MAGNETIC DISC CARTRIDGES

This invention relates to magnetic disc cartridges. Embodiments of the invention comprise a cartridge comprising a jacket in which a rotatable magnetic disc is housed, and embodiments may be used, for example, in electronic still cameras.

Rotatable magnetic discs have been used for recording information in various types of devices. For example, in computer systems and word processors, magnetic discs, sometimes known as "discettes", have been used to record information signals. Typically, such discs are housed in a jacket which serves to protect the magnetic information recording surfaces of the disc and, furthermore, to prevent the disc from being folded, crumpled or otherwise seriously damaged. Such a protective jacket is provided with a window through which one or more magnetic transducers may be inserted to contact the magnetic surface of the disc for recording or reproducing information signals thereon. Such information signals are recorded in a plurality of circular recording tracks.

In a magnetic disc of this type, the jacket may be provided with a shutter member which is rotatably or slidably moved across the window between a closed position and an open position. However, in such a jacket, the shutter member has to be moved manually.

According to the present invention there is provided a magnetic disc cartridge comprising:

a jacket having top, bottom and four side walls;

a rotatable magnetic disc housed within said jacket for recording and/or reproducing signals thereon when said cartridge is inserted into a recording and/or reproducing apparatus;

a guide groove extending longitudinally on one of said side walls of said jacket in the direction in which said cartridge is inserted into a cartridge holder of said apparatus, and said guide groove receiving a guide element on said cartridge holder to establish a predetermined orientation of said cartridge for insertion into said cartridge holder;

a pair of windows respectively provided in said top and bottom walls of said jacket; and

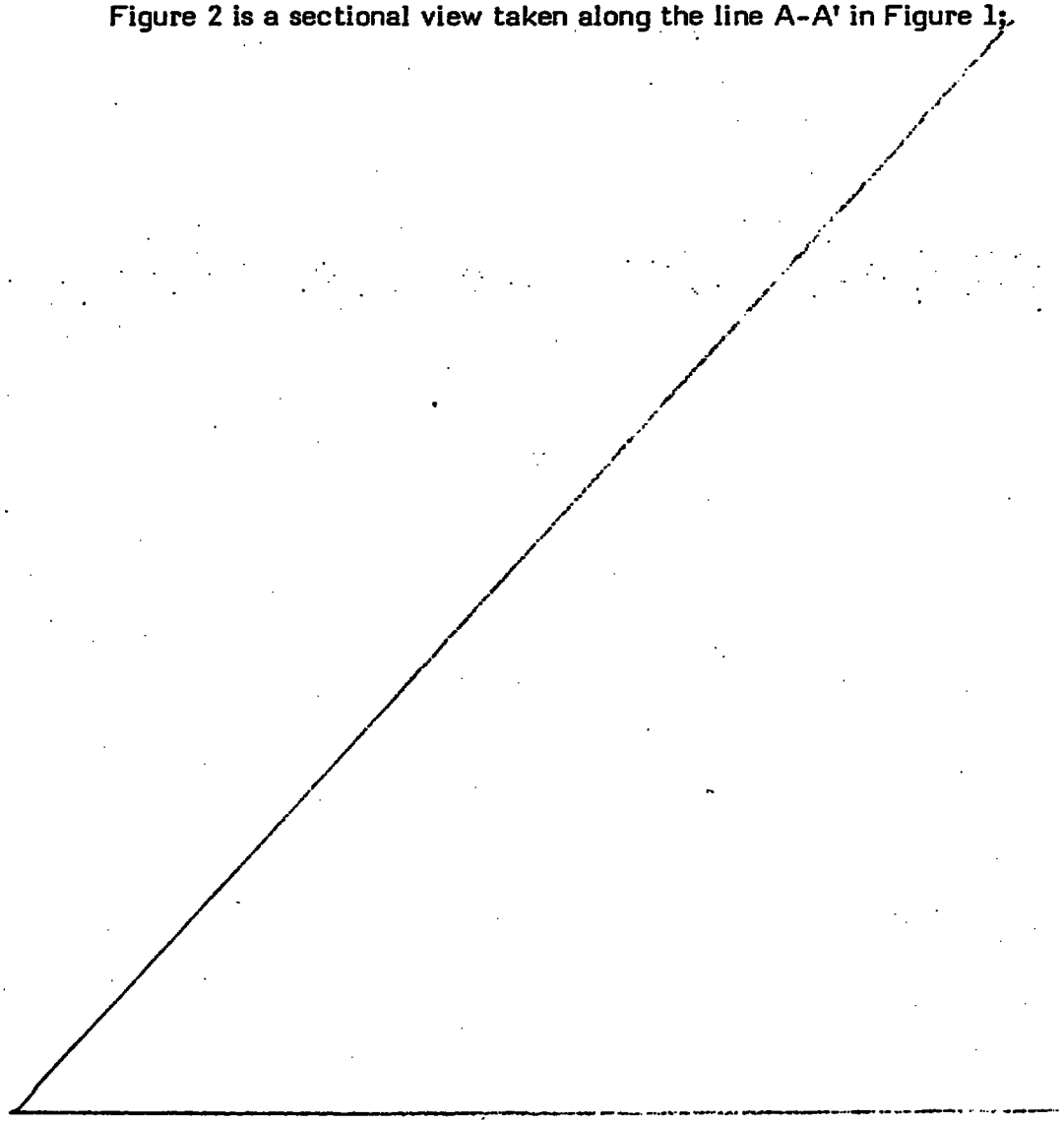
a shutter provided on said jacket so as to slide across said windows between a closed position and an open position, the open position exposing said magnetic disc in said windows; and

a portion of said shutter being exposed in said guide groove so as to be engaged by said guide element when said cartridge is properly inserted into said cartridge holder and thereby to slide said shutter from said closed position to said open position as said cartridge is further inserted.

The invention will now be described by way of example with reference to the accompanying drawings, throughout which like references designate like elements, and in which:

Figure 1 is a plan view of the jacket of an embodiment of cartridge containing a flexible magnetic disc, and which is shown partly broken away;

Figure 2 is a sectional view taken along the line A-A' in Figure 1;



Figures 3 and 4 are side views of the cartridge of Figure 1;

Figure 5 is perspective view of magnetic cartridge recording and/or reproducing apparatus;

Figures 6(a) and 6(b) are a sectional view and a front view of a cartridge holder and a chassis of the apparatus; and

Figures 7(a) and 7(b) are horizontal and vertical sectional views of the cartridge holder in which the cartridge is inserted.

Referring first to Figure 1, a cartridge intended for use in a flexible disc recording and/or reproducing apparatus comprises a substantially flat rectangular jacket or housing 1 which may be moulded of a suitable plastics material and in which a flexible disc or sheet 2 of magnetic material is freely rotatable. The disc 2 is of a suitably small diameter, for example, no more than about 50 mm, so that the jacket 1 can be of correspondingly small size, for example, measuring 60 mm by 54 mm by 3 mm, for convenience of handling, storage and shipping, as by post, and for use in a very compact recording and/or reproducing apparatus which may, for example, be a still picture camera which is not substantially larger than a conventional 35 mm single-lens reflex camera. A window 3 is formed in a portion of the jacket 1 so that the disc 2 is partially exposed to the outside. The window 3 is arranged to receive one or more magnetic heads 4 which function magnetically to record video signals representing still pictures so as to form concentrically a plurality of circular tracks on the disc 2.

At the centre of rotation, the disc 2 has a disc-shaped reinforcing member 8 which has a drive hole 7 to permit insertion of a rotary drive spindle 6 provided in a magnetic recorder 5 and is rotatable around an opening 9 formed in the jacket 1.

An indicator 10 for indicating the number of circular tracks in which the information signals have been magnetically recorded on the disc 2 is provided on the jacket 1. As illustrated in Figure 1, the indicator 10 comprises a disc-shaped dial member 12 with a keyhole-like indication bore 11, a rotary gear 13 connected to the dial member 12, and a stop member 14 having an engaging portion 14a which is resiliently engageable with a sawtooth region 13a of the rotary gear 13. The dial member 12 is housed in the jacket 1 and is allowed to be freely rotatable at the position of an opening 15 formed in the jacket 1. The stop member 14 is anchored firmly with set-screws 16 in the jacket 1 and serves to rotate the gear 13

intermittently.

Around the opening 15 of the jacket 1, there is provided a scale 17 to indicate the numbers corresponding to the circular tracks in which the information signals have been magnetically recorded on the disc 2. In this embodiment, the scale 17 has a maximum graduation of 50. A notch 18 is formed in the indication bore 11 serves as an index point at each graduation of the scale 17.

The cartridge 1 is further provided with a shutter member 19 which straddles the disc 2 and which is sufficiently large to cover the window 3. The provision of the shutter member 19 is effective in preventing entrance of dust and so forth into the jacket 1 through the window 3. In this embodiment, the shutter member 19 is formed so as to cover both sides of the disc 2.

A slide plate 20 is attached to a lateral edge portion of the shutter member 19 integrally therewith. A plurality of guide pins 21 are provided on the upper and lower surfaces of the slide plate 20 in such a manner as to be displaceable along guide grooves 22 formed in the top and bottom plates of the jacket 1. Accordingly, the slide plate 20 is rendered slidable in leftward and rightward directions of Figure 1.

A projection 23 is formed at one end 20a of the slide plate 20 and is inserted into a guide groove 25 extending along one side plate 24 of the jacket 1.

Therefore, the projection 23 is exposed to the outside through the guide groove 25 (see Figures 3 and 4). The projection 23 is engageable with a boss 28 formed in a jacket holder 26 in which the jacket 1 is to be loaded (see Figures 6(a) and 6(b)).

One end 29a of a spring or member 29 having resilient properties is connected to the projection 23 of the slide plate 20, while the other end 29b of the spring 29 is anchored at a pin 30 fixed in the jacket 1. In the vicinity of the middle portion of the spring 29, a rotatable pulley 32 is mounted on a stationary shaft 31 so as to attain enhanced expansion and contraction of the spring 29. The slide plate 20 is always urged leftward in Figure 1 by the elasticity of the spring 29. Consequently, the window 3 is kept closed completely with the shutter member 19. The slide plate 20 is positioned by, for example, the guide pin 21 of the slide plate 20 at one end 22a of the guide groove 22 and is thereby stopped at the position illustrated in Figure 1

so as to be prevented from being further shifted in a leftward direction.

The jacket holder 26 for loading the jacket 1 therein comprises, in this embodiment, a pair of support regions 33 and 34 having U-shaped cross-sections to receive the two side portions 1a and 1b of the jacket 1, and a joint plate 35 and a top plate 36 to couple the support regions 33 and 34 to each other at the two ends thereof. One support region 33 has the boss 28 engageable with the projection 23 formed in the jacket 1. The upper and lower portions of the jacket holder 26 are equipped respectively with a case cover 38 swingably supported by a hinge shaft 37 in an openable/closable manner, and a base plate 39 supported by the hinge shaft 37. The base plate 39 mounts thereon the drive spindle 6 inserted in the drive hole 7 formed in the jacket 1, a flywheel 40 attached to the drive spindle 6, a belt 42 for connecting the flywheel 40 with a pulley 41, a drive motor 43 for rotating the pulley 41, a swing lever 44 to which a magnetic head 4 is attached, a lower guide plate 45 for guiding the disc 2, and a sensor mechanism 46 for detecting the number of tracks recorded on the disc 2. Furthermore, an upper guide plate 47 is attached to the inner surface of the case cover plate 38 at the position corresponding to the lower guide plate 45.

The embodiment functions as follows.

When the jacket 1 in the state of Figures 5, 6(a) and 6(b) is inserted into the jacket holder 26, the two side portions 1a and 1b of the jacket 1 are displaced towards the hinge shaft 37 while being regulated by the support regions 33 and 34 located in the jacket holder 26.

When the jacket 1 thus inserted reaches a predetermined position in the jacket holder 26, the boss 28 formed on one of the support regions 33 and 34 enters the guide groove 25 in one side plate 24 of the jacket 1. With further insertion of the jacket 1 into the jacket holder 26, the projection 23 of the shutter member 19 butts against the boss 28 and is thereby depressed against the elasticity of the spring 29 in the direction (rightward in Figure 1) opposite to the direction of insertion of the jacket 1 into the jacket holder 26 due to the presence of the boss 28. Consequently, the slide plate 20 having the projection 23 is shifted in a rightward direction in Figure 1 along the guide groove 22, and it follows naturally that the shutter member 19 attached to the slide plate 20 is also shifted in the same direction. Therefore, the shutter member 19 that has been completely closing the window 3 is moved therefrom. In the subsequent stage where the jacket 1 is

advanced in the jacket holder 26 until a fore edge 1c comes into contact with an inner surface 35a of the joint plate 35 forming the jacket holder 26, the shutter member 19 is completely removed from the window 3 by the action of the boss 28, and therefore the surface of the disc 2 corresponding in area to the opening of the window 3 is exposed. With the jacket 1 inserted up to this position in the jacket holder 26, when the case cover 38 is rotated slightly towards the base plate 39 around the hinge shaft 37 against the jacket holder 26, the leftward or rightward displacement of the jacket 1 in Figure 7(a) is prevented between a front plate 38a of the case cover 38 and the joint plate 35 of the jacket holder 26, so that the jacket 1 comes to be held in the jacket holder 26. Due to the provision of a positioning mechanism 48 on the joint plate 35, the jacket 1 can be retained at a proper position in the jacket holder 26. As a result, the upper guide plate 47 of the case cover 38 is set opposite to the position of the window 3 in the jacket 1.

When the case cover 38 is pressed towards the base plate 39, the drive spindle 6 on the base plate 39 is inserted into the drive hole 7 in the jacket 1 as illustrated in Figure 7(b), while the upper guide plate 47 is brought into direct engagement with a plurality of positioning pins 49 fixed on the lower guide plate 45. Accordingly, the upper guide plate 47 is supported with accuracy at a predetermined proper position spaced apart from the lower guide plate 45 which serves as a positional reference. The magnetic head 4 inserted through the window 3 is brought into contact with the disc 2. Therefore, with rotation of the drive spindle 6 by the motor 43, desired video signals are magnetically recorded in the form of circular tracks on the disc 2 by the head 4.

In the foregoing embodiment where the boss 28 is provided merely on one of the support regions 33 and 34 in the jacket holder 26 and is insertable into the elongate guide groove 25 formed in the jacket 1, wrong insertion of the jacket 1 into the jacket holder 26 is prevented by the boss 28, if the loading direction is such that the other side portion 1b of the jacket 1 without the presence of such elongate guide groove 25 is positioned in the support region 33 of the jacket holder 26. Thus, the boss 28 is utilizable as means for preventing erroneous insertion of the jacket 1, hence achieving its proper loading in the jacket holder 26.

When the jacket 1 is extracted after releasing the case cover 38 and the jacket holder 26 from the base plate 39, the boss 28 on the jacket holder

26 is separated from the projection 23 of the jacket 1, so that the slide plate 20 is moved in a leftward direction from the state of Figure 7(a) by the elasticity of the spring 29. Consequently, the shutter member 19 is also slid therewith in the same direction to cover the window 3. It follows that the window 3 is automatically closed with the shutter member 19 upon complete extraction of the jacket 1 from the jacket holder 26.

Thus, in the embodiment as described above, the shutter member 19 which is movable across the window 3 is automatically moved therefrom in conformity with insertion of the jacket 1 into the jacket holder 26 and is moved in the opposite direction automatically to close the window 3 in conformity with extraction of the jacket 1 from the jacket holder 26.

CLAIMS

1. A magnetic disc cartridge comprising:
a jacket having top, bottom and four side walls;
a rotatable magnetic disc housed within said jacket for recording and/or reproducing signals thereon when said cartridge is inserted into a recording and/or reproducing apparatus;
a guide groove extending longitudinally on one of said side walls of said jacket in the direction in which said cartridge is inserted into a cartridge holder of said apparatus, and said guide groove receiving a guide element on said cartridge holder to establish a predetermined orientation of said cartridge for insertion into said cartridge holder;
a pair of windows respectively provided in said top and bottom walls of said jacket; and
a shutter provided on said jacket so as to slide across said windows between a closed position and an open position, the open position exposing said magnetic disc in said windows; and
a portion of said shutter being exposed in said guide groove so as to be engaged by said guide element when said cartridge is properly inserted into said cartridge holder and thereby to slide said shutter from said closed position to said open position as said cartridge is further inserted.

2. A cartridge according to claim 1 wherein said guide groove extends from one end of said one of said side walls and is shorter than said one of said side walls.

3. A cartridge according to claim 1 or claim 2 wherein said shutter is urged towards said closed position by a spring provided in said jacket.

4. A cartridge according to claim 1, claim 2 or claim 3 wherein only a single guide groove is provided on said cartridge.

5. A magnetic disc cartridge substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.