer (not shown) of the disk drive enter through the opening hole 102 and the open hole 103a to clamp the disk
10 D. A pickup (not shown) accesses a recording surface of the disk D to perform an information recording and/or reproduction process.

Although not shown in drawings, a torsion spring for elastically biasing the first shutter portion 111 in a counterclockwise direction on the drawings, that is, in a direction to close the opening hole 102, is installed
15 between the first shutter portion 111 and the bottom surface of the case 101. When a force applied by the opening lever 120 is removed, the shutter 110 is returned to the original closed position.

However, in the above structure, since the shutter 110 is installed in the case 101 and the disk D is placed on the shutter 110, during the
20 opening/shutting operation of the shutter 110, the shutter 110 contacts the recording surface of the disk D (a lower surface of a disk in the drawings) so that the recording surface of the disk D may be scratched by the shutter 110 and damaged.

Also, dust can intrude through the open hole 103b of the cover
25 103. Of course, since the upper surface of the disk D facing the open hole 103b is not a surface for recording, direct contamination due to dust does not occur. Nonetheless, as dust intrudes and placed on the shutter 110, the dust on the shutter 110 adheres to the recording surface of the disk D during the opening/shutting operation. Therefore, an
30 improved structure to protect the information area of a disk is needed.

Disclosure of the Invention

To solve the above-described problems, it is an object of the present invention to provide an improved disk cartridge which can protect the information area of a disk from being contaminated during the opening/shutting operation of the shutter installed in the case.

5 To achieve the above object, there is provided a disk cartridge comprising a lower case having an opening hole formed therein, an upper case, installed at the lower case to be capable of being open and shut while pivoting, for accommodating a disk together with the lower case, a shutter, installed at the lower case to be capable of sliding, for
10 opening and shutting the opening hole, a close covering member installed at the shutter to be capable of sliding, the close covering member closely contacting a non-information area at an inner circumference of the disk when the shutter is closed and being separated from the non-information area at an inner circumference of the disk when
15 the shutter is open.

It is preferred in the present invention that the close covering member comprises a space portion having an inclined surface, the space portion closely contacting or being separated from the non-information area at an inclined circumference of the disk while it rises or is lowered
20 along an inner inclined surface of a cut-away portion formed in the shutter, a sliding portion sliding along a slot formed in the shutter during opening/shutting of the shutter, and a lever portion connecting the space portion and the sliding portion and to be capable of being elastically deformed.

25 It is preferred in the present invention that a sealing member is provided on the upper surface of the space portion so that the non-information area at an inner circumference of the disk closely contacts the close covering member.

It is preferred in the present invention that, since an inclined
30 portion is provided at the slot, when the space portion rises, the sliding portion rises from the lower surface of the shutter, and when the space

portion is lowered, the sliding portion is lowered to the lower surface of the shutter.

It is preferred in the present invention that an interference portion for interfering such that the sliding portion is smoothly lowered when the shutter is open is provided at the lower case.

It is preferred in the present invention that the interference portion is disposed at an angle less than the maximum open angle of the shutter.

It is preferred in the present invention that a parking portion having is formed at the lower case so that the space portion is disposed at the parking portion when the shutter is open.

It is preferred in the present invention that a protrusion having an inclined surface and supporting the non-information area of the disk is provided at the shutter so that, when the shutter is open, the disk rises along the inclined surface to closely contact the upper case.

It is preferred in the present invention that a protrusion for supporting the non-information area at the inner circumference of the disk that is lowered along the inclined surface is provided at the lower case.

It is preferred in the present invention that a sealing member is provided at the upper case at a portion of contacting the non-information area of the disk so that the disk closely contact the sealing member.

Brief Description of the Drawings

FIG. 1 is a perspective view of a conventional disk cartridge;
FIGS. 2A and 2B are plan views showing the state of opening/shutting of a shutter of the disk cartridge shown in FIG. 1;

FIG. 3 is an exploded perspective view of a disk cartridge according to a preferred embodiment of the present invention;

FIG. 4 is a view showing the state in which the disk cartridge of FIG. 3 is assembled;

FIG. 5 is a perspective view showing the close covering member shown in FIG. 3;

FIG. 6 is a plan view showing the state in which the shutter is closed in the disk cartridge of FIG. 3;

5 FIG. 7 is a sectional view taken along line IV-IV of FIG. 6;

FIG. 8 is a plan view showing the state in which the shutter is open in the disk cartridge of FIG. 3;

FIG. 9 is a sectional view taken along line V-V of FIG. 8;

FIG. 10 is a sectional view schematically showing the operation relationship between the close covering member and the guide hole when the shutter is open; and

FIG. 11 is a sectional view schematically showing the operation relationship between the close covering member and the guide hole when the shutter is closed.

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Best mode for carrying out the Invention

Referring to FIGS. 3 and 4, a disk cartridge 200 according to a preferred embodiment of the present invention includes a lower case 201 having an opening hole 202 where a turntable (not shown) on which a disk D is placed and an optical pickup device (not shown) are disposed by being inserted into a disk player (not shown), an upper case 203 installed at the lower case 201 to be capable of being open and shut while pivoting for accommodating a disk together with the lower case 201, a shutter 210 installed at the lower case 201 to be capable of sliding for opening and shutting the opening hole 202, and a close covering member 240 for preventing an information area D2 of the disk D from being contaminated by dust which is lowered with respect to the shutter 210 when the shutter 210 is open, and rises with respect to the shutter 210 when the shutter 210 is closed, to closely contact the inner circumference of the disk D, that is, at a clamping area D1.

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The shutter 210 is formed of first and second shutters 211 and 212 installed inside the lower case 201 to be capable of pivoting

symmetrically. Thus, as the first and second shutter portions 211 and 121 pivot in a direction in which they are separated apart from each other, the opening hole 202 is open (refer to FIG. 8). When the first and second shutter portions 211 and 121 pivot in the opposite direction in which they are close to each other, the opening hole 202 is closed (refer to FIG. 6). Reference numeral 213 denotes a connection portion for making the first and second shutter portions 211 and 212 interact. Accordingly, as the first shutter portion 211 pivots, the second shutter portion 212 pivots in the opposite direction by means of the connection portion 213. A torsion spring 204 for elastically biasing the first and second shutter portions 211 and 212 in the directions of closing the opening hole 202, is installed between the bottom surface of the lower case 201 and each of the first and second shutter portions 211 and 212.

When a force applied by the opening lever 120 (refer to FIG. 8) is removed, the shutter 210 returns to the original closed position.

Protrusions 230 and 220 contacting an edge portion D3 of the outer circumference of the disk D are formed at the first and second shutter portions 211 and 212, respectively. That is, the disk D includes a clamping area D1 at the inner circumference, an information area D2 where information is recorded, and an edge portion D3 disposed outside the information area D2. Since the edge portion D3 that is one of the non-information areas is supported by the protrusions 220 and 230, contact between the information area D2 and the shutter 201 can be avoided. The protrusions 220 and 230 have inclined surfaces 221 and 231 that are inclined toward the center of the accommodated disk D, respectively. Thus, as shown in FIG. 6, when the first and second shutter portions 211 and 212 are closed, the edge portion D3 of the disk D is supported by the upper ends of the protrusions 220 and 230. When the first and second shutter portions 211 and 212 are open, as shown in FIG. 8, the disk D is lowered along the inclined surfaces 221 and 231. The clamping area D1 of the lowered disk D at the inner circumference thereof is supported by the protrusion 205 formed at the

case 201. Thus, since the disk D does not contact the first and second shutter portions 211 and 212, when the shutter portions 211 and 212 are open, the information area of the disk D is not scratched. A hole 215 into which the first protrusion 205 is inserted is formed at each of the first and second shutter portions 211 and 212. A plurality of second protrusions 214 are provided at the rear surface of the first and second shutter portions 211 and 212. A slot 206 is formed in the lower case 201 corresponding to the second protrusions 214 so as not to be interfered with the second protrusions 214 when the shutter 210 is open/shut. Thus, when an external force is applied to the first and second shutter portions 211 and 212, the information area D2 of the disk D supported by the second protrusions 214 is prevented from being contacted by the first and second shutter portions 211 and 212.

A cut-away portion 216 having a half-oval shape is formed at each of the first and second shutter portions 211 and 212 so that a through hole 218 is formed at the center when the first and second shutter portions 211 and 212 are closed. When the disk D is picked out by opening the upper case 203, a user easily pick the disk D by inserting a finger into the center hole of the disk D. If the through hole 218 is formed at the shutter 210, the user can bent the finger after inserting it deeper through the center hole of the disk D so that picking the disk D is made easy. Also, when dust is accumulated on the upper surface of the shutter 210 facing the disk D, the dust can be exhausted through the through hole formed in the shutter 210.

The cut-away portion 216 is formed to be inclined at a predetermined angle. This is to allow a space portion 241 (refer to FIG. 5) having an inclined portion 241a formed therein which will be described later to be raised or lowered along the cut-away portion 216.

Reference numeral 250 denotes a spring cover coupled to the lower case 210.

FIG. 5 is a magnified view of the close covering member shown in FIG. 3. Referring to drawing, the close covering member 240 is

provided at each of the first and second shutter portions 211 and 212 and includes a space portion 241 having a half-oval shape and where the inclined portion 241a is formed to be capable of rising or lowering along the cut-away portion 216 of the shutter 210, a sliding portion 242
5 installed to be capable of sliding along a guide hole 217 (refer to FIG. 3) formed in the shutter 210, and a lever portion 243 connecting the space portion 241 and the sliding portion 242 and to be capable of being elastically deformed.

When the shutter 210 is closed, the space portion 241 provided at
10 each of the first and second shutter portion 211 and 212 rises along the cut-away portion 216 so that both ends contact each other and the upper surface of the space portion 241 closely contacts the clamping area D3 of the disk D. When the shutter 210 is open, the space portion 241 is lowered along the cut-away portion 216 and separated from each other
15 so as to be separated from the clamping area D3 of the disk D.

A sealing member is preferably provided on the upper surface of the space portion 241 to prevent intrusion of foreign material such as dust as it closely contacts the clamping area D1 of the disk D. The sealing member is preferably formed of a material, for example,
20 non-woven fabric, capable of being elastically deformed when receiving a pressing force.

A parking portion 208 (refer to FIG. 3) is formed at the lower case
201 so that, when the shutter 210 is open, the space portion 214 is inserted. The inclined portion 241a of the space portion 241 is
25 preferably formed at a portion contacting the space portion 241 to be inclined to be capable of sliding.

An inclined surface 217a is provided at the guide hole 217, as shown in FIGS. 7 and 9. When the space portion 241 rises, the sliding portion 242 rises from the lower surface of the shutter 210. When the
30 space portion 241 is lowered, the sliding portion 242 is lowered to the lower surface of the shutter 210. That is, when the shutter 210 is closed, since the sliding portion 242 is disposed at the rising position from the

lower surface of the shutter 210, the space portion 241 rises along the cut-away portion 216 so that the lever portion 243 can be easily elastically deformed.

On the contrary, when the shutter 210 is open, since the sliding portion 242 is disposed at the lower surface of the shutter 210 and inserted into the guide hole 217, a spindle motor (not shown) can be stably operated without interference.

An interference portion 207 (refer to FIG. 3) protrudes from the lower case 201 to interfere the sliding portion 242 so that the space portion 241 is smoothly inserted into the parking portion 208. The interference portion 207 is preferably disposed at the lower case 201 within an angle less than the maximum open angle of the shutter 210. A sliding groove (not shown) is preferably formed the rear surface of the shutter 210 so that the shutter 210 being opened or shut is not interfered with the interference portion 207.

A clamping hole 203a (refer to FIG. 3) is formed in the upper case 203 into which a clamping apparatus entering the disk drive and clamping the disk D is inserted. A sealing member 260 is preferably provided around the clamping hole 203a to prevent intrusion of foreign material such as dust through the clamping hole 203a so that the information area D2 of the disk D is secondarily prevented from being contaminated by dust. The sealing member 260 can be provided to contact an edge portion D3 at the outer circumference of the disk D.

The operation of the disk cartridge according to a preferred embodiment of the present invention will be described with reference to the attached drawings.

FIG. 6 is a plan view showing a state in which the shutter of the disk cartridge of FIG. 3 is closed. FIG. 7 is a sectional view taken along line IV-IV of FIG. 6. FIG. 8 is a plan view showing a state in which the shutter of the disk cartridge of FIG. 3 is open. FIG. 9 is a sectional view taken along line V-V of FIG. 8. FIG. 11 is a sectional view showing the

operational relationship between the sealing member and the guide hole when the shutter is closed.

Referring to FIGS. 8, 9 and 10, the disk cartridge 200 where the disk D is loaded, as shown in FIGS. 6, enters a disk drive apparatus (not shown) in the state in which the shutter 210 is closed and the upper and lower cases 203 and 201 are closed.

As the disk cartridge 200 enters, the opening lever 120 installed at the disk drive apparatus pushes a locking piece 211a to be unlocked from a stop portion 211c and pushes an interference piece 211b to have the first shutter portion 211 pivot counterclockwise on the drawing. Then, the second shutter portion 212 pivots clockwise by the engaged gear portion 213. Accordingly, the opening hole 202 is open between the first and second shutter portions 211 and 212. Here, since the protrusions 220 and 230 of the first and second shutter portions 211 and 212 only contact the disk D and the contact portion is limited to the edge portion D3 of the disk D which is a non-information area, there is little possibility of the information area of the recording surface being damaged during the opening/shutting operation of the shutter 210. As the shutter 210 is open, the disk D is lowered along the inclined surfaces 221 and 231 of the protrusions 220 and 230 and is temporarily supported on the first protrusion 205.

As both ends of the space portion 241 of the close covering member 240 closely contact each other, the upper surface of the space 241 closely contacts the clamping area D1 of the inner side of the disk D. As the shutter 210 is open, the sliding portion 242 moves along the sliding hole 217. Then, the space portion 241 is lowered along the cut-away portion 216. The sliding portion 242 moves along the inclined surface 217a of the sliding hole 217 to the lower surface of the shutter 210. When the sliding portion 242 contacts the interference portion 207, the space portion 241 is inserted into the parking portion 208.

In this state, the turntable of the disk drive apparatus enters through the opening hole 202 which is open and the clamper enters

through the clamping hole 203a of the upper case 203 to clamp the disk D supported by the first protrusion 205. Then, as the turntable rotates, a recording/reproduction process is performed with respect to the disk D.

Next, referring to FIGS. 5, 6, and 11, when the
5 recording/reproduction process is completed and the clamping by the turntable and the clamper is removed, the clamping area D1 of the disk D is supported on the first protrusion 205. In this state, when the disk cartridge 200 escapes from the disk drive apparatus, the first and second shutter portions 211 and 212 pivot to their original positions and the
10 opening hole 202 is closed. Here, the edge portion D3 at the outer circumference of the disk D rises along the inclined surfaces 221 and 231 of the protrusions 220 and 230. Thus, even when dust intrudes through the clamping hold 203a, since the edge portion D3 at the outer circumference of the disk D is closely contacting the sealing member 260,
15 intrusion of dust in the information area D2 of the disk D is prevented.

When the shutter 210 is closed, the sliding portion 242 is released from the interference with the interference portion 207 and slides along the sliding hole 217. Then, the space portion 241 is separated from the parking portion 208 and rises along the cut-away portion 216. When
20 the first and second shutter portions 211 and 212 are closed, the space portions 241 of the close covering members 240 provided at the first and second shutter portions 211 and 212 contact each other to closely contact the clamping area D1 at the inner circumference of the disk D which is the non-information area, so that foreign material such as dust is
25 prevented from intruding in the information area D2. As a result, the disk D closely contacts the upper case 203 by the sealing member 260 and is fixed between the upper and lower cases 203 and 201 by closely contacting the shutter 210 by means of the close covering member 240 so that the possibility of the disk cartridge 200 being damaged during
30 carrying is lowered.

Industrial Applicability

As described above, the disk cartridge according to the present invention has the following effects.

First, since the sealing member closely contacts the clamping area at the inner circumference of the disk when the shutter is closed,
5 intrusion of dust is prevented so that the possibility of the information area of the disk being contaminated is lowered.

Second, since the disk is fixed between the upper and lower cases by means of the sealing member provided around the clamping area at the inner circumference of the disk, while the disk is carried,
10 noise and damage can be reduced.

While this invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention
15 as defined by the appended claims.

What is claimed is:

1. A disk cartridge comprising:
 - a lower case having an opening hole formed therein;
 - an upper case, installed at the lower case to be capable of being
 - 5 open and shut while pivoting, for accommodating a disk together with the lower case;
 - a shutter, installed at the lower case to be capable of sliding, for opening and shutting the opening hole;
 - a close covering member installed at the shutter to be capable of
 - 10 sliding, the close covering member closely contacting a non-information area at an inner circumference of the disk when the shutter is closed and being separated from the non-information area at an inner circumference of the disk when the shutter is open.
- 15 2. The disk cartridge as claimed in claim 1, wherein the close covering member comprises:
 - a space portion having an inclined surface, the space portion closely contacting or being separated from the non-information area at an inclined circumference of the disk while it rises or is lowered along an
 - 20 inner inclined surface of a cut-away portion formed in the shutter;
 - a sliding portion sliding along a slot formed in the shutter during opening/shutting of the shutter; and
 - a lever portion connecting the space portion and the sliding portion and to be capable of being elastically deformed.
- 25 3. The disk cartridge as claimed in claim 2, wherein a sealing member is provided on the upper surface of the space portion so that the non-information area at an inner circumference of the disk closely contacts the close covering member.
- 30 4. The disk cartridge as claimed in claim 2, wherein, since an inclined portion is provided at the slot, when the space portion rises, the

sliding portion rises from the lower surface of the shutter, and when the space portion is lowered, the sliding portion is lowered to the lower surface of the shutter.

5 5. The disk cartridge as claimed in claim 2, wherein an interference portion for interfering such that the sliding portion is smoothly lowered when the shutter is open is provided at the lower case.

10 6. The disk cartridge as claimed in claim 5, wherein the interference portion is disposed at an angle less than the maximum open angle of the shutter.

15 7. The disk cartridge as claimed in claim 2, wherein a parking portion having is formed at the lower case so that the space portion is disposed at the parking portion when the shutter is open.

20 8. The disk cartridge as claimed in claim 1, wherein a protrusion having an inclined surface and supporting the non-information area of the disk is provided at the shutter so that, when the shutter is open, the disk rises along the inclined surface to closely contact the upper case.

25 9. The disk cartridge as claimed in claim 8, wherein a protrusion for supporting the non-information area at the inner circumference of the disk that is lowered along the inclined surface is provided at the lower case.

30 10. The disk cartridge as claimed in claim 8, wherein a sealing member is provided at the upper case at a portion of contacting the non-information area of the disk so that the disk closely contact the sealing member.