SPECIFICATION

Magnetic-tape recording and/or playback apparatus

The invention relates to a recording and/or playback apparatus for use with a magnetic tape contained in a cassette of the kind (hereinafter referred to as "the kind described") comprising a housing containing two tape spools which are arranged side-by-side in the housing for rotation about parallel axes, the housing comprising two major walls disposed opposite one another in planes perpendicular to the axes of rotation of the tape spools, and a plurality of side walls extending between the two major walls at the peripheries thereof and including first and second walls disposed opposite and parallel to one another, a third wall extending between said first and second walls at one end thereof, and a fourth wall extending between said first and second walls at the other end thereof and having at least one opening through which a component or components of the apparatus, such as a recording and/or playback head, an erase head and a pressure roller, can enter the casette for cooperation with the tape therein, the two major walls of the housing having raised portions on their outer surfaces adjacent the fourth side wall so that the overall thickness of the housing between the outer surfaces of the two major walls is locally increased over the areas of said raised portions, which portions are each spaced from the first and second side walls of the housing.

An example of such a cassette is that known commercially as "Compact Cassette".

The invention relates particularly to a recording and/or playback apparatus having a pivotable cassette holder.

In the present stage of development of apparatus which is adapted for use in conjunction with Compact-Cassettes, which apparatus is often referred to simply as a "cassette recorder", a distinction can be made between two main categories of cassette recorders; one category consisting of cassette recorders in which the cassette is supported with the major walls of the cassette housing in a horizontal position (the so-called "horizontal cassette recorders"), and the other category consisting of cassette recorders in which the cassette is supported with the major walls of the cassette housing in a vertical position (the so-called "vertical cassette recorders"). Of these two categories the first category (horizontal cassette recorders) was the first to appear on the market. In equipment of this category the cassette holder is mounted in the top of the recorder and is pivotable about an axis which is disposed near the rear wall (the aforesaid third side wall) of the housing of a cassette contained in the cassette holder. This makes for easy use of the cassette recorder because it enables the cassette to be manually inserted into the cassette holder with a smooth movement. Moreover, the components of the cassette recorder which co-operate with the magnetic tape in the cassette, such as the magnetic heads and the pressure roller, are located at the front of the cassette recorder facing the user and can be controlled by means of control members, such as push-buttons, which are situated at this location. In the case of horizontal cassette recorders the front wall (the aforesaid fourth side wall) of the housing of an inserted cassette, in which wall the openings for the passage of the aforesaid components are formed, is consequently always located at the open side of the cassette holder, which is the side through which the cassette is inserted into the holder. Thus, incorrect insertion of a cassette can be easily avoided. The locally thickened portion of the cassette housing also is located near the open front side the cassette holder. Consequently stop means may be provided in the cassette holder which permit full insertion of the thinner part of the cassette housing into the cassette holder but which allow the thicker part of the cassette housing to be inserted only part-way into the holder. Compact-Cassettes are labelled in such a way that in the case of horizontal it is correctly positioned for the label to be read by a user.

In vertical cassette recorders the cassette holder is mounted in the part of the recorder and the pivotal axis of the cassette holder is generally situated at the side of the holder which faces the bottom of the apparatus, where the components of the apparatus which co-operate with the magnetic tape in the cassette and the control member of the apparatus are also located. However, in this equipment the cassette should be inserted with the thickened portion of the cassette housing foremost. Thus, in comparison with a horizontal cassette recorder the position of a cassette relative to the pivotal axis of the cassette holder is reversed. This complicates the prevention of incorrect insertion of the cassette into the cassette holder. In a known vertical cassette recorder sensing means are provided in the side walls of the cassette holding for co-operation with ridges which are specially provided for this purpose on the aforesaid first and second side walls of the cassette housing near the fourth side wall thereof, and moving stop means also are provided which are actuated in such a way that the cassette can be fully inserted into the cassette holder only if the ridges have passed the sensing means first.

According to the present invention there is provided a recording and/or playback apparatus for use with a magnetic tape contained in a cassette of the kind described, the apparatus having a pivotable cassette holder which comprises two major walls which are disposed opposite one another substantially in parallel planes extending parallel to the pivotal axis of the holder and which are arranged to receive a cassette between them with the major walls of the cassette housing each facing one of the major walls of the holder, and a plurality of side walls extending between the major walls of the holder at the peripheries thereof and including first and second walls disposed opposite and parallel to one another and arranged so that the first and second side walls of the housing of a cassette inserted between the two major walls of the holder each face one of the first and second side walls of the holder, and a third wall which faces the pivotal

axis of the holder and lies substantially in a plane extending parallel to this axis and at right angles to the planes of the major walls of the holder, said third side wall of the holder having at least one opening through which a component or components of the apparatus which cooperates or cooperate with the magnetic tape in the cassette in the operation of the apparatus can enter a cassette in the holder *via* the opening or openings in the fourth side wall of the cassette housing, and the cassette holder being substantially open at a side of the holder opposite the third side wall thereof to provide an opening through which a cassette can be manually inserted into the holder, one of the major walls of the holder being formed at the boundary of the insertion opening of the holder with a portion whereby, when a cassette is inserted into the holder with the fourth side wall of the cassette housing foremost, during a first part of the insertion the cassette is compelled to occupy a position in which the major walls of the cassette housing extend obliquely with respect to the major walls of the holder, the cassette holder further comprising two elongate guide surfaces on the inner side of one of the major walls of the holder, the cassette holder further comprising two elongate guide surfaces on the inner side of one of the major walls of the holder, which guide surfaces extend substantially parallel to the first and second side walls of the holder and are cooperable during the insertion of a cassette into the holder with the major wall of the cassette housing that is facing the guide surfaces, the cooperation taking place at the areas of said major wall of the cassette housing which lie between the raised portion of the latter wall and the first and second side walls of the cassette housing, and the guide surfaces each having a portion which is inclined with respect to the planes of the major walls of the holder so that during a second part of said insertion of a cassette into the holder the cassette is deflected by the inclined portions of the guide surfaces to bring the major walls of the cassette housing parallel with the major walls of the holder, and said portion of said one of the major walls of the holder being so arranged that in the event of a cassette being inserted into the holder with the third side wall of the cassette housing foremost, before the cassette can reach a fully inserted position the raised portion of the major wall of the cassette housing that is facing said one of the major walls of the holder abuts said portion of the latter wall so that further insertion of the cassette is inhibited.

Thus, the invention provides a cassette holder which without the use of moving parts effectively prevents incorrect insertion of a cassette into the holder. The raised portion of each of the major walls of the housing of a cassette of the kind described usually has a thickness of only 1.7 mm. However, this has been found to be ample for the necessary abutment with the major wall of the cassette holder in the case of incorrect insertion of the cassette.

An embodiment of the invention will now be described in more detail with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a vertical cassette recorder having a cassette holder in accordance with an embodiment of the invention,

Figure 2 is a perspective view of a Compact Cassette,

Figure 3 is a schematic cross-section of the cassette holder of the cassette recorder of Figure 1 showing a Compact Cassette being inserted correctly, into the holder,

Figure 4 is a similar cross-section to Figure 3 showing the cassette fully inserted,

Figure 5 is a similar cross-section to Figures 3 and 4 showing a cassette being inserted incorrectly, and

Figure 6 is a perspective view illustrating the construction of the cassette holder of the cassette recorder of Figure 1 in two basic parts, the two parts being shown separated from one another.

The cassette recorder 1 of Figure 1 comprises a housing 2 with a front panel 3. On the front panel there is located a plurality of push-buttons 4 for controlling the various operations of the cassette recorder. The housing has a recess 5, in which a cassette holder *6* is mounted for pivotal movement about an axis 7 (see Figure 6). In the embodiment shown the cassette recorder 1 is adapted for use with Compact Cassettes (see Figure 2). The cassette *8* is provided with two coplanar tape spools 11 and 12 which are rotatable about parallel axes 9 and 10. The spools are accommodated side-by-side in a cassette housing of rectangular shape comprising two major walls 13 and 14 which are disposed opposite one another in planes perpendicular to the axes 9 and 10 and which are interconnected by four side walls including a pair of parallel shorter walls 15 and 16 and a pair of parallel longer walls 17 and 18. The wall 18 is provided with openings 19, 20, 21, 22 and 23 for the passage of components of the cassette recorder, such as magnetic recording and/or playback head, a magnetic erase head a pressure roller, which are adapted to cooperate with the magnetic tape 24 contained in the cassette housing in the operation of the recorder. Each of the major walls 13 and 14 of the cassette housing is provided with a raised portion 27 and 28 respectively on its outer surface adjacent the wall 18 in which the openings 19 to 23 are formed, so that the overall thickness of the cassette housing is locally increased over the areas of the raised portions 27 and 28. These portions do not extend over the entire length of the cassette housing but only as far as the outer extremities of the two outermost openings 19 and 23 in the wall 18. Openings (not designated by reference numerals) are formed in the raised portions 27 and 28 for the passage of a tape-drive capstan (not shown) and locating pins (not shown) on the recorder.

The cassette holder *6* (see also Figures 3 to 6) substantially corresponds in shape to the cassette housing and comprises two major walls 29 and 30, which are disposed opposite one another substantially in parallel planes extending parallel to the pivotal axis 7 of the holder, and a number of side walls which extend between the major walls 29 and 30 of the holder at the peripheries thereof and

which include a pair of parallel walls 31 and 32 corresponding to the shorter side walls 15 and 16 of the cassette housing, and a wall 33 which faces the pivotal axis 7 and lies substantially in a plane extending parallel to this axis and at right angles to the planes of the major walls 29 and 30 of the holder. The holder is left open at the side opposite the wall 33, which is the side remote from the pivotal axis 7, to provide an opening 34 through which the cassette 8 can be inserted into the holder, as will be described hereinafter. The wall 33 of the holder is open over a large area, the remaining parts 33*a* and 33*b* of this wall serving as stops to determine the fully inserted position of the cassette in the holder and to support the cassette in this position. The opening in the wall 33 allows the aforesaid component of the recorder, namely, the magnetic heads and the pressure roller, to enter the cassette in the holder through the openings 19 to 23 in the wall 18 of the cassette housing. Instead of one large opening a number of small openings may be formed in the wall 33. The wall 30 of the cassette holder is formed with one large opening 45 as shown, or with two smaller openings, to allow the winding spindles of the recorder to engage the hubs of the tape spools 11 and 12 in the cassette when the cassette holder is swung back into the closed position. The wall 29 of the holder comprises a window 46 through which the label on the cassette can be read.

The cassette is inserted into the holder *6* through the opening 34 of the holder. As can be seen in Figures 3 to 5, the opening 34 is slightly offset to one side of the planes of the major walls 29 and 30 of the holder *6*. This is achieved by providing an inwardly directed lip 39 on the edge of the wall 29 which bounds the opening 34 at one side thereof, and forming outwardly flared portions 43 and 44 (Figure 6) at the edge of the wall 30 which bounds the opening 34 at the other side thereof. As a result of the offset position of the opening 34, when the cassette is inserted correctly into the holder *6*, i.e. with the wall 18 of the cassette housing foremost, as shown in Figure 3, the cassette must be held in an oblique position with respect to the walls 29 and 30 of the holder during the initial stage of the insertion so that the thicker portion 27, 28 of the cassette housing can pass through the opening 34. The correct orientation of the cassette relative to the cassette holder is shown in Figure 1. The wall 18 of the cassette housing should face the wall 33 of the cassette holder so that the magnetic heads and the pressure roller of the cassette recorder can enter the cassette through the openings in the wall 18. In order to prevent an incorrect reverse orientation of the cassette in the casette holder, the holder is provided with guide means which co-operate, during insertion of the cassette, with those portions of the major wall 13 or the major wall 14 of the cassette housing which lie between the raised portion 27 or 28 of the respective major wall 13 or 14 and the shorter side walls 15 and 16 of the cassette housing. These guide means consist of two elongate raised guide surfaces 35 and 36 on the innner side of the wall 29 of the cassette holder *6*. which guide surfaces extend across the wall 29 near and parallel to the side walls 31 and 32 of the cassette holder *6*. As shown in 37 and 38 respectively, the height of each of these guide surfaces above the inner surface of the wall 29 gradually increases from the end of the guide surface that is nearer the insertion opening 34 of the cassette holder to a point approximately midway between the ends of the guide surface so that the cassette, when inserted correctly (figure 3), can initally be held in the necessary oblique position and is then, as the insertion progresses, deflected by the guide surfaces 35 and 36 into a position in which the major walls 13 and 14 of the cassette housing are parallel with the major walls 29 and 30 of the cassette holder, as shown in Figure 4.

If the cassette is inserted incorrectly, i.e. with the wall 17 foremost, as shown in Figure 5, the cassette is again deflected by the guide surfaces 35 and 36 into a position in which the major walls of the cassette housing are parallel with the major walls of the cassette holder. However, before the cassette can be fully inserted, the raised portion 27 or 28 of the major wall of the cassette housing that is facing the major wall 29 of the cassette holder abuts the lip 39 on the edge of the wall 29 so that the cassette cannot be inserted any further into the holder.

The construction of the cassette holder *6* can be seen most clearly in Figure 6. It comprises a metal part (the right-hand part in Figure 6) which is formed by bending from metal sheet, and a plastics part (the left-hand part in Figure 6) which is formed by injection moulding. The metal part comprises the major wall 30 of the holder and a pair of arms 47 in which two co-axial pivot pins 48 are fixed for pivotally mounting the holder comprises the other major wall 29 and integral therewith the two side walls 31 and 32, the wall portions 33*a* and 33*b*, the guide surfaces 35 and 36 and the lip 39. To facilitate the oblique entry of the thicker portion 27, 28 of the cassette housing into the holder during the insertion of the cassette, the lip 39 is rounded on its inner side. The plastics part of the holder is secured to the metal part by four bolts 40. On the inner side of the wall 29 of the holder are fixed two leaf springs 41 and 42 which are irrelevant for the invention and which only serve to press the cassette resiliently against hhe bottom of the recess 5 of the cassette recorder when the cassette holding is closed.

CLAIMS

1. A recording and/or playback apparatus for use with a magnetic tape contained in a cassette of the kind described, the apparatus having a pivotable cassette holder which comprises two major walls which are disposed opposite one anothe substantially in parallel planes extending parallel to the pivotal axis of the holder and which are arranged to receive a cassette between them with the major walls of the cassette housing each facing one of the major walls of the holder, and a plurality of side walls extending between the major walls of the holder at the peripheries thereof and including first

which include a pair of parallel walls 31 and 32 corresponding to the shorter side walls 15 and 16 of the cassette housing, and a wall 33 which faces the pivotal axis 7 and lies substantially in a plane extending parallel to this axis and at right angles to the planes of the major walls 29 and 30 of the holder. The holder is left open at the side opposite the wall 33, which is the side remote from the pivotal axis 7, to provide an opening 34 through which the cassette 8 can be inserted into the holder, as will be described hereinafter. The wall 33 of the holder is open over a large area, the remaining parts 33*a* and 33*b* of this wall serving as stops to determine the fully inserted position of the cassette in the holder and to support the cassette in this position. The opening in the wall 33 allows the aforesaid component of the recorder, namely, the magnetic heads and the pressure roller, to enter the cassette in the holder through the openings 19 to 23 in the wall 18 of the cassette housing. Instead of one large opening a number of small openings may be formed in the wall 33. The wall 30 of the cassette holder is formed with one large opening 45 as shown, or with two smaller openings, to allow the winding spindles of the recorder to engage the hubs of the tape spools 11 and 12 in the cassette when the cassette holder is swung back into the closed position. The wall 29 of the holder comprises a window 46 through which the label on the cassette can be read.

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and second walls disposed opposite and parallel to one another and arranged so that the first and second side walls of the housing of a cassette inserted between the two major walls of the holder each face one of the first and second side walls of the holder, and a third wall which faces the pivotal axis of the holder and lies substantially in a plane extending parallel to this axis and at right angles to the planes of the major walls of the holder, said third side wall of the holder having at least one opening through which a component or components of the apparatus which cooperates or cooperate with the magnetic tape in the cassette in the operation of the apparatus can enter a cassette in the holder *via* the opening or openings in the fourth side wall of the cassette housing, and the cassette holder being substantially open at a side of the holder opposite the third side wall thereof to provide an opening through which a cassette can be manually inserted into the holder, one of the major walls of the holder being formed at the boundary of the insertion opening of the holder with a portion whereby, when a cassette is inserted into the holder with the fourth side wall of the cassette housing foremost, during a first part of the insertion the cassette is compelled to occupy a position in which the major walls of the cassette housing extended obliquely with respect to the major walls of the holder, the cassette holder further comprising two elongate guide surface on the inner side of one of the major walls of the holder, which guide surfaces extend substantially parallel to the first and second side walls of the holder and are cooperable during the insertion of a cassette into the holder with the major wall of the cassette housing that is facing the guide surfaces, the cooperation taking place at the areas of said major wall of the cassette housing which lie between the raised portion of the latter wall and the first and second side walls of the cassette housing, and the guide surfaces each having a portion which is inclined with respect to the planes of the major walls of the holder so that during a second part of said insertion of a cassette into the holder the cassette is deflected by the inclined portions of the guide surfaces to bring the major walls of the cassette housing parallel with the major walls of the holder, and said portion of said one of the major walls of the holder being so arranged that in the event of a cassette being inserted into the holder with the third side wall of the cassette housing foremost, before the cassette can reach a fully inserted position the raised portion of the major wall of the cassette housing that is facing said one of the major walls of the holder abuts said portion of the latter wall so that further insertion of the cassette is inhibited.

2. A recording and/or playback apparatus substantially as herein described with reference to the accompanying drawings.

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