Description

The present invention relates to a disk cartridge for holding a plurality of disks, e.g. digital audio disks and which in use is mounted on a reproducing apparatus having an auto changing mechanism or the like.

Prior to this application, we have previously proposed a disk player capable of reproducing disks in sequential and random modes in addition to a normal mode by employing a disk cartridge in which a plurality of disks such as digital audio disks or video disks US-A-4701900 is held.

In a disk cartridge used in the disk player disclosed in this previous proposal, a case body is provided with a disk insertion opening at its front surface and having partition members at intervals each slightly larger than the thickness of a disk to form shelf-like spaces for storing a plurality of disks.

In each disk storage space, a leaf spring extends inwardly in the storage space to bias a disk toward a side wall opposite to the disk insertion opening so that the inserted disk will not be caused to pop out of the case by external force such as an impact upon the case. When a disk passes beyond the leaf spring and the disk is pushed into a storage position.

Push members for pushing disks toward the disk insertion opening to discharge the disks are provided on the side wall opposite to the disk insertion opening of the cartridge. The push members are formed integrally with slide tabs for operation extending outwardly from the side wall surface of the case body and are slidable in an insertion/removal direction.

When such a disk cartridge is mounted on a player, a desired disk is discharged from the case body by operating the corresponding slide tab and returned in its original position at the end of reproduction.

Since the original position is detected by position detection of a slide tab which is operated, the slide tab must be located at either a discharge or storage position so as not to be erroneously operated. However, in a player for an automobile, a slide tab corresponding to a storage space storing no disk originally or a slide tab corresponding to a storage space from which a disk was removed for playback is free, so that the slide tab is sometimes moved from correct positions by tilting, acceleration or vibrations of the player to cause detection errors.

Therefore, it is preferred to provide a click mechanism (a structure wherein a resistance along a sliding direction is locally increased) for holding a slide tab at its discharge and storage positions, respectively. However, when 10 or more disks are charged in the cartridge, the load presented by the click mechanism is so increased that an auto reset mechanism for resetting the above slide tab at its storage position may not correctly operate.

It is an object of the present invention to eliminate the above problem i.e. not to increase a total click load of all slide tabs when a click mechanism is provided to each slide tab.

According to the present invention, there is provided disk cartridge comprising :

a disk cartridge body for storing therein a plurality of disks so that the disks are stacked between shelf-like partitions ;

biasing means, provided inside the disk cartridge body, for biasing a disk to be stored in the storage direction ; and

a plurality of slide members, each having a projecting portion projecting outwardly from a side surface of said disk cartridge body and a push portion for pushing the stored disk in a discharging direction, and being slidable along discharge and storage directions of the stored disk, for discharging or charging the disk to be stored against a biasing force of said biasing means upon operation of said projecting portion, characterised in that for each of said slide members

click locking engaging portions each consisting of at least one engaging portion are provided on either of said disk cartridge body and said slide member and at least one corresponding engaging portion provided on the other are formed at positions such that said slide members are temporarily locked at the disk storage position, the positions of the different slide members at which their engaging portions meet the corresponding engaging portion of the cartridge body being offset by at least one predetermined amount along the sliding direction of said slide members.

Thus, when used with an auto changer player, the click locking load does not instantaneously act on an aligning mechanism for aligning all the slide tabs at one end.

The invention will be further described by way of non-limitative example with reference to the accompanying drawings, in which :-

Figure 1 is a perspective view of a disk cartridge to which the present invention is applied ;

Figure 2 is a plan sectional view of the cartridge;

Figure 3 is a side view of the cartridge ;

Figure 4 is a bottom view of a changing mechanism of a player showing one example of an aligning mechanism of a slide tab for operation for pushing a disk out of the cartridge ;

Figure 5 is a side view showing the cartridge in detail ;

Figure 6 is a cross-sectional view of Figure 5 ;

Figure 7 is a sectional view showing a slide plate and a slide groove in detail ; and

Figures 8 and 9 are schematic side views of an auto change player showing a disk loading operation.

Figure 1 is a perspective view wherein the present invention is applied to a disk cartridge for charging digital audio disks. The front surface of a box-like

case 1 serves as a disk insertion opening 1a. The interior of the case 1 is partitioned by partition plates 2 into a number of intervals each capable of receiving a disk, so that disks 3 can be loaded into storage spaces defined by the partition plates 2 ; there may, for example, be spaces for 10 disks.

Figure 2 is a plan sectional view of one layer and also shows a part of an auto changing mechanism of a player. A leaf spring 4 is fixed at its both ends to an inner surface of a side surface 1b, and a convex portion 4a at the center of the leaf spring 4 biases the disk 3 against a side 1c opposite the side surface 1b. The line of action across the convex portion 4a of the leaf spring 4 is offset slightly toward the discharge side (a side of the disk insertion opening 1a) from a centre A of the disk 3, so that the disk 3 is held at a predetermined position inside the cartridge unless pushed out against the biasing force of the leaf spring 4.

Push members 5 for pushing peripheral edges of the disks 3 toward the disk insertion opening 1a are provided at the side surface 1c of the case 1. Each push member 5 is connected with a slide tab 7 extending outwardly from the case 1 through a slide plate 6 slidably held against the side surface 1c. By operating the slide tab 7, a disk 3 loaded in the case 1 is pushed at its peripheral edge by the push member 5 so as to be discharged from the case 1. The partially discharged disk 3 is then sent to a load position of a player by a pair of load rollers C1 of a changing mechanism of the player.

In the changing mechanism, the slide tab 7 is operated by a pawl C2 which is engaged with the slide tab 7. The pawl C2 is slidably provided on a drive plate C3 and is operated in a disk discharge direction to hook the slide tab 7 so as to discharge the disk 3. The pawl 2 is able to reciprocate in charge/discharge directions, and the drive plate C3 is movable upwardly and downwardly in a vertical direction i.e. to align with each of the disk storage positions by a drive mechanism (not shown) ; in use it is moved and positioned at a disk to be discharged by the above drive mechanism in accordance with a disk selection signal from the player.

Detection tabs 8 extending outwardly from the case 1 are additionally arranged on the slide plates 6 which have the slide tabs 7 projecting therefrom. Each detection tab 8 is provided to detect the return position of the disk 3 at the end of disk playback, and a limit switch C4 serving as a sensor for detecting the return position is provided to the drive plate C3 of the change mechanism. The slide tab 7 at a storage position corresponding to the disk 3 discharged for playback is located at a discharge position indicated by the chain-dashed line in Figure 2 when the disk is discharged, and at the same time the detection tab 8 is also moved to the position indicated by the above line. At the end of disk playback, when the drive plate C3 is moved upward as the disk 3 is unloaded, the limit switch C4 detects the presence of the detection tab 8 at the discharge position, and the movement of the drive plate C3 is stopped thereat. The load rollers C1 are then rotated in the opposite direction to push the disk 3 into the storage position again. The push member 5, the slide tab 7, and the detection tab 8 are then returned to the storage position of the disk 3.

As is apparent from the above description, all the slide and detection tabs 7 and 8 must be at the storage position except during playback. However, not all the storage spaces in the case 1 are necessarily loaded with disks 3, so the disk cartridge is sometimes mounted with the slide and detection tabs not aligned at one end, as shown in a side view of part of the disk cartridge in Figure 3. In this state, since the drive plate C3 is not moved upwardly or downwardly normally, it is difficult to discharge or insert the disk 3, and the disk 3 may not be returned in its original position due to a detection error. To prevent this, a reset leve C5 of the changing mechanism is operated immediately after the disk cartridge is mounted so as to perform a reset operation for aligning the slide tabs 7 at one end corresponding to a complete storage position of the disk 3, as indicated in ghost.

The reset lever C5 is, as shown in Figure 4 which is a bottom view of the relevant part of a disk cartridge mount portion of the changing mechanism, swingable about a support shaft C6, and a drive pin C7 is attached to its drive end. The drive pin C7 is fitted in a heart-shaped cam groove C9 driven by the drive mechanism (not shown). When the disk cartridge is mounted to the apparatus body, the cam disk C8 is rotated once to reciprocably swing the reset lever C5, so that the slide tabs 7 are aligned at one end by an actuation edge C5a of the reset lever C5.

Although the slide and detection tabs 7 and 8 are aligned at one end, since they are not externally locked, the psoitions of the slide tabs 7 may be varied by vibrations, acceleration, deceleration or tilting of a player for automobile or portable use. For this reason, a click positioning mechanism (a structure wherein a sliding load is locally increased in a fixed position) is provided on the slide plate 6 formed integrally with the slide and detection tabs 7 and 8, so that the slide tab 7 is not easily moved. However, the click mechanism causes a load to act on the reset lever C5 described above and the total load depends on the maximum number of disks which can be loaded into the cartridge, so that a large load can be presented to the reset mechanism of the changing mechanism. Therefore, the following specific arrangement is provided so as not to increase the load by the click mechanism.

Figure 5 is a side view of the case 1, and Figure 6 is a sectional view thereof. Each slide plate 6 is slidably fitted in the corresponding slide groove 9 formed at the height of the disk of the side surface 1c of the case 1 and preevented from being removed by covering a side plate 10. The slide and detection tabs 7

and 8 extend outside the side surface 1c through slits 11 in the side plate 10.

Two substantially V-shaped small projections 12a and 12b respectively corresponding to the disk load and discharge positions are provided on an inner surface of the slide groove 9. On the other hand, a single substantially V-shaped projection 13 is provided on the opposite surface of the slide plate 6. As shown in detail in Figure 7, the position at which the projection 13 of the sliding side is moved to the right over the fixed projection 12b corresponds to the disk storage position, and the slide tab 7 is not easily offset from this position to the left, i.e. in the discharging direction. The position at which the projection 13 at the sliding side is moved to the left over the projection 12a at a fixed position corresponding to the disk discharge position, and the slide tab 7 is not easily offset from this position to the right (in the loading direction). The maximum amount of movement in the right and left directions of the slide tab 7 is limited by the slit 11.

Since a click resistance is generated by a flexure of the slide plate 6 occurring when the projection 13 is moved over the projections 12a and 12b, a suitable amount of clearance capable of absorbing the above flexure is provided between the slide plate 6 and the slide groove 9.

If all the slide tabs 7 were aligned by the reset lever C5, the click resistance thereof would simultaneously load the reset lever C5, and the motor or the like for the reset lever C5 could be overloaded. Therefore, as shown in Figure 5, the projections 12a and 12b of every other slide groove 9 are offset from the projectins 12a' and 12b' of the remaining ones of the slide grooves 9 by dx. With this arrangement, the resistance simultaneously acting on the reset lever C5 when the projection 13 is moved over the projection 12a or 12b is reduced to only 1/2 that of all the stages. Accordingly, the load on the drive motor for the reset lever C5 is greatly decreased.

Figures 8 and 9 are side views showing the operation of the changing mechanism of the player. As previously described, when the case 1 of the disk cartridge is mounted on the mount portion of the changing mechanism, the slide tabs 7 are aligned at one end by the reset lever C5, as shown in Figure 3. Then, a disk selection operation is performed, and the drive plate C3 in Figure 2 is positioned at the height of the selected disk in the cartridge. Thereafter, the pawl C2 on the drive plate C3 in Figure 2 is moved in a removal direction to operate one of the slide tabs 7. Thus, the disk 3 is pushed from the front surface 1a of the case 1 and then discharged to the position in Figure 8 by the pair of load rollers C1 and guide roller C10.

Subsequently, the drive plate C3 is moved downwardly and the disk 3 is loaded onto a turntable C11 on a player C12, as shown in Figure 9. At this time, the load rollers C1 and the guide roller C10 are removed from the disk 3 by stoppers C14 and C15 extending from a fixed chassis C13, and a clamp arm C16 provided on the drive plate C5 is moved downwardly so that a disk clamper 17 is set free to fix the disk 3 on the turntable C11 by its magnetic attraction.

An opertion the reverse of that described above is performed at the end of playback. More specifically, the drive plate C3 is lifted, and the limit switch C4 on the drive plate C3 shown in Figures 2 and 3 detects the detection tab 8 reaching the discharge position. Upon this detection, the drive plate C3 is stopped at the height of the disk storage position. The load rollers C1 are then rotated in the opposite direction to push the disk 3 into its original storage position of the disk cartridge, thereby completing the sequence of operation.

Note that in the above embodiment, the projections 12a (12b) of every other slide groove 9 are offset from the projections 12a' (12b') of the corresponding adjacent slide grooves 9 along the sliding direction by the distance dx. However, the storage stages may be offset for every third storage stage, or they may be divided into an upper and a lower group of stages so that the upper group of stages is offset from the lower group of stages. Also, the click positions of all the storage stages may be offset from one another. In addition, only the projection 12b at the storage position need be provided and the projection 12a at the removal position may be omitted as long as the pawl C2 at the side of the changing mechanism functions to prevent the slide tab 7 from being moved to the right (in the inactive direction) at the discharge position.

In the above embodiment, click locking of the projections 12a and 12b with respect to the projection 13 is used, but click locking achieved by projections and recesses engagement may be used.

The present invention has been described with reference to a disk cartridge for housing digital audio disks. However, the present invention is not limited to the above embodiment but can be applied to other disk-like media such as video disks, magnetic disks, and the like and independent of the recording or reproducing system used.

As has been described above, in the present invention, since click engaging portions for temporarily locking slide tabs for disk discharge at one end are provided, the slide tabs are not shifted by an extenral force such as vibrations, so that the detection mechanism on the disk player for detecting the disk selected is not erroneously operated. In addition, the click locking load of all the slide tabs does not simultaneously act on an aligning mechanism, so that the required driving power of the aligning mechanism is reduced and an apparatus can be light in weight and small in size.

Claims

1. A disk cartridge comprising :

a disk cartridge body (1) for storing therein a plurality of disks (3) so that the disks (3) are stacked between shelf-like partitions (2) ;

biasing means (4), provided inside the disk cartridge body (1), for biasing a disk (3) to be stored in the storage direction ; and

a plurality of slide members (6), each having a projecting portion (7) projecting outwardly from a side surface of said disk cartridge body (1) and a push portion for pushing the stored disk (3) in a discharging direction, and being slidable along discharge and storage directions of the stored disk (3), for discharging or charging the disk (3) to be stored against a biasing force of said biasing means (4) upon operation of said projecting portion, characterised in that for each of said slide members

click locking engaging portions (12a, 12b, 13) each consisting of at least one engaging portion (12a, 12b) provided on said disk cartridge body (1) and at least one corresponding engaging portion (13) provided on said slide members (6) are formed at positions such that said slide members (6) temporarily locked at the disk storage position, the positions of the different slide members (6) at which their engaging portions (13) meet the corresponding engaging portions (12b) of the cartridge body (1) being offset by at least one predetermined amount along the sliding direction of said slide members (6).

2. A disk cartridge according to claim 1, wherein said engaging portion (12a, 12b) or said corresponding engaging portion (13) for constituting said click locking engaging portion, is provided at the disk discharge position to lock said slide member (6) thereat.

3. A disk cartridge according to claim 1 or 2 wherein detection portions (8), each projecting outwardly from a side surface of said disk cartridge (1) for detecting the return of a disk to its storage position are provided on said slide members (6).

4. A disk cartridge according to claim 3, wherein at said discharging position the positions of the different slide members (6) at which their engaging portions (13) meet the corresponding engaging portions (12a) of the cartridge body (1), are offset by a predetermined amount along the sliding direction of said slide members (6) between said disk storage spaces.

Patentansprüche

1. Ein Plattenbehälter mit :

einem Plattenbehälter-Körper (1) zum Aufbewahren mehrerer Platten (3) derart, daß die Platten (3) zwischen regalbrettähnlichen Trennwänden (2) gestapelt sind ;

innerhalb des Plattenbehälter-Körpers (1) vorgesehenen Vorspannungsmitteln (4) zum Vorspannen einer aufzubewahrenden Platte (3) in Aufbewahrungsrichtung ; und

mehreren Schieberelementen (6), deren jedes einen von einer Seitenfläche des Plattenbehälter-Körpers (1) nach außen vorspringenden Vorsprungsabschnitt (7) und einen Schubabschnitt zum Verschieben der aufbewahrten Platte (3) in eine Entladerichtung aufweist und in der Entlade- und Aufbewahrungsrichtung der aufbewahrten Platte (3) verschiebbar ist, zum Entladen oder Laden der aufzubewahrenden Platte (3) gegen eine Vorspannungskraft der Vorspannungsmittel (4) bei Betätigung des Vorsprungsabschnitts, dadurch gekennzeichnet,

daß für jedes der Schieberelemente Sperrklinken-Eingriffsteile (12a, 12b, 13) jeweils bestehend aus wenigstens einem am Plattenbehälter-Körper (1) vorgesehenen Eingriffsteil (12a, 12b) und wenigstens einem korrespondierenden, an den Schieberelementen (6) vorgesehenen Eingriffsteil (13), die an solchen Stellen ausgebildet sind, daß die Schieberelemente (6) vorübergehend in der Platten-Aufbewahrungsstellung gesperrt sind, wobei die Stellungen der verschiedenen Schieberelemente (6), an denen ihre Eingriffsteile (13) auf die korrespondierenden Eingriffsteile (12b) des Behälter-Körpers (1) treffen, um wenigstens ein vorbestimmtes Maß in Verschieberichtung der Schieberelemente (6) versetzt sind.

2. Ein Plattenbehälter nach Anspruch 1, in welchem der Eingriffsteil (12a, 12b) oder der korrespondierende Eingriffsteil (13) zur Bildung des Sperrklinken-Eingriffsteils in der Platten-Entladestellung vorgesehen ist, um das Schieberelement (6) ebendort zu sperren.

3. Ein Plattenbehälter nach Anspruch 1 oder 2, in welchem Erfassungselemente (8), deren jedes von einer Seitenfläche des Plattenbehälters (1) nach außen vorspringt, zum Erfassen der Rückkehr einer Platte in ihre Aufbewahrungsstellung an den Schieberelementen (6) vorgesehen sind.

4. Ein Plattenbehälter nach Anspruch 3, in welchem in der Entladestellung die Positionen der verschiedenen Schieberelemente (6), in denen deren Eingriffsteile (13) auf die korrespondierenden Eingriffsteile (12a) des Behälter-Körpers (1) treffen, um ein vorbestimmtes Maß in Verschieberichtung der Schieberelemente (6) zwischen den Plattenspeicherräumen versetzt sind.

Revendications

1. Réceptacle à disques comportant :

un boîtier de réceptacle à disques (1) destiné à y emmagasiner plusieurs disques (3) de telle sorte que les disques (3) sont empilés entre des séparations en forme de rayonnage (2) ;

des moyens de rappel (4), prévus à l'intérieur

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du boîtier de réceptacle à disques (1), destinés à repousser un disque (3) devant être stocké dans la direction de stockage ; et

plusieurs éléments coulissants (6), ayant chacun une partie saillante (7) qui se projette vers l'extérieur depuis une face latérale du dit boîtier de réceptacle à disques (1) et une partie de poussée destinée à pousser le disque stocké (3) dans une direction de sortie, et pouvant coulisser dans des directions de sortie et de stockage du disque stocké (3), afin de sortir ou charger le disque (3) devant être emmagasiné à l'encontre d'une force de rappel des dits moyens de rappel (4) lors de l'actionnement de la dite partie saillante, caractérisé en ce que pour chacun des dits éléments coulissants

des parties d'engagement de verrouillage par encliquetage (12a, 12b ,13) constituées chacune de au moins une partie d'engagement (12a, 12b) prévues sur le dit boîtier de réceptacle à disques (1) et au moins une partie d'engagement correspondante (13) prévue sur les dits éléments coulissants (6) sont formées dans des positions telles que les dits éléments coulissants (6) sont verrouillés temporairement dans la position de stockage de disque, les positions des différents éléments coulissants (6) dans lesquelles leurs parties d'engagement (13) rencontrent les parties d'engagement correspondantes (12b) du boîtier de réceptacle (1) étant décalées de au moins une valeur prédéterminée dans la direction de coulissement des dits éléments coulissants (6).

2. Réceptacle à disques selon la revendication 1, dans lequel la dite partie d'engagement (12a, 12b) ou la dite partie d'engagement correspondante (13) destinées à constituer la dite partie d'engagement de verrouillage par encliquetage est prévue au niveau de la position de sortie de disque afin d'y verrouiller le dit élément coulissant (6).

3. Réceptacle à disques selon la revendication 1 ou 2, dans lequel des parties de détection (8) se projetant chacune vers l'extérieur depuis une face latérale du dit réceptacle à disques (1) afin de détecter le retour d'un disque vers sa position de stockage sont prévues sur les dits éléments coulissants (6).

4. Réceptacle à disques selon la revendication 3, dans lequel, dans la dite position de sortie, les positions des différents éléments coulissants (6) dans lesquelles leurs parties d'engagement (13) rencontrent les parties d'engagement correspondantes (12b) du boîtier de réceptacle (1) sont décalées d'une valeur prédéterminée dans la direction de coulissement des dits éléments coulissants (6) entre les dits espaces de stockage de disque.