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(54) APPARATUS FOR RECORDING AND/OR PLAYING BACK SIGNALS ON AND/OR FROM A RECORD CARRIER CONTAINED IN A CASSETTE

(71) We, PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LIMITED, of Abacus House, 33 Gutter Lane, London E.C.2., a British Company,

do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–

The invention relates to an apparatus for recording and/or playing back signals on and/or from a record carrier contained in a cassette, which apparatus comprises a deck plate, two cassette-centring pins which are disposed perpendicularly to the deck plate and at their bases are rigidly connected thereto and which are arranged to engage in respective ones of two centring openings in the cassette when the latter is placed in position on the apparatus, each pin having a substantially conical tip at its end remote from the deck plate and near this tip a locally thickened portion which, when the cassette is in position on the apparatus, is located within the cassette whilst an intermediate portion of the centring pin located between the base and the tip thereof cooperates with a centring edge of the associated centring opening in the cassette, and resilient means being provided for urging said intermediate portion of each centring pin and the centring edge of the respective centring opening in the cassette into engagement with one another.

In a known apparatus of this construction the centring pins each have the shape of a cylinder on which is coaxially disposed a cone with a base of a diameter greater than the diameter of the cylinder. The apex of the cone is rounded. The transition from the sloping side of the cone to the base thereof is also rounded. It is this transitional part of the cone which forms the locally thickened portion of the centring pin. In the cassette are formed centring openings of a size such that they will just pass over the thickened portions of the pins with a slight clearance. In the cassette recorder a leaf spring is provided which presses againsz the rear side of the cassette, so that as soon as the cassette wall in which the centring openings are formed has passed the thickened portions of the centring pins, the leaf spring presses the centring edges of the centring openings against the cylindrical portions of the centring pins. When the cassette is to xe removed the cassette wall has again to be moved over the thickened portions of the centring pins against friction resulting from the pressure of the leaf spring. This requires a certain force, so that the centring pins in cooperation with the leaf spring prevent the cassette from inadvectently springing out of position during use of the cassette recorder.

An advantage of the use of this type of centring pin is that the cassette, in the inserted position, can make only very slight movements in a vertical direction. This is due to the fact that the cassette is arranged to bear against the thickened portions of the centring pins in order hhat no downward force shall be required to keep the cassette in position. However, a drawback is that the cassette can be moved in the plane of its engagement with the centring pins over a distance which in practice is approximately 0.7 mm, owing to the difference in diameter between the cylindrical portion of the pin and the locally thickened portion, i.e. the rounded portion ut the base of the cone.

For this reason completely cylindrical pins are sometimes used. Owing to the absence of the locally thickened portion the pin as a whole may be slightly thicker, so that they play in the plane of engagement can be limited to approximately 0.17 millimetre. Furthermore, the cassette can be removed more easily from the pins. However, this means that when the cassette is in use it must be kept in position by a force which is

exerted perpendicularly to the plane of engagement. Consequently, the cassette player or recorder, in addition to having means for pressing the cassette against the pins in the plane of engagement, must also be provided with additional pressure means. These means have to be provided mn a lid which covers the cassette during use. With conventional plastics lids the resulting reactiving force on the lid gives rise to undesired distortion of the lid.

According to the invention there is provided an apparatus for recording and/or playing back signals on and/or from a record carrier contained in a cassette, comprising a deck plate, two cassette-centring pins which are disposed perpendicularly to the deck plate and at their bases are rigidly connected thereto and which are arranged to engage in respective ones of two centring openings in the cassette when the latter is placed in position on the apparatus, each pin having a substavtially conical tip at its end remote from the deck plate and near this tip a locally thickened portion which, when the cassette is in position on the apparatus, is located inside the cassette whilst an intermediate portion of the pin located between the base and the tip thereof cooperates with a centring edge of the associated centring opening in the cassette, and resilient means being provided for using said intermediate portion of each centring pin and the centring edge of the respective centring opening in the cassette into engagement with one another, wherein each of the centring pins is longitudinally split along a t least part of its length so that each centring pin comprises a first part and a second part which are separated from eachother by a slit extending longitudinally of the pin the first part of each centring pin being rigidly connected to said deck plate and the second part being urged away from the first part by the resilient means.

In order to avoid undesired axial movements of the conical tips of the centring pins an embodiment is preferred wherein in each of the two centring pins, the longitudinal slit extends through the base of the pin and the second part of the pin is resiliently connected to the deck plate so as to be movable transversely of the longitudinal axis of the centring pin, and wherein the conical tip of the pin is formed substantially on the first part of the pin and the second part thereof is separated from said tip by a slit which extends transversely of the pin and joins the longitudinal slit. It is of advantage if the locally thickened portion of each centring pin is located wholly on the first part of the pin.

In the interests of low manufacturing costs the first and second parts of each centring pin, and the resilient means may all be integral with one common injection-moulded component which is made of a thermoplastic synthetic material and which is fixed to the deck plate.

The second part of each centring pin may be lodged at its base in an associated mount having an opening in which the second part is movable to a limited extent transversly of the longitudinal axis of the centring pin, and the resilient means may be substantially in the form of two leaf springs, each of which is connected to the base of the second part of a corresponding one of the pins and is arranged to urge this part away from the first part of the pin in the transverse direction, the second part of each pin being axially movable into and out of the associated mount to facilitate assembly of the apparatus, and the associated leaf spring being arranged to be twisted by such axial movement so as torsionally to opposit.

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

Figure 1 is a perspective view of a cassette recorder according to an embodiment of the invention;

Figure 2 is an axial sectional view of one of the centring pins of the recorder shown in Figure 1, Figure 2 being drawn to a larger scale than Figure 1 and showing a cassette in engagement with the centring pin, and

Figure 3 is a perspective view of an injection-moulded plastics component which comprises two centring pins whose moveable second parts are connected by integral plastics leaf springs to parts of the component on which are formed mounts for the centring pins, said second parts being shown prior to their insertion in these mounts.

In the drawings, parts which are duplicated are given the same reference numerals and distinguished from one another by single and double superscript dashes (′ and ″) respectively. For simplicity, these dashes are omitted from the following description.

The cassette recorder, which is designated 1, comprises a deck plate 2 on which are perpendicularly disposed two cassette-centring pins 3 which at their bases are rigidly connected to said plate 1 and which are arranged to engage in two centring openings 9 in the cassette when the latter is placed in position on the recorder. The centring pins 3 each have a substantially conical tip 4 (Figures 2 and 3) and near this tip a locally thickened portion 5. When the cassettee 6 is in position on the apparatus (see Figure 2), the locally thickened portion 5 of each centring pin is located inside the cassette. A portion 7 of each centring pin located between thu tip and the base of the pin cooperates with a centring edge 8 of the associated centring opening 9 in the cassette. The openings 9 correspond in size and spacing to the centring pins.

Each of the centring pins 3 is axially split along at least part of its length so that each centring pin comprises first and second parts 11 and 12 which are separated from each other by an axial slit 13. The first part 11 is rigidly connected to the deck plate 2, whilst the second part 12 is urged away from the first part 11 by resilient means 10. These resilient means urge each centring pin and the centring edge 8 of the respective centring opening 9 in the cassette into engagement with one another.

The recorder 1 is provided with a compartment 18 for accommodating the cassette 6. The compartment can be closed by a hinged flap 19.On the deck plate 2 winding spindles 20 and a capstan 21 for a record carrier in the form of a tape are located, in addition to the centring pins 3. The operation of the apparatus is controlled with the aid of a number of push-buttons 22 which are hingeably secured to the housing 23 of the recorder.

In each of the centring pins 3 the axial slit 13 extends through the base of the pin. The second part 12 of each pin is connected to the deck plate 2 by the resilient means 10 so as to be movable transversely of the longitudinal axis of the centring pin. The conical tip 4 is formed substantially on the first part 11 of the pin. In addition to the axial split 13 each pin is divided by a transverse slit 14 which separates the second part 12 of the pin from the conical tip 4 thereof. The locally thickened portion 5 of each pin is located wholly on the first part 11.

The first part 11 and the second part 12 of each centring pin and the associated resilient means 10 are all integral with an injection-moulded component 15 which is made of a thermoplastic synthetic material and which is secured on the deck plate 2. The base of the second part 12 of each centring pin is lodged in an associated mount 16 on the component 15, the mount having an opening 17 in which the part 12 is movable to a limited extent transversely of the longitudinal axis of the centring pin. The first part 11 of each centring pin is integral with the associated mount 16. The part 12 of each pin is connected at its base to the associated resilient means 10, which are substantially in the form of a leaf spring. When the part 12 is lodged in the mount 16, the leaf spring 10 exerts a force on the part 12 in a direction to urge this part away from the part 11. For assembly purposes the second part 12 of each centring pin is movable axially into and out of the associated mount 16. Such movements twists the associated leaf spring 10, so that the spring torsionally opposes the movement.

WHAT WE CLAIM IS:-

1. An apparatus for recording and/or playing back signals on and/or from a record carrier contained in a cassette, comprising a deck plate, two cassette-centring pins which are disposed perpendicularly to the deck plate and at their bases are rigidly connected thereto and which are arranged to engage in respective ones of two centring openings in the cassette when the latter is placed in position on the apparatus, each pin having a substantially conical tip at its end remote from the deck plate and near this tip a locally thickened portion which, when the cassette is in position on the apparatus, is located inside the cassette whilst an intermediate portion of the pin located between the base and the tip thereof cooperates with a centring edge of the associated centring opening in the cassette, and resilient means being provided for urving said intermediate portion of each centring pin and the centring edge of the respective centring opening in the cassette into engagement with one another, wherein each of the centring pins is longitudinally splul along at least part of its length so that each centring pin comprises a first part and a second part which are separated from each other by a slit extending longitudinally of the pin, the first part of each centring pin being rigidly connected to said deck plate and the second part being urged away from the first part by the resilient means.

2. An apparatus as claimed in claim 1, wherein in each of the two centring pins, the longitudinal slit extends through the base of the pin and the second part of the pin is resiliently connected to the deck plate so as to be movable transversely of the longitudinal axis of the centring pin, and wherein the conical tip of the pin is formed substantially on the first part of the pin and the second part thereof is separated from said tip by a slit which extends transversely of the pin and joins the longitudinal slit.

3. An apparatus as claimed in claim 1 or 2, wherein the locally thickened portion of each centring pin is located wholly on the first part of the pin.

4. An apparatus as claimed in claim 1, 2 or 3 wherein the first and second parts of each centring pin and the resilient means are all integral with one common injection-moulded component which is made of a thermoplastic synthetic material and which is secured to the deck plate.

5. An apparatus as claimed in claim 4, wherein the second part of each centring pin is lodged at its base in an associated mount having an opening in which the second part of the pin is movable to a limited extent transversely of the longitudinal axis of the centring pin, and wherein the resilient means are substantially in the form of two leaf springs, each of which is connected to the base of the second part of a corresponding one of the pins and is arranged to urge

Each of the centring pins 3 is axially split along at least part of its length so that each centring pin comprises first and second parts 11 and 12 which are separated from each other by an axial slit 13. The first part 11 is rigidly connected to the deck plate 2, whilst the second part 12 is urged away from the first part 11 by resilient means 10. These resilient means urge each centring pin and the centring edge 8 of the respective centring opening 9 in the cassette into engagement with one another.

The recorder 1 is provided with a compartment 18 for accommodating the cassette 6. The compartment can be closed by a hinged flap 19.On the deck plate 2 winding spindles 20 and a capstan 21 for a record carrier in the form of a tape are located, in addition to the centring pins 3. The operation of the apparatus is controlled with the aid of a number of push-buttons 22 which are hingeably secured to the housing 23 of the recorder.

In each of the centring pins 3 the axial slit 13 extends through the base of the pin. The second part 12 of each pin is connected to the deck plate 2 by the resilient means 10 so as to be movable transversely of the longitudinal axis of the centring pin. The conical tip 4 is formed substantially on the first part 11 of the pin. In addition to the axial split 13 each pin is divided by a transverse slit 14 which separates the second part 12 of the pin from the conical tip 4 thereof. The locally thickened portion 5 of each pin is located wholly on the first part 11.

The first part 11 and the second part 12 of each centring pin and the associated resilient means 10 are all integral with an injection-moulded component 15 which is made of a thermoplastic synthetic material and which is secured on the deck plate 2. The base of the second part 12 of each centring pin is lodged in an associated mount 16 on the component 15, the mount having an opening 17 in which the part 12 is movable to a limited extent transversely of the longitudinal axis of the centring pin. The first part 11 of each centring pin is integral with the associated mount 16. The part 12 of each pin is connected at its base to the associated resilient means 10, which are substantially in the form of a leaf spring. When the part 12 is lodged in the mount 16, the leaf spring 10 exerts a force on the part 12 in a direction to urge this part away from the part 11. For assembly purposes the second part 12 of each centring pin is movable axially into and out of the associated mount 16. Such movements twists the associated leaf spring 10, so that the spring torsionally opposes the movement.

WHAT WE CLAIM IS:–

1. An apparatus for recording and/or playing back signals on and/or from a record carrier contained in a cassette, comprising a deck plate, two cassette-centring pins which are disposed perpendicularly to the deck plate and at their bases are rigidly connected thereto and which are arranged to engage in respective ones of two centring openings in the cassette when the latter is placed in position on the apparatus, each pin having a substantially conical tip at its end remote from the deck plate and near this tip a locally thickened portion which, when the cassette is in position on the apparatus, is located inside the cassette whilst an intermediate portion of the pin located between the base and the tip thereof cooperates with a centring edge of the associated centring opening in the cassette, and resilient means being provided for urving said intermediate portion of each centring pin and the centring edge of the respective centring opening in the cassette into engagement with one another, wherein each of the centring pins is longitudinally splul along at least part of its length so that each centring pin comprises a first part and a second part which are separated from each other by a slit extending longitudinally of the pin, the first part of each centring pin being rigidly connected to said deck plate and the second part being urged away from the first part by the resilient means.

2. An apparatus as claimed in claim 1, wherein in each of the two centring pins, the longitudinal slit extends through the base of the pin and the second part of the pin is resiliently connected to the deck plate so as to be movable transversely of the longitudinal axis of the centring pin, and wherein the conical tip of the pin is formed substantially on the first part of the pin and the second part thereof is separated from said tip by a slit which extends transversely of the pin and joins the longitudinal slit.

3. An apparatus as claimed in claim 1 or 2, wherein the locally thickened portion of each centring pin is located wholly on the first part of the pin.

4. An apparatus as claimed in claim 1, 2 or 3 wherein the first and second parts of each centring pin and the resilient means are all integral with one common injection-moulded component which is made of a thermoplastic synthetic material and which is secured to the deck plate.

5. An apparatus as claimed in claim 4, wherein the second part of each centring pin is lodged at its base in an associated mount having an opening in which the second part of the pin is movable to a limited extent transversely of the longitudinal axis of the centring pin, and wherein the resilient means are substantially in the form of two leaf springs, each of which is connected to the base of the second part of a corresponding one of the pins and is arranged to urge

this part away from the first part of the pin in the transverse direction, the second part of each pin being axially movable into and out of the associated mount to facilitate assembly of the apparatus, and the associated leaf spring being arranged to be twisted by such axial movement so as torsionally to opposite it.

6. An apparatus for recording and/or playing back signals on and/or from a record carrier contained in a cassette, the apparatus being constructed and arranged to operate substantially as herein described with reference to the accompanying drawings.

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