

## DISC CARTRIDGE AND DISC DRIVE APPARATUS USING THE SAME

### Technical Field

The present invention relates to a disc cartridge for  
5 accommodating a disc, i.e., an information recording/reproducing  
medium, and protecting a recording surface of the disc from fingerprints  
and a disc drive apparatus in which the disc cartridge is loaded for use.

### Background Art

10 A disc cartridge accommodating a disc is a sort of disc protecting  
apparatus and is loaded together with the disc in a disc drive apparatus.  
Typically, the disc cartridge is formed of upper and lower cases and  
accommodates a disc in an inner space formed between the upper and  
lower cases. Conventionally, rectangular cases have been widely used  
15 as the disc cartridge. That is, a circular disc is accommodated in a  
space formed inside the rectangular case. However, the rectangular  
case requires four corner portions which unnecessarily protrude, except  
for a circular portion, in accommodating a disc, which restricts  
miniaturization of the disc drive apparatus.

20 To solve the above problem, a circular disc cartridge 20 as shown  
in FIG.1 has been suggested. The disc cartridge 20 is formed circularly  
to correspond to the shape of a disc D so that a compact and smoothly  
rounded disc cartridge to obtain an aesthetic effect can be manufactured.

However, the disc cartridge 20 having a circular shape can be unstably  
25 loaded into the disc drive apparatus, for example, a camcorder 10 shown  
in the drawing. That is, when the disc cartridge 20 is inserted into a  
holder 12 provided inside a door 11 and then the door 11 is closed, the  
disc cartridge 20 is easily rotated and thus positioned at an inaccurate  
position because of the circular shape of the disc cartridge 20. An  
30 access hole 21 is formed on the upper and lower surfaces of the disc  
cartridge 20 so that a recording/reproducing unit of a disc drive

apparatus such as the camcorder 10 may access the disc D. When the disc cartridge 20 is loaded out of its accurate position, since the position of the access hole 21 changes, the recording/reproducing unit cannot access the disc D properly.

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#### Disclosure of the Invention

To solve the above and other problems, the present invention provides a compact disc cartridge that can stably perform a loading operation into a disc drive apparatus, and a disc drive apparatus using  
10 the disc cartridge.

According to an aspect of the present invention, a disc cartridge including a case in which a disc is accommodated and which is guided by both side walls of a holder when inserted in a holder of a disc drive apparatus, wherein the case comprises flat surface portions formed to  
15 have a surface contact with both side walls of the holder, and curved surface portions connecting the flat surface portions.

According to another aspect of the present invention, a disc drive apparatus which performs a recording and reproduction operation by inserting a disc cartridge, accommodating a disc in a case, in a holder  
20 and loading the disc cartridge, wherein the case comprises first flat surface portions formed at both side end portions parallel to a direction in which the cartridge is inserted in the holder, second flat surface portions formed at both side end portions perpendicular to the direction in which the cartridge is inserted in the holder, and a step portion formed  
25 at one of the first flat surface portions to protrude outwardly and having a relatively thin thickness, wherein the holder comprises inner walls provided at both sides of the holder to support the disc cartridge being inserted while having surface contact with the first flat surface portions, and a slot portion formed at one of the inner walls into which the step  
30 portion is inserted.

According to still another aspect of the present invention, a disc

drive apparatus to perform a recording and reproduction operation by inserting a disc cartridge, accommodating a disc in a case using a holder, and loading the disc cartridge, wherein the case comprises first flat surface portions formed at both side end portions perpendicular to a direction in which the cartridge is inserted in the holder, second flat surface portions formed at both side end portions parallel to the direction in which the cartridge is inserted in the holder, and a step portion formed at one of the first flat surface portions to protrude outwardly and having a relatively thin thickness, wherein the holder comprises inner walls provided at both sides of the holder to support the disc cartridge being inserted while having surface contact with the second flat surface portions, and an interval between the inner walls is narrower than a sum of a length between the first flat surface portions and a protruding length of the step portion.

#### Brief Description of the Drawings

FIG. 1 is a view illustrating a conventional disc cartridge and a camcorder using the disc cartridge for recording and reproduction;

FIG. 2 is a view illustrating major parts of FIG. 1;

FIG. 3 is a view illustrating a disc cartridge according to an embodiment of the present invention and a camcorder using the disc cartridge;

FIG. 4 is a magnified view illustrating the disc cartridge shown in FIG.3; and

FIGS. 5 through 8 are views illustrating a variety of cases of inserting the disc cartridge shown in FIG. 4 into a holder of a disc drive apparatus.

#### Best mode for carrying out the invention

FIG. 3 shows a disc cartridge 100 and a disc drive apparatus 200 in which the disc cartridge 100 is loaded for use. That is, the disc

cartridge 100 where the disc D is loaded is inserted into a holder 220 of the disc drive apparatus 200. Then, when a door 210 is closed, the disc cartridge 100 is loaded and a recording/reproducing operation can be performed.

5           The disc cartridge 100, as shown in FIGS. 3 and 4, includes upper and lower cases (110 and 120) which accommodate the disc D. The upper and lower cases (110 and 120) are coupled via a hinge (not shown) to be capable of moving in opposition or toward each other. Hereunder, the upper and lower cases (110 and 120) are referred to as  
10          a case. Reference numeral 100a denotes an access hole which is opened at the upper and lower surfaces of the disc cartridge 200 so that a turntable (not shown), a clamper (not shown), and a pickup (not shown) can access the disc D to perform a recording/reproducing operation in the disc drive apparatus 200.

15           The case (110 and 120) adopted in the disc cartridge 100 according to an embodiment of the present invention has a basic circular shape to enable a compact disc cartridge as well as a partially linear portion. That is, as shown in FIG.4, the case (110 and 120) has a circular shape having rounded corner portions. When a direction in  
20          which the disc cartridge 100 is inserted into the holder 220 provided inside the door 210 of the disc drive apparatus, as indicted by arrow A, is referred to as a first linear direction, the case (110 and 120) includes a first flat surface portion 101 formed at both lateral sides of the case (110 and 120) parallel to the first linear direction and a second flat surface  
25          portion 102 formed at the other lateral sides along a second linear direction which is perpendicular to the first linear direction. Consequently, since the remaining portion other than the first and second flat surface portions 101 and 102 is circular, the case (110 and 120) has a shape in which curved surface portions 103 respectively  
30          connect the flat surface portions 101 and 102. The first and second flat surface portions 101 and 102 have a surface contact with side walls 221

of the holder 220 and serve as a guide when the disc cartridge 100 is inserted into the holder 220. That is, when the entire case is formed circularly as in the conventional technology, since the cases almost have a point contact with the inner walls of the holder, the disc cartridge is easily rotated and positioned at an inaccurate position. When the case (110 and 120) has the first and second flat surface portions 101 and 102 having a surface contact as above, since the disc cartridge 100 is prevented from rotating in the holder 220, a stable loading position guide is possible.

Here, the first flat surface portion 101 is formed to have a surface contact with the side wall 221 of the holder 220 when the cartridge 100 is inserted into the disc drive apparatus in which a loading direction is set to a direction indicated by arrow A of FIG. 4. The second flat surface portion 102 is formed to have a surface contact with the side wall 221 of the holder 220 when the cartridge 100 enters in the disc drive apparatus in which a loading direction is set to a direction indicated by arrow B perpendicular to the direction A (please refer to FIG. 7). Further, a step portion 104 having a round shape and protruding from the first flat surface portion 101 close to the access hole 100a is formed at the first flat surface portion 101. The step portion 104 reinforces an open portion of the case (110 and 120) by the access hole 100a and simultaneously prevents an error of incorrectly loading the cartridge 100 by changing the left and right sides. That is, when the cartridge 100 is loaded such that the first flat surface portion 101 has a surface contact with the inner wall 221 of the holder 220, as shown in FIG. 4, the state of the cartridge 100 being loaded is shown in FIG. 5. A slot portion 222 corresponding to the thickness of the step portion 104 so that the step portion 104 can enter is formed in the holder 220, in addition to the inner wall 221 contacting the first flat surface portion 101. Thus, when the cartridge 100 is inserted in a manner in which the step portion 104 is positioned to the right side of the drawing by changing the left and right

sides of the cartridge 100, as indicated by a dotted line of FIG. 5, since the original right portion of the cartridge 100 is thicker than the step portion 104, the cartridge 100 cannot be loaded so that an accidental mis-insertion is prevented from the beginning.

5 In addition to the above-described mis-insertion case, a method to prevent a case in which the cartridge 100, which is supposed to be inserted into the disc drive apparatus in the direction A, is erroneously inserted in the direction B, that is, the cartridge 100 is inserted with the step portion 104 rotated to face forward, is needed. To prevent the  
10 above mis-insertion, a length Y between the second flat surface portions 102 is formed greater than a length X between the first flat surface portions 101. Thus, since the length between the inner walls 221 of both sides of the holder 220 is formed to fit into the length X between the first flat surface portions 101, the cartridge 100 cannot be inserted with a  
15 width of the length Y between the second flat surface portions 102 which is greater than the length X, so that the cartridge 100 is hooked by the entrance of the holder 220, as indicated by a dotted line of FIG. 6. Thus, mis-insertion in this direction is prevented as well.

On the contrary, there may be a disc drive apparatus where the  
20 loading direction of the cartridge 100 is set to the direction B of FIG. 4. In this case, the second flat surface portion 102 is inserted while having a surface contact with the inner wall 221 of the holder 220, as shown in FIG. 7, which is a normal loading state. Here, a method to prevent mis-insertion of the cartridge 100 in the direction A of FIG. 4 is needed.  
25 For this purpose, the length Y between the second flat surface portions 102 is formed to be shorter than a sum of the length X between the first flat surface portions 101 and a length Z of the step portion 104 protruding outwardly. Thus, when the cartridge 100 is loaded in a direction in which the first flat surface portion 101 has a surface contact  
30 with the inner wall 221, since the width of the cartridge 100 and the width of the holder 220 are not identical, as shown in FIG. 8, mis-insertion of

the cartridge 100 is prevented. Of course, in this case, the inner wall 221 of the holder 220 has a surface contact with the second flat surface portion 102 and is formed to fit into the second flat surface portion 102 so that insertion of the cartridge 100 is guided properly.

5           When the cartridge 100 is formed to meet the relationship that (Length X between the first flat surface portions 101) < (Length Y between the second flat surface portions 102) < (Length X between the first flat surface portions 101 + Length Z of the step portion 104 protruding outwardly), mis-insertion of the cartridge 100 in a different  
10          direction from the set loading direction is prevented from the beginning. Thus, the mis-insertion can be prevented by the above simple structure.

          When the disc cartridge 100 having the above structure is inserted into the holder 220 of the disc drive apparatus, since the first or second flat surface portion 101 or 102 has a surface contact with the  
15          inner wall 221 of the holder 220, the cartridge 100 is stably and accurately loaded without being rotated. Therefore, when the relationship between the lengths of the respective flat surface portions 101 and 102 and the step portion 104 is set, the mis-insertion in a different loading direction can be prevented.

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#### Industrial Applicability

As described above, the disc cartridge and the disc drive apparatus according to the present invention has the following advantages.

25          First, since the corner portions of the case of the disc cartridge have round shapes, the disc drive apparatus can be compact.

          Second, since the cartridge has a surface contact with the inner wall of the holder when the cartridge enters in the holder of the disc, a loading work can be stably and accurately performed.

30          Third, since the relationship between the lengths between the sides of the cartridge is set according to the loading direction along

which the cartridge is inserted, mis-insertion of the cartridge can be prevented.

What is claimed is:

1. A disc cartridge including a case in which a disc is accommodated and which is guided by both side walls of a holder when inserted in a holder of a disc drive apparatus, wherein the case  
5 comprises:  
flat surface portions formed to have a surface contact with both side walls of the holder: and  
curved surface portions connecting the flat surface portions.
- 10 2. The disc cartridge as claimed in claim 1, wherein the flat surface portion comprises:  
first flat surface portions formed at both sides of the case along a first linear direction; and  
second flat surface portions formed at both sides of the case  
15 along a second linear direction which is perpendicular to the first linear direction.
3. The disc cartridge as claimed in claim 2, wherein a length Y between the second flat surface portions is greater than a length X  
20 between the first flat surface portions.
4. The disc cartridge as claimed in claim 3, wherein a step portion extending outwardly forming a step is further provided at one side of the first flat surface portion.  
25
5. The disc cartridge as claimed in claim 4, wherein the length Y between the second flat surface portions is shorter than a sum of the length X between the first flat surface portions and a length Z of the step portion extending outwardly.

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6. The disc cartridge as claimed in claim 4, wherein the step portion is a curved surface portion.

7. A disc drive apparatus which performs a recording and reproduction operation by inserting a disc cartridge, accommodating a disc in a case, in a holder and loading the disc cartridge, wherein the case comprises:

first flat surface portions formed at both side end portions parallel to a direction in which the cartridge is inserted in the holder;

10 second flat surface portions formed at both side end portions perpendicular to the direction in which the cartridge is inserted in the holder; and

a step portion formed at one of the first flat surface portions to protrude outwardly and having a relatively thin thickness,

15 wherein the holder comprises inner walls provided at both sides of the holder to support the disc cartridge being inserted while having surface contact with the first flat surface portions, and a slot portion formed at one of the inner walls into which the step portion is inserted.

20 8. The disc drive apparatus as claimed in claim 7, wherein a length between the inner walls is narrower than a length between the second flat surface portions.

9. A disc drive apparatus to perform a recording and reproduction operation by inserting a disc cartridge, accommodating a disc in a case using a holder, and loading the disc cartridge, wherein the case comprises:

25 first flat surface portions formed at both side end portions perpendicular to a direction in which the cartridge is inserted in the holder;

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second flat surface portions formed at both side end portions parallel to the direction in which the cartridge is inserted in the holder; and

- 5 a step portion formed at one of the first flat surface portions to protrude outwardly and having a relatively thin thickness,

wherein the holder comprises:

inner walls provided at both sides of the holder to support the disc cartridge being inserted while having surface contact with the second flat surface portions; and

- 10 an interval between the inner walls is narrower than a sum of a length between the first flat surface portions and a protruding length of the step portion.