

Description

The invention relates to a guide arrangement for guiding an object over a kinked path, comprising an object carrier which is movable along the path, at least one stationarily arranged guide plate provided with mutually offset profiled first and second grooves each profiled in conformity with said path and each groove having a first and second path section inclined relative to one another said first groove having a smaller width than said second groove, and first and second guide members which are connected to the object carrier, which engage the profiled grooves so as to be movable in said grooves, and which have a transverse dimension corresponding at least substantially to the width of the respective profiled grooves.

Such a guide arrangement is disclosed in US-4,320,424 and is intended for guiding a magnetic-tape cassette to its operating position in a magnetic-tape apparatus by means of the object carrier via the front side of this apparatus. The magnetic-tape cassette is transported over a path comprising a horizontal and a vertical path section. During this transport guidance is provided by profiled grooves each having portions which extend in the guide plate in conformity with the respective path sections. During the transition from the horizontal to the vertical path section the guide members of the object carrier, which are constructed as rollers, experience a certain instability. This instability occurs in the kink of the path and hence in the bends of the profiled grooves where the tangent to the path is perpendicular to the line interconnecting the rollers. In order to compensate for this instability the guide plate of the known guide arrangement has a first and a second profiled groove, which are disposed in line horizontally, and a third profiled groove, which is disposed at a lower level, resulting in a comparatively large overall height and depth of the object carrier and the guide plate and hence of the guide arrangement.

It is the object of the invention to provide a guide arrangement of the type defined in the opening paragraph, which is of a simple and a compact construction and yet provides a satisfactorily stable guidance over the entire path of the object carrier.

To this end the guide arrangement in accordance with the invention is characterized in that said first profiled groove of the mutually offset profiled grooves in the guide plate has a greater depth than said second profiled groove of said grooves, said first guide member extending in the first profiled groove extends to a point beyond the bottom of the second profiled groove, and the second path section of the first profiled groove intersects the first path section of the second profiled groove.

The combination of a comparatively deep and narrow groove with a comparatively shallow and wide groove enables a satisfactory stability to be obtained in the kink between the two path sections, the stability in the remainder of the path of the object carrier being also adequate. The use of two locally intersecting profiled grooves in the guide plate results in comparatively small overall dimensions of the guide plate and the object carrier, which, also considering the small number of parts, renders the guide arrangement in accordance with the invention suitable for use in equipment of compact construction.

In the guide arrangement in accordance with the invention the second path section of the first profiled groove intersects the first path section of the second profiled groove. If the, for example vertical, second path section of the first profiled groove intersects the, for example horizontal, first path section of the second profiled groove, the first profiled groove with the first path section can be situated above the second profiled groove, thereby ensuring a stable guidance, also in the kink between the two path sections, by means of a guide arrangement of comparatively small overall height.

Examples of equipment of compact construction are magnetic-tape-cassette apparatuses of the 8-mm video type and of the R-DAT type, which apparatuses, when intended for mobile use, must have small dimensions and require an effective guide arrangement for the magnetic-tape cassettes. However, the invention can also be used advantageously in other equipment, such as record players and card readers, where the favourable combination of compactness and a stable guidance over two inclined path sections is important.

An embodiment of the guide arrangement in accordance with the invention is characterized in that the location where the first and second profiled grooves intersect one another in the guide plate is situated near that end of the second path section of the first profiled groove which is remote from the first path section. This location of the intersection enables a high stability to be obtained in the bends of the two profiled grooves.

An embodiment of the guide arrangement in accordance with the invention, in which the kinked path is substantially L-shaped, is characterized in that the first path sections are the longer sections, viewed in the direction of one of the grooves from the first towards the second path section, the first profiled groove being situated partly before the second profiled groove in the guide plate, and the first path section of the first profiled groove in the guide plate is situated at that side of the first path section of the second profiled groove which is remote from the second path section. This arrangement also increases the stability of the guidance in

the kink of the path and further results in a smaller overall height and depth of the guide arrangement.

It is preferred that the first profiled groove is a slot in the guide plate. In this way the first profiled groove can readily be the groove having the greater depth. This means that during manufacturing it is not necessary to form the depth of the grooves with a very high accuracy.

The invention further relates to a magnetic-tape-cassette apparatus comprising the guide arrangement in accordance with the invention and a record player comprising the guide arrangement in accordance with the invention.

It is to be noted that a device for guiding a front door of a record player is known from JP-A-58-122644. That known device is provided with guide grooves having a wide horizontal part and a narrow oblique branch part. The front door is provided with thick and thin guide pins for cooperation with the wide parts and the narrow parts, resp., to move the front door from a horizontal position into a vertical position and vice versa. A similar device, however, provided with long and short guide pins cooperating with deep and shallow guide parts, resp., is known from JP-A-58-122643.

The invention will now be described in more detail, by way of example, with reference to the drawings, which in addition to an example of the prior art show an embodiment of the guide arrangement in accordance with the invention. In the drawings:

Figure 1 is a diagrammatic view of a guide plate of a prior-art guide arrangement, the guide members being shown in three positions;

Figure 2 is a diagrammatic view of a guide plate of a guide arrangement in accordance with the invention, the guide members also being shown in three positions;

Figure 3 is a partly perspective view of the guide arrangement in accordance with the invention, the guide members with the object carrier being shown in a first position after insertion of a magnetic-tape cassette;

Figure 4 is a perspective view of the guide arrangement shown in Figure 3, the guide members and the object carrier being shown as they move in the path at the kink between the first and the second path section; and

Figure 5 is a perspective view of the guide arrangement shown in Figure 3, the guide members and the object carrier being situated at the end of the second path section.

For a better understanding of the invention Figure 1 diagrammatically shows a prior-art guide arrangement comprising a guide plate 1 in which two congruent profiled grooves 2 and 3 of the same width and depth are formed. The profiled grooves comprise groove portions 2A, 2B and 3A,

3B respectively, which are oriented in the same way as the path sections of a kinked path along which guide members 4 and 5 are guided during the movement over the path. Hereinafter the groove portions of the slots 2 and 3 will be referred to as path sections. The guide members 4 and 5 are constructed, for example, as pins or rollers, and in a manner not shown they are connected to an object carrier which is moved over the kinked path as it is guided along the path sections. This guiding movement comprises a horizontal movement followed by a vertical movement of the object carrier, referred to as an X-Y movement. In such guide arrangements guide plates with profiled grooves as shown in Figure 1 are arranged at opposite sides of the object carrier. At the transition from the X to the Y movement the guide members are situated in the bends between the first and second path sections 2A, 2B and 3A, 3B respectively. In Figure 1 this position of the guide members is indicated by the reference numerals 4A and 5A respectively. A connecting line 6 between the two guide members is now in the position indicated by the reference numeral 6A. The tangent to the path of the guide members, indicated by the reference numeral 7, now extends perpendicularly to the connecting line 6A. In this situation the guide member 5A can perform a rotary movement about the centre of the guide member 4A. This implies that in the bend between the two path sections an instability occurs during the guidance of the guide members. Preferably, the angle α between the connecting line 6 and the first path section in the prior-art guide arrangement is positive. Indeed, in the case of a negative angle the situation will arise that the entire first profiled groove must be situated above or before the other profiled groove, so that the guide plate must have a relatively larger overall height or depth.

In the guide arrangement in accordance with the invention, shown diagrammatically in Figure 2 and in perspective view in Figures 3 to 5, a maximum stability is obtained as the guide members proceed from the first to the second path section. For this purpose the guide arrangement 10 in accordance with the invention comprises two guide plates 11 and 111, which are arranged mirror-symmetrically relative to one another and which at their facing sides are formed with profiled grooves 12, 112 and 13, 113 respectively. The profiled grooves, as is clearly shown in Figure 3, have different profiles. The first profiled groove 12, 112 is constructed as a slot in the guide plate 11, 111 and has a smaller width than the second profiled groove 13, 113, which is constructed as a groove in a guide plate. Therefore, the first profiled grooves have a greater depth than the second profiled grooves, whereas the second profiled grooves have

a larger width than the first profiled grooves. The profiled grooves each comprise two path sections. Figure 2 shows that the profiled groove 12 has path sections 12A and 12B and the profiled groove 13 has path sections 13A and 13B. The path sections extend horizontally and vertically respectively, but it is to be noted that other paths providing X and Y guidance are also possible. The profiled grooves 12 and 13 are disposed in such a way that the second path section 12B intersects the first path section 13A near that end of the second path section 12B which is remote from the first path section 12A. Viewed in the direction from the first towards the second path section the first profiled groove 12 is situated mainly before the profiled groove 13, whereas the first path section 12A in the guide plate 11 is situated at that side of the first path section 13A which is remote from the second path section 13B. The same applies to the profiled grooves 112 and 113 in the guide plate 111.

The profiled grooves are engaged by guide members which in the present embodiment comprise pins 14, 15 and 114, 115 respectively. The pins must have a width adapted to the width of the relevant profiled groove, whilst the pin 14 or 114 extends into the profiled groove beyond the bottom of the respective profiled groove 13 or 113. A connecting line between the pins 14 and 15 is indicated by the reference numeral 16 in Figure 2.

This adaptation of the groove shape and the pin shape ensures that the relevant pins 14 or 15 cannot become disengaged from the groove although the two grooves intersect one another. The connecting line 16 between the pins 14 and 15 may now extend at a negative angle β to the first path section, because the total height occupied by the grooves in the guide plate 11 is comparatively all on account of the intersection of the two profiled grooves. The same applies to the pins 114 and 115 in the guide plate 111.

The guide members 14, 15 and 114, 115 are mounted on a carrier plate, 18 and 118 respectively, which is provided with a gear rack 19 and 119 respectively both on a horizontal and a vertical side. The carrier plate 18 and the facing carrier plate 118 are interconnected, the interconnecting parts being largely omitted for clarity of the Figures 3 to 5. The ends and the central portion of a basic member which extends between the two carrier plates 18 and 118 are shown. The carrier plates 18 and 118 together with the basic member 20 constitute an object carrier 22 on which a cassette can be positioned, which object carrier can be moved along the kinked path by means of the guide arrangement 10. The object carrier is driven by means of pinions 24 and 124, which are driven by gear wheels 25 and 125 respectively, mounted on a central shaft 26 which is driven by an electric

motor, not shown. When the pins pass through the first path sections of the profiled grooves 12 and 13, the pinion 24 meshes with the horizontal part of the gear rack 19 and after the pins have passed the bends in the profiled grooves the pinion 24 meshes with the vertical part of the gear rack 19. In this way the guide members 14, 15 and 114, 115 respectively are guided by the profiled grooves to drive the object carrier 22. In the present embodiment the object carrier is thus moved along a substantially L-shaped path. In this respect it is important that, as is shown in Figure 2, during the movement through the bend in the profiled grooves 12 and 13, where the tangent to the path extends perpendicularly to the connecting line 16 between two guide members 14 and 15, is suitably oriented to provide maximum stability in the bend. The position of the object carrier 23 in this bend is illustrated in Figure 4.

The guide plates 11 and 111 are interconnected by connecting elements 27, shown diagrammatically and are arranged stationarily inside the housing of an apparatus, in the present embodiment a magnetic-tape-cassette apparatus. Of this apparatus a frame 28 is shown, which carries two winding spindles 29 which, after the magnetic-tape cassette has been lowered along the L-shaped path, cooperate with the reel hubs of the cassette 21 (Figure 5). Thus, the guide arrangement 10 in accordance with the invention enables the cassette to be loaded into the apparatus shown in a very effective manner.

In principle, the guide arrangement can be used advantageously in all apparatuses where a compact housing is required and where a highly stable guidance is essential. Examples of this are magnetic-tape apparatuses of the 8-mm video type or the R-DAT type. However, it is to be noted that the guide arrangement in accordance with the invention is also very suitable for use in equipment of a different type, such as record players, card readers etc.

Moreover, it is to be noted that on account of the highly stable guidance by the guide plate 11 and the guide members 14 and 15 the guide plate 111 and the guide members 114 and 115 at the right-hand side of the guide arrangement may be dispensed with, in which situation the guide means for the object carrier at the right-hand side may be simplified, for example by connecting at the right-hand side only one guide member to the object carrier and guiding it in an L-shaped groove. This may be the case, for example, if a small object having a small overall width is to be guided.

Claims

1. A guide arrangement (10) for guiding an object



a larger width than the first profiled grooves. The profiled grooves each comprise two path sections. Figure 2 shows that the profiled groove 12 has path sections 12A and 12B and the profiled groove 13 has path sections 13A and 13B. The path sections extend horizontally and vertically respectively, but it is to be noted that other paths providing X and Y guidance are also possible. The profiled grooves 12 and 13 are disposed in such a way that the second path section 12B intersects the first path section 13A near that end of the second path section 12B which is remote from the first path section 12A. Viewed in the direction from the first towards the second path section the first profiled groove 12 is situated mainly before the profiled groove 13, whereas the first path section 12A in the guide plate 11 is situated at that side of the first path section 13A which is remote from the second path section 13B. The same applies to the profiled grooves 112 and 113 in the guide plate 111.

The profiled grooves are engaged by guide members which in the present embodiment comprise pins 14, 15 and 114, 115 respectively. The pins must have a width adapted to the width of the relevant profiled groove, whilst the pin 14 or 114 extends into the profiled groove beyond the bottom of the respective profiled groove 13 or 113. A connecting line between the pins 14 and 15 is indicated by the reference numeral 16 in Figure 2.

This adaptation of the groove shape and the pin shape ensures that the relevant pins 14 or 15 cannot become disengaged from the groove although the two grooves intersect one another. The connecting line 16 between the pins 14 and 15 may now extend at a negative angle β to the first path section, because the total height occupied by the grooves in the guide plate 11 is comparatively all on account of the intersection of the two profiled grooves. The same applies to the pins 114 and 115 in the guide plate 111.

The guide members 14, 15 and 114, 115 are mounted on a carrier plate, 18 and 118 respectively, which is provided with a gear rack 19 and 119 respectively both on a horizontal and a vertical side. The carrier plate 18 and the facing carrier plate 118 are interconnected, the interconnecting parts being largely omitted for clarity of the Figures 3 to 5. The ends and the central portion of a basic member which extends between the two carrier plates 18 and 118 are shown. The carrier plates 18 and 118 together with the basic member 20 constitute an object carrier 22 on which a cassette can be positioned, which object carrier can be moved along the kinked path by means of the guide arrangement 10. The object carrier is driven by means of pinions 24 and 124, which are driven by gear wheels 25 and 125 respectively, mounted on a central shaft 26 which is driven by an electric

motor, not shown. When the pins pass through the first path sections of the profiled grooves 12 and 13, the pinion 24 meshes with the horizontal part of the gear rack 19 and after the pins have passed the bends in the profiled grooves the pinion 24 meshes with the vertical part of the gear rack 19. In this way the guide members 14, 15 and 114, 115 respectively are guided by the profiled grooves to drive the object carrier 22. In the present embodiment the object carrier is thus moved along a substantially L-shaped path. In this respect it is important that, as is shown in Figure 2, during the movement through the bend in the profiled grooves 12 and 13, where the tangent to the path extends perpendicularly to the connecting line 16 between two guide members 14 and 15, is suitably oriented to provide maximum stability in the bend. The position of the object carrier 23 in this bend is illustrated in Figure 4.

The guide plates 11 and 111 are interconnected by connecting elements 27, shown diagrammatically and are arranged stationarily inside the housing of an apparatus, in the present embodiment a magnetic-tape-cassette apparatus. Of this apparatus a frame 28 is shown, which carries two winding spindles 29 which, after the magnetic-tape cassette has been lowered along the L-shaped path, cooperate with the reel hubs of the cassette 21 (Figure 5). Thus, the guide arrangement 10 in accordance with the invention enables the cassette to be loaded into the apparatus shown in a very effective manner.

In principle, the guide arrangement can be used advantageously in all apparatuses where a compact housing is required and where a highly stable guidance is essential. Examples of this are magnetic-tape apparatuses of the 8-mm video type or the R-DAT type. However, it is to be noted that the guide arrangement in accordance with the invention is also very suitable for use in equipment of a different type, such as record players, card readers etc.

Moreover, it is to be noted that on account of the highly stable guidance by the guide plate 11 and the guide members 14 and 15 the guide plate 111 and the guide members 114 and 115 at the right-hand side of the guide arrangement may be dispensed with, in which situation the guide means for the object carrier at the right-hand side may be simplified, for example by connecting at the right-hand side only one guide member to the object carrier and guiding it in an L-shaped groove. This may be the case, for example, if a small object having a small overall width is to be guided.

Claims

1. A guide arrangement (10) for guiding an object



(21) over a kinked path, comprising:

- an object carrier (22) which is movable along the path,
- at least one stationarily arranged guide plate (11) provided with mutually offset profiled first and second grooves (12, 13) each profiled in conformity with said path and each groove having a first and second path section inclined relative to one another said first groove (12) having a smaller width than said second groove (13), and
- first and second guide members (14, 15) which are connected to the object carrier, which engage the profiled grooves so as to be movable in said grooves, and which have a transverse dimension corresponding at least substantially to the width of the respective profiled grooves,

characterized in that said first profiled groove (12) of the mutually offset profiled grooves in the guide plate (11) has a greater depth than said second profiled groove (13) of said grooves, said guide member (14) extending in the first profiled groove extends to a point beyond the bottom of the second profiled groove, and the second path section (12B) of the first profiled groove intersects the first path section (13A) of the second profiled groove.

2. A guide arrangement as claimed in Claim 1, characterized in that the location where the first and second profiled grooves (12, 13) intersect one another in the guide plate (11) is situated near that end of the second path section (12B) of the first profiled groove (12) which is remote from the first path section (12A).

3. A guide arrangement as claimed in Claim 2, in which the kinked path is substantially L-shaped, characterized in that the first path sections are the longer sections, viewed in the direction of one of the grooves from the first towards the second path section, the first profiled groove (12) being situated partly before the second profiled groove (13) in the guide plate (11), and the first path section (12A) of the first profiled groove in the guide plate is situated at that side of the first path section (13A) of the second profiled groove which is remote from the second path section (13B).

4. Magnetic-tape-cassette apparatus comprising a frame (28) carrying winding spindles (29) and a guide arrangement as claimed in any one of the preceding Claims to load a cassette (21) having reel hubs into the apparatus to enable the spindles to cooperate with the reel hubs.

5. Record player comprising a guide arrangement as claimed in Claims 1, 2, 3 or 4.

Revendications

1. Dispositif de guidage (10) pour guider un objet (21) sur un trajet coudé comportant:

- un support porte-objet (22) pouvant être déplacé suivant le trajet,
- au moins une plaque-guide (11) disposée de manière stationnaire et pourvue de première et deuxième gorges profilées (12, 13) décalées l'une par rapport à l'autre et profilées chacune en correspondance avec ledit trajet, chaque gorge ayant des première et deuxième sections de trajet clinées l'une par rapport à l'autre, ladite première gorge (12) ayant une largeur inférieure à celle de ladite deuxième gorge (13) et
- des premier et deuxième éléments de guidage (14, 15) reliés au support porte-objet, éléments s'engageant dans les gorges profilées de façon à pouvoir être déplacés dans lesdites gorges et ayant une dimension transversale correspondant au moins sensiblement à la largeur des gorges profilées respectives,

caractérisé en ce que la première (12) desdites gorges profilées décalées l'une par rapport à l'autre et pratiquées dans la plaque-guide (11) présente une profondeur supérieure à la deuxième (13) desdites gorges profilées, en ce que ledit élément de guidage (14) s'étendant dans la première gorge profilée se termine à un point situé au-delà du fond de la deuxième gorge profilée, et en ce que la deuxième section de trajet (12B) de la première gorge profilée coupe la première section de trajet (13A) de la deuxième gorge profilée.

2. Dispositif de guidage selon la revendication 1, caractérisé en ce que l'endroit où les première et deuxième gorges profilées (12, 13) se coupent dans la plaque-guide (11) est situé près de l'extrémité de la deuxième section de trajet (12B) de la première gorge profilée (12), située à l'opposé de la première section de trajet (12A).

3. Dispositif de guidage selon la revendication 2, dans lequel le trajet coudé présente à peu près la forme d'un L, caractérisé en ce que les premières sections de trajet sont les sections les plus longues, vues, dans la direction de l'une des gorges, à partir de la première vers la deuxième section de trajet, la première gorge profilée (12) étant située partiellement avant



la deuxième gorge profilée (13) de la plaque-guide (11) et la première section de trajet (12A) de la première gorge profilée de la plaque-guide est située du côté de la première section de trajet (13A) de la deuxième gorge profilée, section qui est éloignée de la deuxième section de trajet (13B).

4. Appareil à cassette à bande magnétique comportant un châssis (28) portant des arbres d'enroulement (29) et un dispositif de guidage selon l'une quelconque des revendications précédentes, pour introduire une cassette (21), muni de moyeux de bobine, dans l'appareil de façon à permettre aux arbres de coopérer avec les moyeux de bobine.

5. Lecteur de disques comportant un dispositif de guidage selon la revendication 1, 2, 3, ou 4.

Patentansprüche

1. Führungsvorrichtung (10) zum Führen eines Gegenstandes (21) über eine abgewinkelte Strecke, mit:

- einem über die Strecke beweglichen Gegenstandsträger (22),
- mindestens einer ortsfest angeordneten Führungsplatte (11) mit einer ersten und zweiten zueinander versetzten profilierten Rille (12,13), die je entsprechend der genannten Strecke profiliert sind und je einen ersten und zweiten zueinander schrägen Teil aufweisen, wobei die erste Rille (12) eine geringere Breite hat als die zweite Rille (13), und
- ersten und zweiten mit dem Gegenstandsträger verbundenen Führungselementen (14, 15), die zur Bewegung in den Rillen mit denselben zusammenarbeiten und eine Querabmessung aufweisen, die der Breite der jeweiligen profilierten Rillen nahezu entspricht,

dadurch gekennzeichnet, daß die genannte erste profilierte Rille (12) der zueinander versetzten profilierten Rillen in der Führungsplatte (11) eine größere Tiefe aufweist als die genannte zweite profilierte Rille (13) der genannten Rillen, wobei das genannte Führungselement (14) in der ersten profilierten Rille sich bis an eine Stelle hinter dem Boden der zweiten profilierten Rille erstreckt, und daß der zweite Teil (12B) der ersten profilierten Rille den ersten Streckenteil (13A) der zweiten profilierten Rille schneidet.

2. Führungsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Stelle, an der

die erste und zweite profilierte Rille (12,13) sich in der Führungsplatte (11) schneiden, in der Nähe desjenigen Endes des zweiten Streckenteils (12B) der ersten profilierten Rille liegt, die von dem ersten Streckenteil (12A) entfernt ist.

3. Führungsvorrichtung nach Anspruch 2, wobei die abgewinkelte Strecke im wesentlichen L-förmig ist, dadurch gekennzeichnet, daß die ersten Streckenteile die längeren Teile sind, dies gesehen in der Richtung einer der Rillen vom ersten zum zweiten Streckenteil, wobei die erste profilierte Rille (12) teilweise vor der zweiten profilierten Rille (13) in der Führungsplatte (11) liegt, und wobei der erste Streckenteil (12A) der ersten profilierten Rille in der Führungsplatte an derjenigen Seite des ersten Streckenteils (13A) der zweiten profilierten Rille liegt, die von dem zweiten Streckenteil (13B) entfernt ist.

4. Magnetbandkassettengerät mit einem Rahmen (28) mit Wickelspindeln (29) und einer Führungsvorrichtung nach einem der vorstehenden Ansprüche zum Einführen einer Kassette (21) mit Wickelkernen in das Gerät, damit die Spindeln mit den Wickelkernen zusammenarbeiten können.

5. Plattenspieler mit einer Führungsvorrichtung nach Anspruch 1, 2, 3 oder 4.