## Description

The invention relates to an apparatus for writing and/or reading through a transparent substrate with the aid of a radiation beam information on a reflecting information surface of an information disc which rotates about an axis of rotation, which apparatus comprises: a movable objective for concentrating the radiation beam through the said substrate to form a radiation spot in a focussing plane coinciding with the said information surface and comprising a lens system with one or more lenses and with an optical axis and having a free end which is to be directed towards the information disc; an objective frame supporting the movable objective and comprising a parallel guide for guiding the movements of the objective along the optical axis; a subframe movably supporting the objective frame and comprising guide means and drive means to move the objective parallel to the information disc to scan the information on it; drive means for rotatably driving the information disc and comprising a drive spindle carrying a turntable for supporting the information disc; and a cabinet housing the subframe and other elements belonging to the apparatus, the cabinet comprising a deck parallel to the information disc if present on the turntable.

Such apparatus is known from, for example, United States Patent Specification 3,977,684. In the apparatus known from said Patent Specification, a video disc player, the main frame comprises a cabinet with a radial slot in which the objective is movable by means of the movable objective frame. Since it is generally undesirable to have an open slot in the cabinet of a video disc player, through which dust may penetrate into the interior of the apparatus and through which a user may come into contact with live parts of the apparatus, the slot in the known video disc player is sealed by sealing means which move along with the objective frame. Said means may be constituted by, for example, a strip which moves with the objective frame and is guided over rollers. It may be desirable that the objective itself is also protected against dust, mechanical damage and being touched. This is because the objective is an expensive and comparatively vulnerable part, whilst moreover the surface of the lens that faces the information disc should be kept free from contaminants as far as possible. Therefore, the lens surface is preferably cleaned periodically, which inevitably means that the objective is subjected to a mechanical load.

It has been found that the movements of the objective in optical video disc players of the above kind are the main source of annoying spurious sounds from the disc player. Owing to the irregularities in the location of the information surface of the video disc, focussing movements of the objective are necessary during each revolution of the disc. These movements are automatically controlled by an electrical servo control provided for this purpose. The video disc rotates with a speed of 25 or 30 revolutions per second, depending on the mains frequency, so that the movements of the objective have a fundamental frequency of 50 or 60 Hz respectively. In addition, there are several harmonics at frequencies up to several kHz, which cause air vibrations to which the human ear is very sensitive.

It is the object of the invention to provide an apparatus of the type mentioned in the opening paragraph, which provides a better protection of the objective and which damps the annoying noises caused by the focussing movement of the objective.

The apparatus according to the invention is characterized in that the objective is accommodated in an enclosure forming a fully enclosed space which encloses the objective in a substantially dust-tight manner which damps out annoying sounds produced by focussing movements of the objective, the enclosure comprising stationary plane-parallel, radiation-beam-transmissive shielding means near the free end of the movable objective so as to extend transversely of the optical axis and parallel to the deck at a location between the lens system and the location of the rotary information disc if disposed on the turntable and the lens system is corrected for the optical properties of the shielding means.

The invention provides an effective protection of the movable objective from dust and ambient contamination as well as from mechanical damage. However, it is a requirement that there should be a sufficient operating distance between the objective and the rotary information disc. It is found possible to develop objectives for optical video disc players having an operating distance of roughly 4 mm, whilst an even larger operating distance seems to be possible. Obviously, the surface of the shielding means facing the information disc should also be kept clean. Regular contact with the surface of the shielding means is therefore inevitable. However, when said means are touched neither the objective nor the objective frame is subjected to any load. In this respect it is to be noted that from United States Patent Specification 1,855,426 it is known *per se* to interpose a kind of plane-parallel optical element between an objective and a rotary information disc in an apparatus of the type mentioned in the opening paragraph. The presence or absence of said optical element in said apparatus determines which information tracks of the information disc are being read. The plane-parallel optical element is not mounted stationarily on the main frame of the apparatus, but movably and therefore does not constitute a shielding means which can protect the objective against contaminants dust and mechanical damage.

The apparatus according to the invention has the further important advantage that the surroundings are isolated from the noise produced by the objective, so that the air vibrations caused by the movements of the objective will not reach human ears at all or only at a strongly reduced level.

In order to obtain the necessary mechanical and

optical qualities of the shielding means, a preferred embodiment of the invention is of interest which is characterized in that the shielding means are made of a moulded polyamid foil. Apart from a number of suitable optical properties, polyamide foils generally have a less suitable property in that double refraction may occur owing to internal stresses in the material caused by mechanical operations. However, in the case of moulded polyamide foils this disadvantage is found to be mitigated or substantially eliminated.

A further embodiment is characterized in that the shielding means fit in an opening in the deck so that the deck together with the shielding means constitute a substantially closed surface. Preferably the shielding means are integral with at least a part of said deck. An additional advantage of such an application is that a more attractive styling can be obtained resulting in products having a highly elegant and aesthetically pleasing outer shape.

If an apparatus is employed which is constructed in accordance with a previously mentioned embodiment in which the objective is movable between first and second extreme positions, *i.e.* from nearer the centre of an information disc towards the circumference of the information disc, a further embodiment of the invention is of importance in order to inhibit an undesired contact between the shielding means and the edge of a slightly sagging information disc. This embodiment is characterized in that, in order to inhibit contact between the shielding means or parts carrying the shielding means and the edge of a slightly sagging information disc when the apparatus is put into operation, at least one stop roller is arranged on the deck near the edge of the information disc disposed on the turntable for rolling contact with the edge. In the case of a slightly sagging information disc the stop roller, normally speaking, only contacts a part of the circumference of the information disc when said disc is accelerating to its operating speed. The centrifugal forces which are exerted on the information disc by the rapid rotation tend to straighten said disc in a plane perpendicular to the axis of rotation.

It is also possible to utilize another embodiment of the invention which is characterized in that in order to inhibit contact between the shielding means and an edge of a slightly sagging information disc when the apparatus is put into operation, the shielding means, near the turntable, are connected to the cabinet so as to be pivotable about a pivotal axis perpendicular to the axis of rotation of the information disc and are at least pivotable between an inclined position and a levelled position, the objective frame and the shielding means are provided with pivoting means which cooperate with each other, and when the objective frame moves radially away from the turntable to the edge of the information disc the shielding means are pivoted from the inclined position to the levelled position, and *vice versa*, by cooperation of the said pivoting means.

The invention will now be described in more detail with reference to the drawing, which relates to some embodiments and in which:

Fig. 1 is a perspective view of a video disc player with open cover,

Fig. 2 is a perspective view of a mounting unit incorporated in the video disc player of Fig. 1,

Fig. 3 is a cross-sectional view taken on the line III—III in Fig. 2,

Fig. 4 is a perspective view of a modified video disc player,

Fig. 5 is a perspective view of a modified mounting unit for the video disc player of Fig. 4, and

Fig. 6 is a perspective view of a video camera with an information disc on which video information is to be recorded.

The video disc player of Fig. 1 comprises a main frame, which frame comprises a cabinet 1 with a number of controls 2 at the front side for controlling the various functions. In the centre there is a recessed portion 3 which can be covered by means of a hinged cover 4. A drive spindle 6 extends through the substantially plane deck 5 in the recessed portion 3. Said spindle is provided with a centring member 7 for a video disc 21 as well as a turntable 8. The cover carries a disc loader 9 which is movable to a position opposite the centring member, which loader magnetically cooperates with the centring member in order to clamp the video disc on the supporting table. In the cabinet 1 there is mounted a mounting unit 10 (see Fig. 2) belonging to the main frame, which unit comprises a subframe 11. Said subframe comprises a profiled injection-moulded product to which the cover 4 is hinged. Furthermore, it accommodates substantially all the optical and mechanical elements necessary for the operation of the video disc player, such as the spindle 6 with the centring member 7 and the supporting table 8, as well as a drive motor (not shown) for the spindle. Furthermore, it carries a laser 12, a number of optical elements 13, 14 and 15 (see Fig. 3) as well as a movable objective frame 16 in which the objective 17 is movably guided. For further information on the construction of the objective frame and the cooperation with the objective reference is made to the Applicants' previous United States Patent Specification 4,021,101 (herewith incorporated by reference). In the objective 17 there is arranged a lens system having an optical axis 18, along which the objective can be moved upwards and downwards. For the guidance of the objective 17 along the axis 18 there is provided a bearing bush 19, which is rigidly connected to the objective frame 16.

Near the free end 20 of the objective 17, extending transversely of the optical axis 18 and located between the lens system in the objective 17 and the location of the rotary video disc 21, stationary plane-parallel, radiation-beam-transmissive shielding means 22 which are connected to the main frame, for shielding the objective 17 from dust, contaminants and mechanical damage.

The objective frame 16 is movable over the subframe 11 along a straight guide by means of a drive motor, not shown. As is shown in Fig. 3 the straight guide comprises a rod 23 and a flat guide way 24 over which a roller 25 runs. See also Fig. 5, which shows a modified embodiment of the invention, but in which the subframe and the objective frame are identical except for some details. The laser 12 produces a light beam which enters the objective 17 *via inter alia* the optical elements 13, 14 and 15. Upon reflection of the focussed beam at the information surface of the video disc 21 the light beam returns to the interior of the video disc player via the objective 17 and the optical elements 15 and 14. The video signal, the audio signal as well as the signals required for the automatic control of the movements of the objective frame 16 and the objective 17 and for any other moving elements in the light path of the video disc player, are obtained by conversion of the light-beam modulation into an electrical modulation with the aid of opto-electronic means, not shown, which are irrelevant to the present invention.

The shielding means 22 comprises a plane-parallel shielding plate having a thickness not greater than 0.5 mm. The objective frame 16 is movable to the main frame. Relative to the main frame and thus also relative to the subframe 11, the objective 17 follows a straight path between a first extreme position nearer the axis of rotation 26 of the video disc 21 and a second extreme position nearer the circumference of the video disc. The shielding plate 22 extends between the first and THE second extreme position over the full length of the said path. Said shielding plate may for example be constituted by a moulded polyamide foil.

As is shown especially in Figs. 2 and 3, the objective 17 is located in an enclosure *27*, which encloses the objective in a substantially dust-tight manner, and the shielding plate 22 forms a part of said enclosure. The shielding plate may for example be connected to the rest of the enclosure by glueing, clamping or R.F. welding. The subframe 11 is designed so that the part covered by the enclosure 27 is also closed at the underside. As a result of this the objective 17 is accommodated in a fully enclosed space, so that an excellent protection against dust and damage is obtained. Said enclosure not only accommodates the objective but also the other optical components of the light path. The laser 12 is for the greater part disposed outside the enclosure *27*. An important additional advantage of this embodiment of the invention is that annoying sounds produced by the focussing movements of the objective 17 can be damped out in a considerably more efficient manner.

In order to avoid contact between the enclosure *27*, which carries the shielding plate 22, and the edge of a slightly sagging video disc when the video disc player is put into operation, two stop rollers 28 are arranged on the main frame 1 near the second extreme position of the objective 17 for rolling contact with the edge of the sagging video disc.

Figs. 4 and 5 relate to a video disc player which is largely identical to that of Figs. 1 to 3, except for the means for shielding the objective. The components which are identical to those which also appear in Figs. 1 to 3 are designated by reference numerals that are 100 higher than those in Figs. 1 to 3. The shielding means comprise a board shielding plate 140, which is made in one piece from a suitable radiation-beam-transmissive plastics. Said shielding plate forms parts of the deck 103 which constitutes the bottom of the recess 105 in the cabinet of the main frame 101. In this embodiment the shielding plate also extends over the entire length of the path which the movable objective 117 describes relative to the subframe 111. In order to avoid contact of the shielding plate 140 with the edge of a slightly sagging video disc when the video disc player is put into operation the shielding plate is pivotably connected to the subframe 111, which belong to the main frame, near the first extreme position of the objective system 116, which position is situated near the spindle 106. As a result of this the shielding plate is pivotable about a pivotal axis 141 perpendicular to the axis of rotation 126 of the video disc, between an inclined position, shown in Figs. 4 and 5, and a horizontal position. The horizontal position is reached when the objective is in its second extreme position near the edge of the video disc. The means for pivotably connecting the shielding plate 140 to the subframe 111 may comprise two pivot pins 142, one at each side of the shielding plate.

The objective frame 116 and the shielding plate 140 are provided with cooperating pivoting means. Said means comprise the lower surface of the shielding plate 140 and a ridge 143 on the objective frame. When the objective frame is moved from the first extreme position, see Figs. 4 and 5, to the second extreme position, the shielding plate 140 is pivoted from the inclined position to the horizontal position by cooperating of the ridge 143 with the underside of the shielding plate 140. When the objective frame returns, the shielding plate is pivoted back from the horizontal position to the inclined position. The shielding plate can be pivoted back to the inclined position by its own weight but may also be urged in the direction of the inclined position by resilient means.

Fig. 6 shows an electronic camera which is adapted to record video information on a rotary information disc 150. The camera comprises a main frame 151 on which there are arranged a pivotable cover 152, an objective 153, a viewfinder 154, a grip 155 and a number of controls 156 and 157. The information disc 150 can be fitted onto a turntable 158 on which a centring element 159 is located, the information disc being fitted onto said element with its central opening 160. In the cover 152 there is arranged a disc loader, not shown, for pressing the information disc onto the turntable 158. The main frame 151

comprises a substantially flat frame plate 161 extending transversely of the axis of rotation 162 of the information disc. The whole or part of said frame plate is radiation-beam-transmissive and constitutes a shielding plate for an objective which is movable in the housing 151 of the camera. *Via* said objective video information can be recorded on the information disc with the aid of a radiation beam. The information disc may for example be of the type described in United States Patent Specification 4,074,282 (herewith incorporated by reference).

**Claims**

1. An apparatus for writing and/or reading through a transparent substrate with the aid of a radiation beam information on a reflecting information surface of an information disc which rotates about an axis of rotation, which apparatus comprises:

— a movable objective for concentrating the radiation beam through the said substrate to form a radiation spot in a focussing plane coinciding with the said information surface and comprising a lens system with one or more lenses and with an optical axis and having a free end which is to be directed towards the information disc,

— an objective frame, supporting the movable objective and comprising a parallel guide for guiding the movements of the objective along the optical axis,

— a subframe movably supporting the objective frame and comprising guide means and drive means to move the objective parallel to the information disc to scan the information on it,

— drive means for rotatably driving the information disc and comprising a drive spindle carrying a turntable for supporting the information disc, and

— a cabinet housing the subframe and other elements belonging to the apparatus, the cabinet comprising a deck parallel to the information disc if present on the turntable,

characterized in that:

— the objective is accommodated in an enclosure, forming a fully enclosed space which encloses the objective in a substantially dust-tight manner which damps out annoying sounds produced by focussing movements of the objective, the enclosure comprising stationary plane-parallel, radiation-beam-transmissive shielding means near the free end of the movable objective so as to extend transversely of the optical axis and parallel to the deck at a location between the lens system and the location of the rotary information disc if disposed on the turntable, and

— the lens system is corrected for the optical properties of the shielding means.

2. An apparatus as claimed in Claim 1, characterized in that the shielding means are made of a moulded polyamide foil.

3. An apparatus as claimed in Claim 1, characterized in that the shielding means fit in an opening in the deck so that the deck together with the shielding means constitute a substantially closed surface.

4. An apparatus as claimed in Claim 3, characterized in that the shielding means are integral with at least a part of said deck.

5. An apparatus as claimed in Claim 3 or 4, characterized in that, in order to inhibit contact between the shielding means or parts carrying the shielding means and the edge of a slightly sagging information disc when the apparatus is put into operation, at least one stop roller is arranged on the deck near the edge of the information disc disposed on the turntable for rolling contact with the edge.

6. An apparatus as claimed in Claim 3, characterized in that, in order to inhibit contact between the shielding means and an edge of a slightly sagging information disc when the apparatus is put into operation,

— the shielding means, near the turntable, are connected to the cabinet so as to be pivotable about a pivotal axis perpendicular to the axis of rotation of the information disc and are at least pivotable between an inclined position and a levelled position,

— the objective frame and the shielding means are provided with pivoting means which cooperate with each other, and

— when the objective frame moves radially away from the turntable to the edge of the information disc the shielding means are pivoted from the inclined position to the levelled position, and *vice versa*, by cooperation of the said pivoting means.

**Patentansprüche**

1. Gerät zum Aufzeichnen und/oder Wiedergeben von Information auf einer rotierenden Informationsscheibe mittels eines Strahlungsbündels auf einer reflektierenden Informationsfläche einer Informationsscheibe, die um eine Drehungsachse sich dreht, wobei das Gerät die folgenden Elemente aufweist:

— ein bewegliches Objektiv zum Konzentrieren des Strahlungsbündel durch das genannte Substrat hindurch zur Bildung eines Strahlungsfleckens in einer Fokussierebene, die mit der genannten Informationsfläche zusammenfällt und ein Linsensystem aufweist mit einer oder mehreren Linsen und mit einer optischen Achse sowie mit einem freien Ende, das der Informationsscheibe zugewandt werden muss,

— ein Objektivgestell, das das bewegliche Objektiv trägt und eine Parallelführung aufweist zur Führung der Bewegungen des Objektivs längs der optischen Achse,

— ein Hilfsgestell, das auf bewegliche Weise das Objektivgestell trägt und Führungsmittel aufweist sowie Antriebsmittel zur Bewegung des Objektivs parallel zur der Informationsscheibe zum Abtasten der Information darauf,

— Antriebsmittel zum drehenden Antreiben der Informationsscheibe und mit einer Antriebsspindel, die einen Plattenteller trägt zum Unter-

comprises a substantially flat frame plate 161 extending transversely of the axis of rotation 162 of the information disc. The whole or part of said frame plate is radiation-beam-transmissive and constitutes a shielding plate for an objective which is movable in the housing 151 of the camera. *Via* said objective video information can be recorded on the information disc with the aid of a radiation beam. The information disc may for example be of the type described in United States Patent Specification 4,074,282 (herewith incorporated by reference).

**Claims**

1. An apparatus for writing and/or reading through a transparent substrate with the aid of a radiation beam information on a reflecting information surface of an information disc which rotates about an axis of rotation, which apparatus comprises:

— a movable objective for concentrating the radiation beam through the said substrate to form a radiation spot in a focussing plane coinciding with the said information surface and comprising a lens system with one or more lenses and with an optical axis and having a free end which is to be directed towards the information disc,

— an objective frame, supporting the movable objective and comprising a parallel guide for guiding the movements of the objective along the optical axis,

— a subframe movably supporting the objective frame and comprising guide means and drive means to move the objective parallel to the information disc to scan the information on it,

— drive means for rotatably driving the information disc and comprising a drive spindle carrying a turntable for supporting the information disc, and

— a cabinet housing the subframe and other elements belonging to the apparatus, the cabinet comprising a deck parallel to the information disc if present on the turntable,

characterized in that:

— the objective is accommodated in an enclosure, forming a fully enclosed space which encloses the objective in a substantially dust-tight manner which damps out annoying sounds produced by focussing movements of the objective, the enclosure comprising stationary plane-parallel, radiation-beam-transmissive shielding means near the free end of the movable objective so as to extend transversely of the optical axis and parallel to the deck at a location between the lens system and the location of the rotary information disc if disposed on the turntable, and

— the lens system is corrected for the optical properties of the shielding means.

2. An apparatus as claimed in Claim 1, characterized in that the shielding means are made of a moulded polyamide foil.

3. An apparatus as claimed in Claim 1, characterized in that the shielding means fit in an opening in the deck so that the deck together with the shielding means constitute a substantially closed surface.

4. An apparatus as claimed in Claim 3, characterized in that the shielding means are integral with at least a part of said deck.

5. An apparatus as claimed in Claim 3 or 4, characterized in that, in order to inhibit contact between the shielding means or parts carrying the shielding means and the edge of a slightly sagging information disc when the apparatus is put into operation, at least one stop roller is arranged on the deck near the edge of the information disc disposed on the turntable for rolling contact with the edge.

6. An apparatus as claimed in Claim 3, characterized in that, in order to inhibit contact between the shielding means and an edge of a slightly sagging information disc when the apparatus is put into operation,

— the shielding means, near the turntable, are connected to the cabinet so as to be pivotable about a pivotal axis perpendicular to the axis of rotation of the information disc and are at least pivotable between an inclined position and a levelled position,

— the objective frame and the shielding means are provided with pivoting means which cooperate with each other, and

— when the objective frame moves radially away from the turntable to the edge of the information disc the shielding means are pivoted from the inclined position to the levelled position, and *vice versa*, by cooperation of the said pivoting means.

**Patentansprüche**

1. Gerät zum Aufzeichnen und/oder Wiedergeben von Information auf einer rotierenden Informationsscheibe mittels eines Strahlungsbündels auf einer reflektierenden Informationsfläche einer Informationsscheibe, die um eine Drehungsachse sich dreht, wobei das Gerät die folgenden Elemente aufweist:

— ein bewegliches Objektiv zum Konzentrieren des Strahlungsbündel durch das genannte Substrat hindurch zur Bildung eines Strahlungsfleckens in einer Fokussierebene, die mit der genannten Informationsfläche zusammenfällt und ein Linsensystem aufweist mit einer oder mehreren Linsen und mit einer optischen Achse sowie mit einem freien Ende, das der Informationsscheibe zugewandt werden muss,

— ein Objektivgestell, das das bewegliche Objektiv trägt und eine Parallelführung aufweist zur Führung der Bewegungen des Objektivs längs der optischen Achse,

— ein Hilfsgestell, das auf bewegliche Weise das Objektivgestell trägt und Führungsmittel aufweist sowie Antriebsmittel zur Bewegung des Objektivs parallel zur der Informationsscheibe zum Abtasten der Information darauf,

— Antriebsmittel zum drehenden Antreiben der Informationsscheibe und mit einer Antriebsspindel, die einen Plattenteller trägt zum Unter-



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stützen der Informationsscheibe und

— ein Gehäuse, das das Hilfsgestell und andere Elemente, die dem Gerät zugeordnet sind, umfasst, wobei das Gehäuse eine Montageplatte aufweist, die sich parallel zu der Informationsscheibe erstreckt, wenn diese auf dem Plattenteller vorhanden ist,

dadurch gekennzeichnet, dass:

— das Objektiv sich in einer Hülle befindet, die einen völlig geschlossenen Raum bildet, der das Objektiv auf nahezu staubdichte Weise umschliesst, wobei dieser Raum störende Geräusche, die durch die Fokussierbewegungen des Objektivs verursacht werden, ausschaltet, wobei die Umhüllung ortsfeste planparallele Strahlungsbündelübertragungsschutzmittel aufweist in der Nähe des freien Endes des beweglichen Objektivs, die sich quer zu der optischen Achse und parallel zu der Montageplatte an einer Stelle zwischen dem Linsensystem und der Stelle der sich drehenden Informationsscheibe befinden, wenn diese sich auf dem Plattenteller befindet und

— das Linsensystem für optische Eigenschaften der Schutzmittel korrigiert wird.

2. Gerät nach Anspruch 1, dadurch gekennzeichnet, dass die Schutzmittel aus einer in einem Pressverfahren hergestellten Polyamidfolie bestehen.

3. Gerät nach Anspruch 1, dadurch gekennzeichnet, dass die Schutzmittel in einer Öffnung in der Montageplatte passen so dass die Platte zusammen mit den Schutzmitteln eine nahezu geschlossene Oberfläche bilden.

4. Gerät nach Anspruch 3, dadurch gekennzeichnet, dass die Schutzmittel mit wenigstens einem Teil der genannten Montageplatte einen integrierten Teil bilden.

5. Gerät nach Anspruch 3 oder 4, dadurch gekennzeichnet, dass zur Vermeidung eines Kontaktes zwischen den Schutzmitteln oder Teilen, die die Schutzmittel tragen und dem Rand einer einigermassen gewölbten Informationsscheibe, wenn das Gerät in Betrieb gesetzt wird, wenigstens eine Halterolle auf der Montageplatte in der Nähe des Randes der Informationsscheibe auf dem Plattenteller vorgesehen ist für einen rollenden Kontakt mit diesem Rand.

6. Gerät nach Anspruch 3, dadurch gekennzeichnet, dass zur Vermeidung eines Kontaktes zwischen den Schutzmitteln und einem Rand einer leicht gewölbten Informationsscheibe wenn das Gerät in Betrieb gesetzt wird,

— die Schutzmittel in der Nähe des Plattentellers mit dem Gehäuse verbunden und um eine Schwenkachse senkrecht zu der Drehungsachse der Informationsscheibe schwenkbar und wenigstens zwischen einer schrägen Lage und einer flachen Lage schwenkbar sind,

— das Objektivgestell und die Schutzmittel mit Schwenkmitteln versehen sind, die miteinander zusammenarbeiten und

— wenn das Objektivgestell sich in radialer Richtung von dem Plattenteller zu dem Rand der Informationsscheibe bewegt, die Schutzmittel aus der schrägen Lage in die flache Lage geschwenkt werden und umgekehrt und zwar durch Zusammenarbeit der genannten Schwenkmittel.

**Revendications**

1. Appareil d'enregistrement et/ou de lecture, à travers un substrat transparent et à l'aide d'un faisceau de rayonnement, d'information sur une surface d'information réfléchissante d'un disque d'information tournant autour d'un axe de rotation, appareil comportant:

— un objectif mobile servant à concentrer le faisceau de rayonnement à travers ledit substrat pour former un spot de rayonnement dans un plan de focalisation coïncidant avec ladite surface d'information, objectif qui comporte un système de lentilles ayant une ou plusieurs lentilles et un axe optique et présente une extrémité libre dirigée vers le disque d'information,

— un cadre porte-objectif supportant l'objectif mobile et comportant un guide parallélogramme pour guider l'objectif dans ses mouvements suivant l'axe optique,

— un sous-cadre supportant à mobilité le cadre porte-objectif et comportant des moyens de guidage et des moyens d'entraînement servant à déplacer l'objectif parallèlement au disque d'information pour explorer l'information sur celui-ci,

— des moyens d'entraînement servant à animer le disque d'information d'un mouvement de rotation et comportant un arbre d'entraînement portant un plateau tournant pour supporter le disque d'information et

— un boîtier contenant le sous-cadre et d'autres éléments faisant partie de l'appareil, boîtier qui est muni d'une platine qui est parallèle au disque d'information placé sur le plateau tournant,

caractérisé en ce que:

— l'objectif est disposé dans une enceinte formant un espace entièrement fermé enfermant l'objectif d'une manière sensiblement étanche aux poussières, de sorte qu'il amortit des sons gênants produits par des mouvements de focalisation de l'objectif, enceinte comportant des moyens de blindage stationnaires transmettant des faisceaux de rayonnement et ayant des faces planes et parallèles, moyens qui sont placés à proximité de l'extrémité libre de l'objectif mobile de façon à s'étendre perpendiculairement à l'axe optique et parallèlement à la platine à un endroit situé entre le système de lentilles et l'endroit du disque d'information rotatif placé sur le plateau tournant et

— le système de lentilles est corrigé pour les propriétés optiques de moyens de blindage.

2. Appareil selon la revendication 1, caractérisé en ce que les moyens de blindage sont constitués par une feuille moulée de polyamide.

3. Appareil selon la revendication 1, caractérisé en ce que les moyens de blindage s'adaptent à une ouverture du couvercle, de sorte que la platine conjointement avec les moyens de blindage constituent une surface sensiblement fermée.



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4. Appareil selon la revendication 3, caractérisé en ce que les moyens de blindage sont solidaires d'au moins une partie de ladite platine.

5. Appareil selon la revendication 3 ou 4, caractérisé en ce que, pour empêcher lors de la mise en service de l'appareil que les moyens de blindage ou des parties supportant les moyens de blindage n'entrent en contact avec le bord d'un disque d'information légèrement fléchi, il est prévu sur la platine, à proximité du bord du disque d'information placé sur le plateau tournant, au moins un galet de butée servant à entrer en contact de roulement avec le bord.

6. Appareil selon la revendication 3, caractérisé en ce que, pour empêcher lors de la mise en service de l'appareil que les moyens de blindage n'entrent en contact avec un bord d'un disque d'information légèrement fléchi,

— les moyens de blindage, à proximité du plateau tournant, sont réunis au boîtier de façon à pouvoir pivoter autour d'un axe de pivotement perpendiculaire à l'axe de rotation du disque d'information et peuvent au moins pivoter entre une position inclinée et un position horizontale,

— le cadre porte-objectif et les moyens de guidage sont munis de moyens de pivotement coopérant les uns avec les autres et

— lors du déplacement du cadre porte-objectif dans le sens radial à partir du plateau tournant vers le bord du disque d'information, les moyens de blindage sont amenés à pivoter à partir de la position inclinée dans la position horizontale et inversement par coopération desdits moyens de pivotement.



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