

DISK CARTRIDGE

Technical Field

The present invention relates to a disk cartridge for
5 accommodating an information recording/reproduction medium (a disk)
so that a recording surface of the disk can be protected from
contaminants such as dust or finger prints.

Background Art

10 In general, a disk cartridge accommodating a disk, that is, an
information recording/reproducing medium, is loaded in a disk drive
apparatus. As shown in FIG. 1, a conventional disk cartridge 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/shutting an opening
15 hole 102 formed in the case 101, so that a pickup (not shown) of the disk
drive apparatus can access the disk D, and a cover 103 coupled to the
upper portion of the case 101. Reference numeral 103b denotes an
open hole formed in the cover 103 to change the disk D. Reference
numeral 103a denotes an escape prevention lever installed on the cover
20 103 to be capable of sliding so that the disk D does not escape through
the open hole 103b. Thus, when the disk D is installed, the escape
prevention lever 103a is moved back not to interfere with the disk D.
When the installation of the disk D is completed, the escape prevention
lever 103a is moved forward, as shown in the drawing, so that the disk D
25 is prevented by a leading end portion of the escape prevention lever
103a from escaping through the open hole 103b.

When the disk cartridge 100 in which the disk D is accommodated
is inserted in the disk drive apparatus, as shown in FIG. 2A, an opening
lever 120 installed at the disk drive apparatus pushes a locking piece
30 111a to release locking between a protrusion 111c of the shutter 110
and a groove 101a of the case 101. Next, as shown in FIG. 2B, the

opening lever 120 pushes and rotates an interference piece 111b. The shutter 110 includes first and second shutter portions 111 and 112 which are respectively installed to be capable of rotating around left and right rotation shafts 110a and engaged with each other via an engagement
5 threaded portion 113. When the first shutter portion 111, integrally connected to the interference piece 111b, rotates clockwise, the second shutter portion 112 rotates counterclockwise. Accordingly, the first and second shutter portions 111 and 112 are separated from each other and then the opening hole 102 is opened. Thus, a pickup (not shown) of the
10 disk drive apparatus can access a recording surface of the disk D through the open hole 102 that is opened, so that information recording and/or reproduction can be performed. Although not shown in the drawing, a torsion spring for elastically biasing the first shutter portion 111 counterclockwise, that is, in a direction in which the opening hole
15 102 is shut is, installed on the rotation shaft 110a between the first shutter portion 111 and the bottom surface of the case 101. Thus, when a force applied to the opening lever 120 is removed, the shutter 110 is returned to the original shut state.

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

25 Also, dust can enter through the open hole 103b of the cover 103.

Of course, since the upper surface of the disk D facing the open hole 103b is not a recording surface, direct contamination by dust is not generated. However, when dust intrudes through a gap between the disk D and the cover 103 and remains on the shutter 110, the dust on
30 the shutter 110 can adhere to the recording surface of the disk indirectly during the opening/shutting operation.

Therefore, there is a need to protect the recording surface of the disk during the opening/shutting operation of the shutter 110.

Disclosure of the Invention

5 To solve the above and other problems, the present invention provides a disk cartridge which can protect a recording surface of a disk from being damaged by a contamination source during the opening/shutting operation of a shutter installed in a case.

According to an aspect of the present invention, a disk cartridge
10 including a case accommodating a disk, a cover installed at the case and having an open hole open to the outside, and a shutter installed to be capable of moving in the case under the disk to open/shut an open hole formed in the case, which comprises a plurality of protruding portions provided at the shutter to support a non information area
15 provided at an outer circumferential side of the disk and having inclined surfaces inclined at a predetermined angle, so that, when the shutter is opened, the disk descends along the inclined surfaces and, when the shutter is shut, the disk ascends along the inclined surfaces to closely contact a portion around the open hole of the cover.

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Brief Description of the Drawings

FIG. 1 is a perspective view illustrating a conventional disk cartridge;

FIGS. 2A and 2B are plan views illustrating a state in which the
25 shutter of the disk cartridge shown in FIG. 1 is opened/shut;

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

FIG. 4 is a perspective view illustrating the assembled state of the disk cartridge of FIG. 3;

30 FIG. 5 is a plan view showing the state in which the shutter of the disc cartridge shown in FIG. 3 is shut;

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

FIG. 7 is a plan view illustrating the state in which the shutter of the disc cartridge shown in FIG. 3 is opened;

FIG. 8 is a view showing the state in which the disk moved up and
5 down along the shutter opening/shutting operation of the disk cartridge shown in FIG. 3;

FIG. 9 is a view illustrating another example of the cover shown in FIG. 3; and

FIG. 10 is a view illustrating yet another example of the shutter
10 shown in FIG. 3.

Best mode for carrying out the invention

FIGS. 3 and 4 show the disassembled and assembled states of a disk cartridge according to the present invention.

15 Referring to the drawings, a disk cartridge includes a case 201 for accommodating a disk D, a shutter 210 for opening/shutting an opening hole 202 formed in the case 201 under the disk D, and a cover 203 covering an upper surface of the case 201. Reference numeral 240 denotes a non woven fabric, which is a sealing member, attached
20 around an open hole 203a of the cover 203.

First, the shutter 210 includes first and second shutter portions 211 and 212 installed inside the case 201 to be capable of rotating symmetrically with respect to each other. Thus, when the first and second shutter portions 211 and 212 are rotated in a direction in which
25 they are separated from each other, the opening hole 202 is opened (refer to FIG. 7). In contrast, when the first and second shutter portions 211 and 212 are rotated in a direction in which they approach each other, the opening hole 202 is shut (refer to FIG. 5). Reference numeral 213 denotes an engagement threaded portion for connecting the first and
30 second shutter portions 211 and 212 to be engaged with each other. Accordingly, when the first shutter portion 211 is rotated, the second

shutter portion 212 is rotated in a direction symmetrical to the direction of the rotation of the first shutter portion 211. A torsion spring 204 for elastically biasing the first and second shutter portions 211 and 212 in directions to shut the opening hole 202 is installed between each of the first and second shutter portions 211 and 212 and the bottom surface of the case 201. Thus, when a force applied by an opening lever 120 is removed, the shutter 210 is returned to the original shut state.

Protruding portions 220 and 230 contacting an edge portion D3 of the outer circumferential side of the disk D are formed at the first and second shutter portions 211 and 212. That is, the disk D is divided into a clamping area D1 provided at the inner circumferential side, an information area D2 where information is recorded, and the edge portion D3 provided outside the information area D2. Since the protruding portions 220 and 230 support the edge portion D3 that is one of non information areas, contact between the information area D2 and the shutter 210 can be avoided. The protruding portions 220 and 230 include inclined surfaces 221 and 231 inclined toward the center of the disk D, respectively, as shown in FIG. 8. Thus, when the shutters 211 and 212 are shut as indicated by a dotted line of FIG. 8, the edge portion D3 of the disk D is supported by the upper ends of the protruding portions 220 and 230. When the shutter 211 and 212 are opened as indicated by a solid line of FIG. 8, the disk D descends along the inclined surfaces 221 and 231. The clamping area D1 at the inner circumferential side of the disk D that is lowered is supported by a plurality of protrusions 205 formed on the case 201. In contrast, the edge portion D3 of the disk D that is raised closely contacts the non woven fabric 240 that is a sealing member, as shown in FIG. 6. Thus, a gap between the cover 203 and the edge portion D3 of the disk D is blocked so that dust can be prevented from intrusion through the gap. In stead of the above non woven fabric 240, soft materials, such as

rubber, which can be elastically deformed when receiving a closely pushing force by the disk D can be adopted.

Since the open hole 203a of the cover 203 is formed to have a diameter smaller than the diameter of the disk D, the disk D is prevented
5 from escaping through the open hole 203a. When the disk D is to be replaced, as shown in FIG. 4, the cover 203 pivots to be opened as shown in FIG. 4. Then, the disk D is taken from the case 201 and a new disk is accommodated therein. Reference numerals 203b and
201b denote a locking protrusion and a coupling hole respectively
10 provided at the cover 203 and the case 201 and elastically coupled to each other when the cover 203 is shut.

The disk cartridge where the disk D is installed enters the disk drive apparatus in the state in which the shutter 210 and the cover 203 are shut, as shown in FIGS. 5 and 6. When the disk cartridge enters
15 the disk drive apparatus, as shown in FIG. 7, the opening lever 120 installed at the disk drive apparatus pushes the locking piece 211a to unlock a protrusion 211c and a groove 201a and then pushes an interference piece 211b to rotate the first shutter portion 211
counterclockwise on the drawing sheet. Then, the second shutter
20 portion 212 is rotated clockwise by the engagement threaded portion 213. Accordingly, the opening hole 202 is opened between the first and second shutter portions 211 and 212. Here, since the disk D is contacted only by the protruding portions 220 and 230 of the first and second shutter portions 211 and 212, and the contact portion is limited
25 only to the edge portion D3 of the disk D, there is hardly a possibility to damage the information area of the recording surface during the opening/shutting operation of the shutter 210. As the shutter 210 is opened, the disk D descends along the inclined surfaces 221 and 231 of the protruding portions 220 and 230 so as to be supported on the
30 protrusions 205. In this state, a turntable (not shown) for driving a disk of the disk drive apparatus enters through the opening hole 202 that is

opened, and a clamber (not shown) enters through the open hole 203a of the cover 203 to clamp the disk D supported on the protrusions 205. Then, as the turntable rotates, recording and reproduction is performed with respect to the disk D.

5 When the recording and/or reproduction is completed and the clamping by the turntable and the clamber is released, the disk D remains such that the clamping area D1 is supported on the protrusions 205. In this state, when the disk cartridge escapes from the disk drive apparatus, the first and second shutter portions 211 and 212 pivot to
10 their original positions so that the opening hole 202 is shut. Here, the edge portion D3 of the disk D ascends along the inclined surfaces of the protruding portions 220 and 230 to be in the state shown in FIGS. 5 and 6. Here, since the shutting operation is performed without contacting between the shutter 210 and the information area D2, the information
15 area D2 can be safely kept. Also, in this state, since the edge portion D3 of the disk D closely contacts the circumferential portion of the open hole 203a of the cover 203 via the non woven fabric 240 interposed therebetween, contaminants, such as dust, hardly intrudes through the gap.

20 In the present preferred embodiment, since the open hole 203a is formed to have a diameter smaller than that of the disk D, the disk D can be prevented from escaping through the open hole 203a without installing the escape prevention lever 103a (refer to FIG. 1) in the conventional technology. However, any open hole having a variety of
25 shapes capable of preventing escape of the disk D can be adopted. For example, as shown in FIG. 9, a rectangular open hole 203a' having an area smaller than that of the disk D is formed at the center of a cover 203', so that the disk D is prevented from escaping through the open hole 203a'. However, an open area through which the clamber enters
30 should be secured for clamping of the disk.

Also, in the above preferred embodiment, semicircular cut portions 211d and 212d are formed to form a hole at the center when the first and second shutter portions 211 and 212 are shut (refer to FIG. 8). When the cover 203 is opened and the disk D is to be taken out, the hole formed at the shutter 210 facilitates taking out the disk by inserting a finger into the hole of the disk D. That is, when the hole is formed in the shutter 210, since the finger can be inserted deep into the center hole of the disk D and bent, the disk D can be conveniently taken out. However, to reduce the amount of dust adhering to the recording surface of the disk D from the lower side of the shutter 210, the structure shown in FIG. 10 is possible although it becomes inconvenient to take out the disk D. In FIG. 10, a slot is formed in the first and second shutter portions 211 and 212 corresponding to a portion interfered with the protrusion 205 during the opening/shutting operation while blocking the other portions. Thus, to prevent the smallest possibility that dust adheres to the recording surface of the disk D, the semicircular cut portion can be removed as shown in FIG. 10.

Industrial Applicability

As described above, the disk cartridge of the present invention has the following advantages.

First, since the shutter in the case contacts only the non information area of the disk, the disk information area can be safely kept during the operation of opening/shutting the opening hole.

Second, since the edge portion of the outer circumferential side of the disk closely contacts the sealing member around the open hole of the cover in the state in which the shutter is shut, a gap through which dust can intrude is blocked so that a possibility of contaminating the recording surface can be reduced.

Third, since the cover is installed at the case to be open/shut by pivoting to facilitate replacement of the disk and the area of the open

hole is formed to be smaller than that of the disk, the disc can be safely kept without installing an additional escape prevention member.

What is claimed is:

1. A disk cartridge including a case accommodating a disk, a cover installed at the case and having an open hole open to the outside, and a shutter installed to be capable of moving in the case under the disk to open/shut an open hole formed in the case, the disk cartridge comprising:

a plurality of protruding portions provided at the shutter to support a non information area provided at an outer circumferential side of the disk and having inclined surfaces inclined at a predetermined angle, so that, when the shutter is opened, the disk descends along the inclined surfaces and, when the shutter is shut, the disk ascends along the inclined surfaces to closely contact a portion around the open hole of the cover.

2. The disk cartridge as claimed in claim 1, wherein a sealing member is installed around the open hole so that the disk closely contacts the sealing member.

3. The disk cartridge as claimed in claim 2, wherein the sealing member is formed of a material which can be elastically deformed according to a closely contacting force of the disk.

4. The disk cartridge as claimed in claim 3, wherein the sealing member is formed of any one of non woven fabric and rubber.

5. The disk cartridge as claimed in claim 1, wherein the cover is installed at the case to be capable of being opening/shut while pivoting.

6. The disk cartridge as claimed in claim 5, wherein the open hole is formed to have an area smaller than that of the disk.

7. The disk cartridge as claimed in claim 5, wherein a locking protrusion is formed at any one of the cover and the case and a coupling groove to be elastically coupled to the locking protrusion is formed at the
5 other one of the cover and the case.

8. The disk cartridge as claimed in claim 1, wherein a protrusion is provided at the case in order to support a non information area at an inner circumferential side of the disk where the disk descends
10 along the inclined surface.