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A Disc Player

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Field of the Invention

The present invention relates to a disc player, more particularly but not exclusively, to a disc player for playing music and video disc.

Background of the Invention

Nowadays, audio/video players are equipped with disc players for playing compact disc (CD) or digital video disc (DVD) etc. A typical disc player comprises a loading tray that is ejected when an "eject" button is depressed so that a disc can be loaded. With increased competition, manufacturers have proposed other alternatives of enabling a disc to be loaded so that the designs would appeal to consumers but the mechanisms which enables the disc to be loaded usually involves multiple interconnecting parts which may make manufacturing of the disc player complex.

It is an object of this invention to propose a disc player which provides an alternative choice to the general public.

Summary of the Invention

The invention provides a disc player comprising a base for resting on a support surface, a main console for playing a disc, the main console being supported by the base and arranged to be spaced from the support surface, and a carrier supported by the main console and carrying a loading tray for the disc, the carrier and the loading tray being arranged to project from the main console towards the support surface which permits the loading tray to be ejected.

The disc player may further comprise an abutment member arranged to move in a linear motion to impart translational motion to raise or lower the carrier along a direction substantially perpendicular to the linear motion.

Preferably, the disc player further comprises linkage means coupled to the carrier and to the abutment member, the abutment member arranged to actuate the linkage means to cause the carrier to be raised or lowered.

The linkage means may comprise a Y-shaped cam path which the abutment member engages with so as to cause the carrier to be raised or lowered.

The carrier may be pivotally coupled to cam paths of the linkage means and the cam paths may be arcuate in shape.

A gear arrangement may be used to drive the abutment member.

The invention further provides a method of operating the disc player described above, and the method comprises the steps of: projecting the carrier and the loading tray towards the base member; and ejecting the loading tray.

As it would be appreciated from the described embodiment, this invention provides a novel way of loading a disc and yet requires a simple mechanism to control the movement of the loading tray.

Brief Description of the Drawings

A preferred embodiment of the invention will now be described by way of example, with reference to the accompanying drawings, of which:

Figures 1(a) to 1(g) show a disc player according to a preferred embodiment in various views;

Figures 2(a) and 2(b) are top views of a carrier of the disc player of Figures 1(a) to 1(g) showing a gear arrangement driving a rack pin;

Figures 3(a) to 3(d) illustrate linear motion of the rack pin of Figure 2(a) which is arranged to abut a Y-shaped cam path;

Figures 4(a) and 4(b) illustrate the carrier of Figures 2(a) and 2(b) being pivotally coupled to two different types of cam paths.

Detailed Description of the Preferred Embodiment

Figures 1(a) and 1(b) are perspective and side views of a disc player 211 such as an audio or a video player. The disc player 211 has a main console 212 for playing a disc and the main console 212 has a display 213 which is similar to displays of known disc players. The disc player 211 has a base 200 having a substantially planar base member 201 for resting on a support surface 300 (such as on top of a shelf or cabinet) and two side upstanding supporting walls 202 for supporting the main console 212 in a spaced relationship with the base member 201. Each of two supporting walls 202 has a tapered side profile as shown in Figure 1b so that the main console 212 forms an acute angle with the substantially planar base member 201.

The disc player 211 includes a carrier 215 carrying a loading tray 217, both being received within the main console 212 when playing a disc or in an inoperative condition. When a user depresses an "eject" button (not shown) on the main console 213, this projects the carrier 215 by lowering it towards the base member 201 of the base 200 (and thus towards the support surface 300) as shown in Figures 1(c) and 1(d). Since the loading tray 217 is supported by the carrier 215, the loading tray 217 is similarly lowered which permits the loading tray 217 to be ejected as shown in Figures 1(e) and 1(f). This allows a disc 219 to be placed on the loading tray 217 to be played when the loading tray 217 is retracted into the carrier 215 and the carrier 215 and the loading tray 217 raised so that the main console 212 can read the disc 219.

The lowering and lifting operation of the carrier 215 which carriers the loading tray 217 will now be described with reference to Figures 2(a) and 2(b).

As shown in Figure 2(a), disc player 211 comprises linkage means which are arranged at/near the top of the carrier 215 and this includes a first linkage 216 arranged on one side of the carrier 215, a second linkage 214 arranged on the opposite side of the carrier 215, and a linkage shaft 218 connected to both

linkages 214, 216. The linkage shaft 218 serves as an axis of rotation for the first and second linkages 216, 214.

The first linkage 216 has a generally Y-shaped cam path 224 and a generally curved shaped cam path 222a, and an abutment member in the form of a rack pin 223 is located within the Y-shaped cam path 224 and is arranged to actuate the first linkage. The rack pin 223 is driven by a gear arrangement 220 which is controlled in a conventional manner and no elaboration is required.

The second linkage 214 is of a similar construction having a generally curved cam path 222b, just like the one at the first linkage 216. However, the second linkage 214 does not have a Y-shaped cam path 224.

The carrier 215 is pivotally coupled to the first and second linkages 216,214 via respective pivoting pins 221 (only one is shown in Figures 2(a) and 2(b)) extending sideways in relation to the carrier 215. The pins 221 are located in the respective cam paths 222a, 222b of the first and second linkages 216, 214.

The lateral or linear movement of the rack pin 223 of the gearbox 220 through the Y-shaped cam path 224, comprising three slots – A, B and C, will now be explained with reference to Figures 3(a) to 3(d) which illustrates the lifting motion of the carrier 215 into the main console 212.

When the rack pin 223 is arranged at the leftmost position along a linear path 225, the rotational movement of the carrier 215 is "locked" in the sense that the first linkage 216 does not pivot about the linkage shaft 218. In this "locked" position, the rack pin 223 is located at slot 'A' of the Y-shaped cam path 224.

As the rack pin 223 traverses the linear path 225, the rack pin 223 moves through the Y-shaped cam path 224 by first moving out of slot 'A' of the cam path 224 and then engaging slot 'B' of the cam path 224, as illustrated by Figures 3(a) and 3(b). As the rack pin 223 continues to transverse the linear

path 225, the rack pin 223 moves out of slot 'B' of the cam path 223 before finally engaging slot 'C' of the Y-shaped cam path 224 illustrated in Figures 3(c) and 3(d). The lateral movement of the rack pin 223 translates into rotational movement of the first linkage 216, which rotates the linkage shaft 218, and in turn rotates the second linkage 214. The actuation of the first and second linkages 216, 214 in turn urge the movement of the pivoting pins 221 along respective curved-shaped cam paths 222a, 222b. This gradually lifts the carrier 215 (and the loading tray 217) until the rack pin 223 is in the final slot 'C' position of the Y-shaped cam path 224 and the pivoting pins 221 are at the end positions of the respective cam paths 222a,222b, which stops the lifting of the carrier 215, as illustrated in Figure 3(d). The final position of the carrier 215 and the loading tray 217 is that shown in Figures 1(a) and 1(b).

To lower the carrier 215, the reverse takes place with the gear arrangement 220 actuating the rack pin 223 from the position shown in Figure 3(d) back to the position of Figure 3(a) which translates into the lowering movement of the carrier 215 due to the operations of the first and second linkages 216,214 and the linkage shaft 218. The final position of the carrier 215 and the loading tray 217 is that shown in Figures 1(c) and 1(d). At this final position, the loading tray 217 can be ejected for removing/receiving the disc 219.

Figures 4(a) illustrates the position of the pivoting pins 221 when the carrier 215 is at a lowered position. Due to the curved shape of the cam path 222a, 222b, the resultant force that acts on the pivoting pins 221 in order to raise the pins from a lower position to a higher position is shown by direction 228. Thus, 100% of this resultant force is used for lifting the carrier 215 to the higher position.

A variation of the cam paths 222a, 222b is shown in Figure 4(b), and the cam paths are straight. The resultant force that acts on the pivoting pins 221 of the carrier 215 in order to raise the pins from a lower position to a higher position is shown by direction 229. Thus, only the vertical component of the resultant force is used for lifting the carrier 215. By resolving this resultant force into its

respective y-direction component 230 and x-direction component 231, it can be seen that the vertical component of this resultant force is only a fraction of the resultant force. Accordingly, a larger output power of the gearbox 220 would be required if straight cam paths 227 are used as compared with the preferred curved cam path 222a, 222b.

The described embodiment should not be construed a limitation. For example, the base 200 may be in other suitable shapes and/or sizes as long as it elevates the main console 212 to create a space between the main console 212 and the support surface 300 to allow the carrier 215 to be lowered. The base member 201 may also be other suitable configurations. For example, the base member 201 may be two separate plates connected to the two separate walls 202. It is also envisaged that the main console 212 may be supported just by the two side supporting walls 202 but this is not desirable.

Although the invention has been described above using a particular embodiment, many variations are possible within the scope of the claims, as will be clear to the skilled reader, without departing from the scope of the invention as claimed

CLAIMS

1. A disc player comprising
a base for resting on a support surface,
a main console for playing a disc, the main console being supported by the base and arranged to be spaced from the support surface, and
a carrier supported by the main console and carrying a loading tray for the disc, the carrier and the loading tray being arranged to project from the main console towards the support surface which permits the loading tray to be ejected.

2. A disc player according to claim 1, further comprising an abutment member arranged to move in a linear motion to impart translational motion to raise or lower the carrier along a direction substantially perpendicular to the linear motion.

3. A disc player according to claim 2, further comprising linkage means coupled to the carrier and to the abutment member, the abutment member arranged to actuate the linkage means to cause the carrier to be raised or lowered.

4. A disc player according to claim 3, wherein the abutment member is arranged to engage with a Y-shaped cam path of the linkage means so as to cause the carrier to be raised or lowered.

5. A disc player according to any of claims 3 to 4, wherein the carrier is pivotally coupled to cam paths of the linkage means.

6. A disc player according to claim 5, wherein the cam paths are arcuate in shape.

7. A disc player according to any of claims 2 to 6, further comprising a gear arrangement to drive the abutment member.

8. A disc player according to any preceding claim, wherein the base comprises a substantially planar member for resting on the support surface and the main console forms an acute angle with respect to the member.

9. A method of operating the disc player of any of the preceding claim, the method comprising the steps of:
projecting the carrier and the loading tray towards the support surface; and ejecting the loading tray.