The invention relates to a compact disc changer in accordance with the first part of claim 1.

A CD changer in which different compact discs can be selectively played back, preferably contains a playback unit having the drive mechanism, the scanner and the signal processing circuits as well as a magazine in which a multitude of compact discs are arranged in the form of a stack. Means are provided between the playback unit and the magazine with which one of the compact discs contained in the magazine can be extracted from the magazine as required and brought into the play back position within the playback unit. In the process for the selection of different compact discs, a relative movement between the playback unit and the magazine is required. Due to this movement, the playback unit is brought into the position with respect to the magazine in which a wanted compact disc can be extracted from the magazine. For this, it is necessary to detect and control the relative positions of the playback unit and the magazine very precisely.

A changer player for cassettes which is equipped with a device for the extraction of cassettes is described in the US -PS 4 608 679.

The device for the extraction of a cassette is fitted with an infrared transmitter and an infrared receiver. A strip having circular reflecting surfaces is provided below each row of compartments of a magazine wherein one circular reflecting surface is associated with each compartment. The device for the extraction of a cassette is then correctly positioned for the extraction of the cassette when the light emitted by the infrared transmitter is reflected from the circular surface onto the infrared receiver. However, it cannot be determined by means of the infrared transmitter, the circular reflecting surface and the infrared receiver whether or not a cassette is present in a compartment. In order to be able to determine this, a second opto-electric device having an infrared transmitter and an infrared receiver for each compartment is provided. In order to be able to further determine if a cassette is correctly oriented in the compartment, a third opto-electric device having an orientation transmitter and an orientation receiver for each compartment is provided. This changer player is built proportionately expensively because three different opto-electric devices are provided for the device for the extraction of the cassettes.

A disc changer in which a play back unit is exactly positioned relative to the magazine is known from the DE-OS 34 21 912. The

exact positioning is achieved by a light reflecting plate having reflecting patterns and by means of photosensors. Furthermore, addresses for the individual discs are provided on the light reflecting plate in the form of further reflecting patterns. However, the light reflecting plate is attached to the rear side of the magazine; the photosensors are arranged in a housing behind the light reflecting plate. The magazine is movable while the play back unit and the photosensors are arranged to be fixed.

A disc player having a magazine in which the play back unit and the magazine are positioned relative to one another is disclosed in the BE-A 903 223. For this purpose, an optical reading device is provided which reads the data for the correct positioning of the individual compartments and this is then subsequently evaluated in a microprocessor.

The object of the invention is thus to develop for a CD changer in accordance with the first part of claim 1, a positioning of the play back unit relative to the magazine which is particularly simple and which, in particular, is achieved substantially without mechanically moved parts.

This object is achieved by the invention defined in claim 1. Advantageous developments of the invention are specified in the appendant claims.

By the use of an optically effective coupling between the two parts, there results a particularly simple, operationally secure and contactlessly functioning determination and control of the relative positioning between the play back unit and the magazine. Mechanically moved parts are not thereby required. This is particularly advantageous for a CD changer for a car because the functioning of mechanically moved parts can be dependent on the forces of acceleration effective on the car. With the invention, the reflecting properties of the compact disc can be used in an advantageous manner in order to determine the position of the play back unit relative to the magazine. Special reflecting markings on the magazine are not thereby required. A further advantage consists in that the light beam is likewise not reflected from a compartment of the magazine in which no compact disc is present. Thus, in an advantageous manner, the play back unit is not stopped at this point for the extraction of a compact disc from the magazine.

The invention will be explained hereinafter with the help of the drawing. Therein

Fig. 1 shows in principle, the mode of operation of play back unit and magazine

Fig. 2 a special construction of a light source and a photoelement and

Fig. 3 the magazine in two further developments of the invention.

In Fig. 1, the play back unit 1 having the platter 2 is displaceably arranged in the direction 3 relative to the stationary magazine 4 in order to be able to selectively extract different compact discs 5 out of the individual compartments 6. On each occasion, one compact disc 5 is extracted from the magazine 4 by means that are not specifically illustrated and fed in the direction 7 to the platter 2.

The play back unit 1 contains a light source 8 which projects the light beam 9 in the direction onto the left wall of the magazine 4. There are further provided in the play back unit 1, a photoelement 10, a control circuit 11, a drive mechanism 12 and a control stage 13 for the extraction of a disc 5 in the direction 7.

When the play back unit 1 is moved in the direction 3 in order to extract a specific disc 5 from the magazine 4, the light beam 9 initially strikes for example, the darkly coloured front wall 14 of the magazine 4 as is illustrated by the light beam 9a. The light beam 9a is not reflected at the black coloured front wall 14. Thereby, no light reaches the photoelement 10. The control circuit 11 is thereby controlled such that the drive mechanism 12 for the movement of the play back unit 1 in the direction 3 remains switched on and the control stage 13 for the extraction of a disc 5 in the direction 7 is not turned on. The play back unit 1 or else the magazine 4 may be moved in the direction 3 for the selection of a specific compact disc 5.

When the play back unit 1 has reached a position relative to the magazine which is relatively suitable for the extraction of a disc 5, the light beam 9 strikes the reflecting outer edge of a compact disc 5. There thus ensues the reflected light beam 9b which reaches the photoelement 10. The control circuit 11 is thereby controlled such that the drive mechanism 12 for the movement in the direction 3 is switched off and the control stage 13 for the extraction of a disc 5 is turned on. The

reflection of the light beam 9 at an edge of a compact disc 5 is thus used as the criteria that the play back unit 1 has reached a position relative to the magazine which is suitable for the extraction of a compact disc 5. When the light beam 9 is directed onto the chamber 6d which does not contain a disc 5, there is likewise no reflection. The control stage 13 for the extraction of a disc 5 is not then activated.

Fig. 2 shows a device which simultaneously forms the light source 8 and the photoelement 10. A ring shaped photocell 16 in the form of a semiconductor body is introduced into the semiconductor substrate 15. A light emitting diode 17 in the form of a gallium arsenide diode as the semiconductor in the substrate 15 is introduced into the inner opening of the photocell 16. A ring shaped screen 18 is provided between the photocell 16 and the light emitting diode 17. Photocell 16 and light emitting diode 17 have a common terminal 19 which is connected to earth. A battery 21, which causes the diode 17 to light up and produce the light beam 9, is connected to the second terminal 20 of the light emitting diode 17. The reflected light beam 9b strikes the ring shaped photocell 16 and produces at the terminal 22, a voltage Us which is evaluated in the control circuit 11 in accordance with Fig. 1. The ring shaped screen 18 prevents the light emitted by the light emitting diode 17 from directly reaching the photocell 17. Such an arrangement is described in more detail in the DE-PS 24 25 855.

Fig. 3 shows a magazine 4 having two additional features in accordance with further developments of the invention.

A magnetic strip 23 serving as a writable and readable store is associated with each of the disc compartments 6a to 6d. The address of the disc 5a located in the compartment 6a is writable into the magnetic strip 23 with the keyboard 24 of the play back unit 1 and the scanner 25. The address of the disc 5a located in the compartment 6a is then contained in the magnetic strip 23. The remaining compartments 6b to - d are correspondingly formed. For the play back of a wanted disc 5, the address of this disc is entered via the keyboard 24 in the play back unit 1. The magnetic strip 23 is read by the scanner 25 during the movement of the play back unit 1 relative to the magazine 4 in accordance with Fig. 1. When it is determined that there is agreement between the address read from the magnetic strip 23 and the address entered in the keyboard 24, the movement of the play back unit 1 in the direction 3 in accordance with Fig. 1 is stopped and the disc 5 is extracted from the compartment 6. Thus, in this manner, a currently wanted disc 5 can be fed for reproduction to the play back unit 1 by operation of the

keyboard 24 which, e.g. in a car, is arranged remotely from the play back unit 1 and the magazine 4. Instead of the magnetic strip 23, other stores, e.g. optical stores or solid state memories which are writable for the insertion of an address, readable for the recognition of the address and erasable for the insertion of another address, may be provided. Such types of store for the insertion and recognition of addresses of cassettes are described for example in the DE OS- 29 43 409.

Moreover, a character field 26 having the numerals 1 - 8 is allocated to each disc compartment 6. The numerals 1 - 8 represent the individual items e.g. short or long pieces of music, which are each stored on the disc 5. In practice, the number will be greater than 8. The operator marks the numbers of the items which he wants to hear from the current disc 5 e.g. with a black pen as is indicated by the blacked out fields. When the disc 5a is fed to the play back unit 1 for a reproduction, the character field is scanned by the opto-electronic scanner 27 and the result supplied to the play back unit 1. By appropriate control of the scanning advance of the play back unit 1, it is achieved that only the marked items 2 and 7 are played back during the reproduction and the items located therebetween are jumped over with a very short pause in the order of magnitude of 1 - 2 seconds by means of the fast search mechanism. Correspondingly, for the disc 5b, only the item no. 4, and for the disc 5c, only the items no. 1 and 8 are reproduced. No numeral is marked in the character field 26d because there is no disc 5 located in the compartment 6d.

By the combination of the addressing with the magnetic strips 23 and the evaluation of the marked numerals of the character field 26, it is thus possible to reproduce any selected items from any selected disc 5 in a desired sequence. Preferably, the play back unit 1 contains a store for the addresses of the discs 5 which are to be fed one after the other to the play back unit 1 in order to then reproduce from each disc the items marked in the character field 26.

The magazine 4 may also be formed by assembling together individual containers which each contain a respective disc. For example, each compact disc is mounted in a housing open on one side, and the individual housings or containers for the compact discs are then built up into the magazine 4 by means of snap-in fastenings or some other positive locking arrangement.

* C L M S *

Claims

1. Information carrier changer including a gripping device (1) and a magazine (4) containing the information carriers (5), which are relatively displaceable for the extraction of different information carriers (5), wherein an optical device (8 - 10) serving to position the gripping device (1) relative to the magazine (4) is provided between the two parts, in which a light source (8) projecting a light beam (9) onto the open side of the magazine (4) i.e. onto the walls and edges of the magazine facing the gripping device (1) and onto the information carriers, and a photoelement (10, 16) detecting light reflected from the open side of the magazine (4) are provided on the gripping device (1), wherein the photoelement (10, 16) is connected to a control circuit (11) for the positioning of the gripping device (1) relative to the magazine (4) and for the extraction of an information carrier (5), characterised in that, the walls and edges of the magazine (4) facing the gripping device (1) are made non-light reflecting and the information carriers (5) are compact discs which reflect the light beams (9) emitted from the light source (8) onto the photoelement (10, 16).

2. Information carrier changer in accordance with claim 1, characterised in that, the photoelement (16) surrounds the light source (17) in a ring-like manner.

3. Information carrier changer in accordance with claim 1, characterised in that, the light source is formed from light emitting diodes (17) and the photoelement from photocells (16) each as a semiconductor body on the same substrate (15).

4. Information carrier changer in accordance with claim 1, characterised in that, the gripping device (1) is displaceably mounted relative to the stationary magazine (4) for the extraction of the different discs (5).

5. Information carrier changer in accordance with claim 1, characterised in that, a respective storage element (23) is allocated to an information carrier compartment (6) of the magazine (4), in which identification codes of an information carrier (5) are inscribable and are readable for the control of the extraction of this information carrier (5) by the gripping device (1).

* C L M S *

6. Information carrier changer in accordance with claim 1, characterised in that, a manually markable character field (26) for the items present on the information carrier (5) is allocated to a respective information carrier compartment (6) and that the character field (26) is scannable by a reading device (27) which controls the gripping device (1) for the reproduction of the marked items.

7. Information carrier changer in accordance with claim 1, characterised in that, the magazine (4) is constituted by individual containers each holding an information carrier (5).