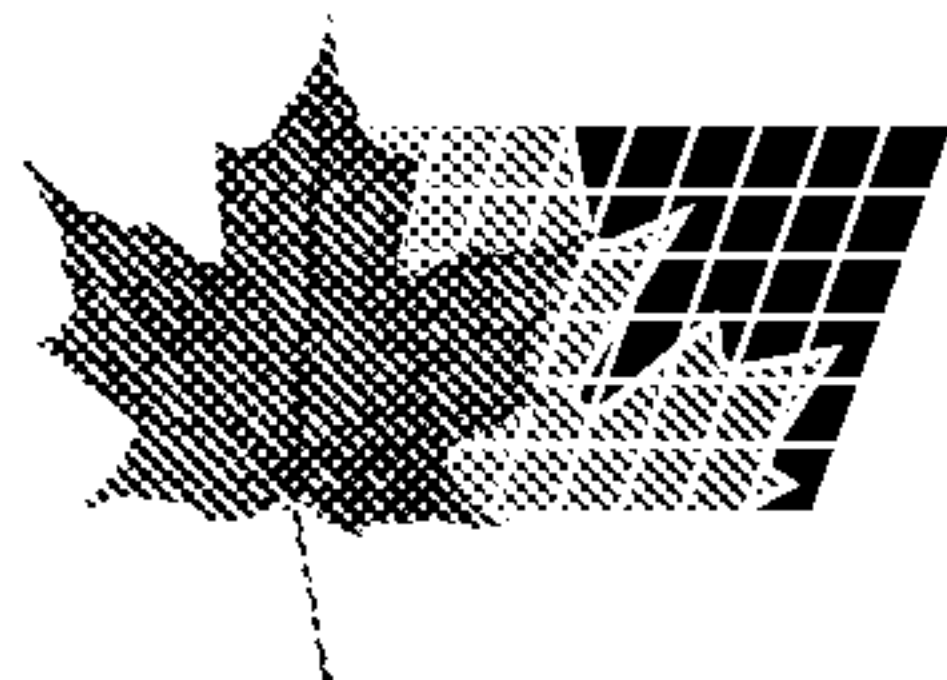
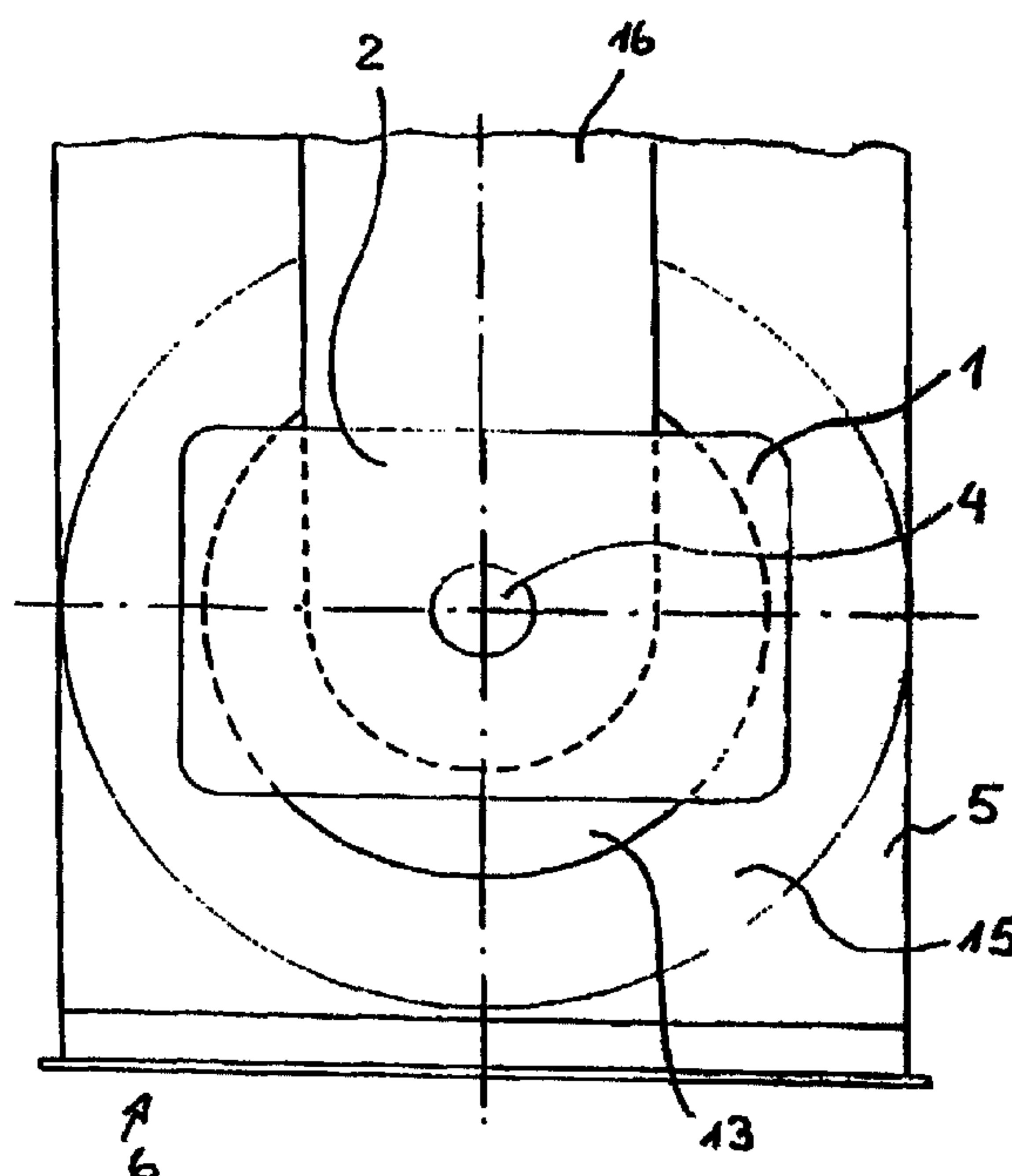




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(54) **SUPPORT DE DONNEES NUMERIQUE**
(54) **DIGITAL DATA CARRIER**



(57) L'invention concerne un support de données numérique (1) présentant un profil, s'écartant d'un diamètre extérieur standard, d'un corps de support (2) permettant le passage dans un lecteur de CD standard (6) comportant un tiroir mobile (5) possédant un premier logement (15) pour des supports de données de diamètre standard supérieur et un deuxième logement (13) pour des supports de données de diamètre standard inférieur. Le support de données numérique présente, sur une face inférieure du corps de support tournée vers le tiroir, un système auxiliaire de centrage permettant le centrage dans le deuxième logement (13), ce système de centrage étant constitué de deux pièces annulaires mutuellement opposées adaptées au deuxième logement (13).

(57) The invention relates to a digital data carrier (1) with a carrier body (2) whose profile deviates from the standard outer diameter. The inventive digital data carrier is for playing in a standard CD-drive (6) which has a retractable tray (5) with a first receiving element (15) for data carriers with a larger standard diameter and a second receiving element (13) for data carriers with a smaller standard diameter. The digital data carrier has a centring aid on the side of the carrier body facing towards the tray, for centring in the second receiving element (13). Said centring aid consists of two ring pieces located opposite each other and adapted to the second receiving element (13).

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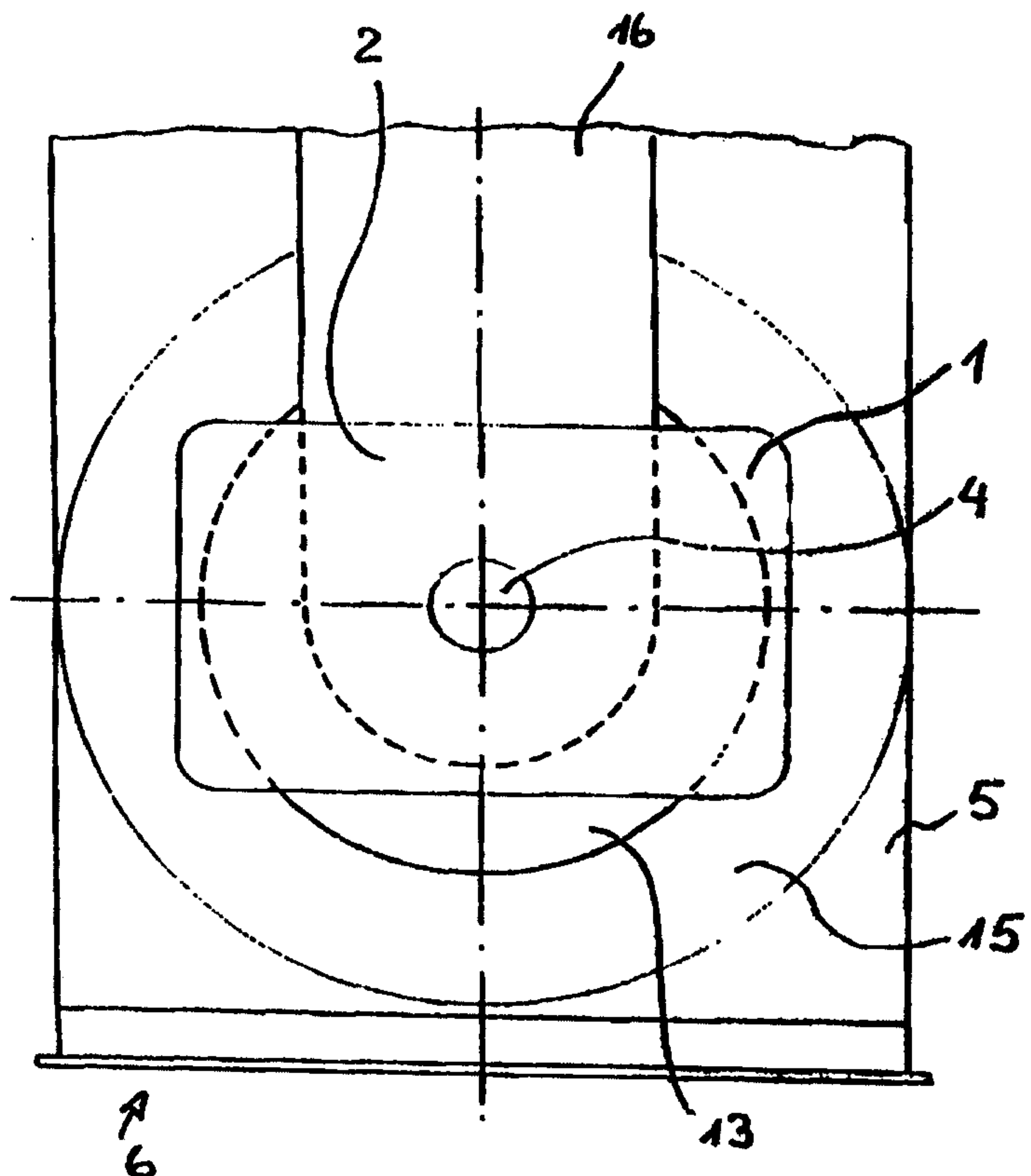
(54) Bezeichnung: DIGITALER DATENTRÄGER

(57) Abstract

The invention relates to a digital data carrier (1) with a carrier body (2) whose profile deviates from the standard outer diameter. The inventive digital data carrier is for playing in a standard CD-drive (6) which has a retractable tray (5) with a first receiving element (15) for data carriers with a larger standard diameter and a second receiving element (13) for data carriers with a smaller standard diameter. The digital data carrier has a centring aid on the side of the carrier body facing towards the tray, for centring in the second receiving element (13). Said centring aid consists of two ring pieces located opposite each other and adapted to the second receiving element (13).

(57) Zusammenfassung

Digitaler Datenträger (1) mit einem von einem Standardaußendurchmesser abweichenden Umriß eines Trägerkörpers (2) zur Abspielung in einem Standard-CD-Laufwerk (6), das eine ausfahrbare Schublade (5) mit einer ersten Aufnahme (15) für Datenträger größeren Standarddurchmessers und einer zweiten Aufnahme (13) für Datenträger kleineren Standarddurchmessers aufweist, der an einer der Schublade (5) zugewandten Unterseite des Trägerkörpers eine Zentrierhilfe zur Zentrierung in der zweiten Aufnahme (13) aufweist, wobei die Zentrierhilfe aus zwei einander gegenüberliegenden, auf die zweite Aufnahme (13) abgestimmten, Ringstücken ausgebildet ist.



PCT/DE99/01582

A digital data carrier

Description:

5 The invention relates to a digital data carrier with a carrier body having an outline which deviates from the standard outer diameter, for playing in a standard CD-drive having an ejectable tray which has a first receiving section for data carriers with a larger standard diameter and a second receiving section for data carriers with a smaller standard diameter.

10

The invention further relates to a system comprising a data carrier in accordance with one of claims 1 to 68 and comprising associated functional stations.

15 The invention further relates to a method for the use of data carriers in accordance with one of claims 1 to 71 at a functional station.

The invention further relates to a method for the manufacture of a digital data carrier in accordance with one of claims 1 to 68.

20

The invention further relates to an injection mold for the manufacture of a digital data carrier in accordance with one of claims 1 to 68.

A digital data carrier is known from DE 297 09 648.6 which is made as a
25 business card consisting of a compact disk (CD) whose maximum width does not exceed 110 mm and whose maximum height does not exceed 70 mm. Information on the sender is stored on or applied to one side of the business card in an optical manner for visual inspection and information

in digital form is stored on a second side, with said information being able to be read in a standard CD drive with an optical reading head and subsequently further processed.

- 5 The disadvantage here is that such a business card or digital data carrier deviating from the standard outer diameter of a compact disk can only be centered in a standard front-loading CD drive with difficulty.

10 A playing aid for non-standard round and/or non-round compact disks is known from DE 297 98 678. This playing aid or centering aid comprises a data carrier receiving section whose outer diameter corresponds to the standard outer diameter of a compact disk and which has an inner shape into which the non-standard digital data carrier can be inserted and which can be placed into an ejectable tray of a standard CD drive together
15 with the centering aid.

The disadvantage here is that an additional centering aid is required which makes the operation of the digital data carrier substantially more difficult.

20

Furthermore, a digital data carrier in the form of a business card is known which has four centering pins at its lower side which engage into a second receiving section for a so-called mini-CD of a standard CD drive and center the digital data carrier in said receiving section.

25

The disadvantage here is that the receiving sections for data carriers of smaller standard diameters or for mini-CDs generally have a radial slit so

that the data carrier provided with the centering pins is only reliably centered in certain positions.

A further disadvantage is that the subsequently punched centering pins,
5 on the one hand, can break off easily so that the standard CD drive can be damaged and, on the other hand, the lower side can be deformed by the subsequent punching such that the digital information applied thereto can no longer be read reliably.

10 Furthermore, so-called shaped CDs are known which are made from a compact disk with a free outline. However, this requires some points or parts of the prior diameter to be left in place so that the so-called shaped CD can be centered in the receiving section for the larger standard diameter of a compact disk.

15

It is the object of the present invention to improve the centering aid of a digital data carrier comprising a carrier body whose outline deviates from a standard outer diameter such that damage to the digital data carrier or the standard CD drive is reliably avoided and such that the CD can be
20 centered easily and reliably.

The object is satisfied in accordance with the invention by the centering aid being made of two ring pieces located opposite one another and matched to the second receiving section.

25

A reliable centering is achieved in any position of the digital data carrier due to the two ring pieces located opposite one another. In addition, a shearing off or breaking off of the ring pieces is reliably avoided by the

reliable centering of the ring pieces which extend over the whole width of the lower side.

In accordance with a preferred embodiment of the invention, the ring
5 pieces have a bead-like cross-section.

As a result of the bead-like cross-section, a self-centering is achieved to a certain extent and tolerances can be compensated so that the centered seat of a digital data carrier inserted into the standard CD drive is
10 improved. The bead-like shape without sharp edges furthermore avoids the scratching of CDs stacked on top of one another.

In accordance with a further preferred embodiment of the invention, the ring pieces form a positioning shoulder and have a width which is
15 bounded outwardly by an outer diameter corresponding to the smaller standard diameter and inwardly by the inner diameter of the centering bore.

The mechanical stability of the carrier body is improved in the region of
20 the positioning shoulder due to the forming of the ring pieces into a positioning shoulder.

In accordance with a further preferred embodiment of the invention, the lower side of the carrier body or of the digital data carrier has information
25 in digitized form, which can be read by the standard CD drive, and an upper side remote from the lower side has information in printed form for visual inspection.

The digital data carrier can thus initially be inspected or read visually and its digital data can subsequently be read by a standard CD drive, for example of a computer.

- 5 In accordance with a further preferred embodiment of the invention, the carrier body has an optical memory molding and a functional card molding which are integrated into a single-piece dual molding. The carrier body has at least one additional functional element for an associated functional station, with the functional card molding and the arrangement
10 of the functional element corresponding to the geometrical boundary conditions of the functional station.

By combining the very large memory capacity of the optical memory molding with the functions of the functional card molding, which are
15 integrated into a single-piece mold, the application functions of functional cards of a known kind are combined with the large information capacity of the optical memory, which is, moreover, also simple to access with widely used, favorably priced drives. As a result, the possibilities of the known functional cards, which [are characterized]* by relatively low memory
20 capacities, for example of only a few kilobytes in the case of an EEPROM, are combined with the very large optical storage capacities of, for example, more than 10 megabytes. This opens up a huge field of combined applications with the new data carrier in a dual molding. The difficult
25 problem of the completely different or opposite or even mutually exclusive demands made on an optically readable data carrier on the one hand and

* Translator's note: Verb supplied; obviously lacking in the original

on functional cards on the other is also solved with the data carrier in accordance with the invention.

Optically readable data carriers and so the optical memory molding must
5 essentially be mechanically relatively solid, stable and absolutely flat and must allow an unimpeded, perfect optical reading, whereas functional cards (such as credit cards) must be relatively thin and flexible, so that they can easily be bent in use and due to their being constantly carried by the card owner and they must, however, fulfil the boundary conditions, in
10 particular the guiding or positioning of the functional card in the associated functional station, e.g. also the positioning of the functional elements on the card relative to the functional station. This problem is solved by the data carrier in accordance with the invention having the positioning shoulder and being made in a dual molding so that the optical
15 memory molding corresponds to the reading conditions of the optical reading devices with respect to its mechanical and optical properties and is in particular also completely balanced with respect to the central inner bore, and so that the design of the functional card molding meets the boundary conditions of the functional station, with the layer thickness
20 being made thinner and so also more flexible outside the positioning shoulder or the optical mold, while the optical region remains sturdy.

The dependent claims relate in particular to further developments and advantageous variants of the invention with higher storage capacities,
25 better handling properties and extended functions and applications.

The scope of application is extended by the use of a chip (contact chip, contact-free chip, biochemical chip, ball chip, memory chip or electronic

chip) as an additional functional element. The use of such a chip is explained with reference to the following example.

Let us assume that the data carrier or card contains a wide range of possible sports events and activities as the information in the optical memory area. For example, ski resorts, swimming baths, soccer stadiums with the games scheduled to be held there over the coming season. All these data are contained in the optically readable memory and can be read together with information which can additionally be downloaded via an internet link. The user or legal owner of the card can now view the range and select the activities on his home PC and compile a list. He then makes a connection to the internet using the software on the card and books the selected sports events and stays in the ski resorts. The inserted card has, for example, a contact-free memory chip. When the card was issued, a numeric code was hidden under a special scratch-off layer; the user now knows the code. After making his order via the internet, he now also enters this number and thus authorizes "his card" as an admission ticket for the events and sports activities booked, such as the ski lift, etc.. The trip to the selected activities could proceed as follows. The card owner goes to the train station and waits for his train. The departure times were [sent to]* him by e-mail after [he]** had made payment by credit card (which could also be integrated in the present card) via the internet. The arrival time and connections to his destination are now also known to him. He naturally also booked a hotel room at the same time. Now his train arrives and the card owner boards the train without having purchased a ticket. There were naturally so-called antennas at the boarding doors of the train

* Translator's note: Verb supplied; obviously lacking in the original

** Translator's note: Pronoun supplied; obviously lacking in the original

which check whether the memory chip, which the card owner has on his card, also authorizes him to travel on this train. It is almost not worth mentioning that the seats are no longer numbered on the actual train, but that the names are actually displayed and that a check is made on the basis of the chip as to whether the correct card owner is actually sitting on this seat. After changing trains twice – the card owner was informed personally at his seat by a computer voice at the right times in each case – he arrives at his destination. The hotel has already been advised of his arrival and also that the train with the card owner was a little late. The hotel naturally also has a taxi with an illuminated number display waiting at the station which picks up the card owner, and the card owner is welcomed with a friendly "Hello, ..." in the passenger compartment. On his arrival at the hotel, the card owner is allocated the reserved room whose key is already on the card. The memory chip opens the room door without any contact and the guest can feel at home. The card owner is woken the next morning at the right time so that he will not miss the exciting soccer match at the [stadium]* on Sunday; the taxi is naturally also waiting in front of the hotel after he has had the breakfast ordered on his PC. It does not need mentioning that the card owner simply passes through the turnstile at the football [stadium]**.

The reflection layer of the optically readable memory area, which is made of gold, silver, copper, aluminum or similar metals known in CD-ROM production and which was applied in a vapor deposition process, can be employed as an antenna when a contact-free chip is used or when

* Translator's note: Stadium substituted; the original had the typographical error "Station" for German "Stadion"

** See previous note.

electronic components are employed which are used as receivers or transmitters. For this purpose, a connection is needed between the chip or electronic component used, which can be made by soldering, gluing or spot welding or by another known kind of joining method. In connection
5 with the contact-free memory chip or a transmitting or receiving electronic module, an antenna is needed in most cases. The large area of the reflection layer means that the reception and transmission of signals is very easily possible. At the same time, the metal coating can be reinforced with an additional metallic layer, which is applied to the existing reflection
10 layer. Whether an insulating layer needs to be applied between the different layers or not depends on which contact-free chip is used.

Various electronic components for different applications and purposes can be used and applied to or molded at any position on the card; such
15 components are supplied with power from an internal battery applied to the coating or from an external battery (e.g. inserted in the inner area as a microcell) or obtain the required energy from applied solar cells or work without card energy sources, e.g. by reflection of the radio or energy waves transmitted to the card.

20

An inserted electronic component is explained with reference to the following example:

Michael J. has just written a new song which should naturally be
25 prominently positioned on the shelves of record stores. To do this, a part of the song or even the whole song is stored on the card or the data carrier as a promotion gimmick. Since it is even more eye-catching, a small electronic component is applied at the center (not a condition) which in

turn controls three small LEDs or similar light sources. The battery was fitted by applying different thin metallic layers to the lower side of the card – in the regions not taken up by the optically readable data. The charging of the battery is taken on by a miniature solar cell applied to the inside
5 area of the upper side. The small lamps light up on the touching of a photocell applied to the electronic component and the whole card lights up at the edges or at other points which are as clear as glass and which can be formed at any point such that they further amplify the illumination. The visual advertising campaign of the new song can thus begin. This
10 procedure can, like that of the others, also be used on a known, completely standard CD-ROM.

Electronic circuits can also be applied directly to the card or data carrier at any point. For example, to apply a circuit such that it is applied over
15 the whole surface or on parts of the whole surface in the card. This allows the use of the card as, for example, a small radio receiver with a small, flat loudspeaker which can be used as a coating element in a similar way as in watches. The electronic component can be applied in very compact form in the center of the carrier body. The batteries can consist of the coating
20 applied to the lower side of the card. The loudspeaker can be arranged, for example, as a coating element on the upper side of the carrier body. By applying different layers to the carrier body, e.g. also a photoresist coating, a complete circuit can be accommodated directly in the layers applied, as is also the case with the electronic chip. This is meaningful, for example,
25 when the card is used as a key and removal of the electronic circuit should be avoided. A circuit applied in this way can never be removed from the card without its being destroyed. Complex circuits, which are used other than for the protection of the card, can then naturally also be

applied to the card. It is thus possible, for example, to apply a small radio receiver to the actual carrier body or to implement a clock in the inner or outer region in conjunction with a digital display (liquid crystal display).

- 5 Solar components or solar modules can be applied at any point on and under the carrier body, either on the whole or a part thereof. For example, for the electronic components or chips located on the carrier body to obtain energy. Conventional microcells, which can be applied and distributed in the inner or also outer regions of the carrier body, can be
10 used as the power supply. The batteries are positioned so that imbalance during the rotation of the carrier body can be avoided. A very flat battery can be applied, which can then be charged on the solar cells, by the application of suitable layers to the upper or lower sides of the carrier body. It is, however, also possible to supply the applied electronic
15 elements directly by solar cells.

It is further possible to arrange so-called micro-cameras and lenses at the carrier body which can record data and store them in a memory chip. In conjunction with an optically readable part, e.g. an LCD or liquid crystal
20 display, an address book, for example, can be stored on the data carrier and can be modified via the screen. The data are retrieved via a kind of keyboard which is generated on the upper and lower sides of the carrier body with different applied layers. The corresponding circuit is constructed and arranged in a balanced manner.

25

An electronic circuit with a liquid crystal display can be applied to any point on the carrier body. It is thus possible with the liquid crystal display to retrieve data which are optically readable on the card. For example, a

card owner can receive important data encoded on a recordable card or data carrier which are intended only for him. He then inserts the data carrier into his PC drive and starts the application on the data carrier. The application asks him for his security code which only the card owner
5 knows. Once this has been entered, a signal is emitted from the PC to the contact-free chip of the data carrier and said contact-free chip in turn generates a visible code on the LCD or liquid crystal display. The card can now be removed from the PC and the code entered, for example, on the input device now required.

10

Furthermore, an infrared transmitter or receiver can be applied at any point and can record and transmit data in order to communicate with devices of any kind also equipped with such transmitters and receivers. In this way, communication becomes easily possible between the card or the
15 data carrier and other input or output devices.

Furthermore, security features can be applied at any point on or in the carrier body and these can be detected or analyzed either visually or electronically or optically. The security features can be applied to the
20 surface or also inside the actual data carrier (injection molded, implanted). This serves the recognition and elimination of forgeries or, however, the clear identification of the actual data carrier. For instance, invisible or visible barcodes and numbers can be applied which can be used in connection with data located on the card for certain access rights, or even
25 small electronic circuits or even small objects such as micro-glass spheres which have a small number inserted, as is done, for example, with diamonds.

The lower side of the carrier body can also have different metallic or non-metallic coatings which do not impair the [reading]* procedure of the card or the card carrier. For example, a fluorescent layer can be used in order to generate a striking visual effect. The inner or outer regions of the carrier
5 body can be made by building up different thin films to form a battery. An electrostatic layer can also be applied which is used to detect sound or image data on suitable devices.

Furthermore, a magnetic layer can also be applied as a strip of any
10 desired width in order to store data. Electronic components are designed and arranged directly on the carrier body by different thin films which can lie on top of one another or adjacent to one another.

The carrier body can have multiple alloys in layers or adjacent to one
15 another which consist of the most varied metallic or non-metallic materials. An invisible hard protective lacquer can be applied to the lower side of the carrier body to hinder or prevent scratching of the lower side. In this way, the carrier body can be transported without damage even without a stacking ring and can be put down with the optically readably
20 side facing down.

The opening in the inner region of the carrier body, the centering bore, does not have to be centered from the start. It can be positioned at practically any point on the card so that, for example, the centering bore is

* Translator's note: Reading substituted; the original had "Laservorgang", meaning a laser process, which appears to be a typographical error and is presumed to mean "Lesevorgang" (meaning reading procedure) which would be pronounced the same way in German.

at the center after a pre-treated card region has been broken off or the carrier body is balanced by the application of a lacquer, color or coating film. Small weights can also be applied to the sides of the carrier body, said weights being lighter than the opposite sides in order to achieve a
5 balancing of the carrier body.

Coils of wire or of a coating can be arranged on and in the carrier body and be used as an antenna for receiving signals or transmitting signals. This is especially advantageous when using contact-free chip systems.
10 Different coil types can also be applied onto and in the carrier body in order to carry out different functions. The coil can be made of a metallic or a metal-like material, for example of copper, brass, iron, ferrite, gold, silver, etc. or, however, also of a conductive or non-conductive plastic.

15 In accordance with a further preferred embodiment of the invention, the carrier card is made as a business card having a substantially rectangular outline.

In this way, it is possible to add digitized information, which can be read,
20 for example, in a computer, to the conventional information of a business card.

Such information can be audio or audiovisual recordings or, for example, catalogs or the like.

25

In accordance with a further preferred embodiment of the invention, the carrier body is made as an admission ticket and has at least one separable cancellation section at its periphery.

Additional computer-readable information can also be applied here by using a digital data carrier as the admission ticket. It is thus also, for example, possible to record picture sequences or audio samples of pieces
5 of music.

A disadvantage in the known method of manufacturing a digital data carrier by punching a centering aid is that the punching process has to take a relatively long time in order to achieve no perforation of the
10 centering aid in the form centering pins.

A further disadvantage is that the digital information can be damaged during the punching process.

15 It is therefore a further object of the invention to improve the manufacturing process and in particular the quality and to reduce the manufacturing time and the manufacturing costs.

This object is satisfied in accordance with the invention by the ring pieces
20 being manufactured through high-pressure injection molding of the carrier body in an injection molding tool which has the ring pieces as a negative mold.

It is possible in this way to manufacture the carrying body and the ring
25 pieces in one working step and to accelerate the manufacturing process thereby and, at the same time, to avoid any damage to the digital information applied in the same working step.

A further object of the invention is to improve the known injection molding form such that a digital data carrier or carrier body having ring pieces can be manufactured through high-pressure injection molding.

- 5 This object is satisfied in accordance with the invention by the injection molding tool having ring pieces which are machined in as a negative mold.

The carrier body can be manufactured in a conventional manner by high-pressure injection molding through the machined-in ring pieces as a
10 negative mold.

Further details of the invention can be found in the following detailed description and in the enclosed drawings in which preferred embodiments of the invention are illustrated by way of example.

15

What is shown in the drawings is:

Figure 1: a top view of an ejected tray of a standard CD drive with an inserted digital data carrier in a scaled-down representation;

20

Figure 2: a top view of a digital data carrier formed as a business card;

Figure 3: a front view of the digital data carrier of Figure 2, cut along the line III – III;

25

Figure 4: a bottom view of the digital data carrier of Figure 3 from the direction IV;

- Figure 5: a top view of a digital data carrier formed as a shaped CD;
- Figure 6: a bottom view of a digital data carrier formed as an admission ticket with four removable cancellation sections;
- 5
- Figure 7: a bottom view of a digital data carrier formed as an admission ticket with one cancellation section;
- Figure 8: a bottom view of a further data carrier formed as an admission ticket with one cancellation section;
- 10
- Figure 9: a bottom view of a further data carrier formed as an admission ticket with one cancellation section at its long side;
- 15
- Figure 10: a bottom view of a data carrier formed as an admission ticket with two cancellation sections formed at its narrow side;
- Figure 11: a bottom view of a data carrier formed as an admission ticket with two cancellation sections;
- 20
- Figure 12: a schematic side view of an injection molding tool with an outwardly moved die in cross-section;
- Figure 13: a front view of a digital data carrier with ring pieces, which form a planar positioning shoulder, sectioned along the line III – III of Figure 2;
- 25

- Figure 14: a bottom view of a data carrier with an optical memory molding and a functional card molding in a dual molding;
- 5 Figure 15: a front view of the digital data carrier of Figure 14, cut along the line XV – XV;
- Figure 16: a front view of a two-part digital data carrier, cut along the line XV – XV of Figure 14;
- 10 Figure 17: a bottom view of the memory molding of the digital data carrier of Figure 14;
- Figure 18: a bottom view of the functional card molding of the digital data carrier of Figure 14;
- 15 Figure 19: a bottom view of a digital data carrier with a diameter of the optical memory molding protruding beyond the width of the functional card molding;
- 20 Figure 20: a bottom view of a circular memory molding;
- Figure 21: a bottom view of a digital data carrier with the optical memory molding of Figure 20 and positioning shoulders or ring pieces in the functional card molding;
- 25 Figure 22: a side view of the digital data carrier of Figure 21, cut along the line XXI – XXI;

- Figure 23: a front view of a one-piece dual molding of a digital data carrier with a positioning shoulder and functional elements in cross-section and cut away;
- 5 Figure 24: a front view of a two-piece dual molding of a digital data carrier with a positioning shoulder and functional elements in section and cut away;
- 10 Figure 25: a front view of a two-piece dual molding of a digital data carrier with a positioning shoulder in the functional card molding in section and cut-away;
- Figure 26: a top view of a digital data carrier with a contact-free identification medium as a functional element;
- 15 Figure 27: a front view of the digital data carrier of Figure 26 in section;
- Figure 28: a bottom view of a digital data carrier with additional optical data areas;
- 20 Figure 29: a front view of a one-piece DVD data carrier in a dual molding in cross-section;
- Figure 30: a front view of a two-piece dual molding with a DVD data carrier in section;
- 25 Figure 31: a top view of a digital data carrier in mini-CD format;

Figure 32: a system with data carriers in accordance with the invention and associated functional stations and optical reading stations;

5 Figure 33: a system with phonecard data carriers and associated telephone stations.

A digital data carrier (1) substantially comprises a carrier body (2) having an outline (3) deviating from a standard outer diameter of a so-called
10 compact disk of 120 mm. The carrier body (2) has a centering bore (4) usual for CDs or mini-CDs at its center.

The carrier body (2) has information in digitized form at its lower side (7) confronting a tray (5) of a standard CD drive (6) and said information is
15 readable by an optical reading head (not shown) of the standard CD drive (6). An upper side (9) remote from the lower side (7) can have information (10) in a printed form for visual inspection.

The lower side (7) has a centering aid (11) made from two ring pieces (12)
20 opposite to one another. The outer diameters (14) of the ring pieces (12) are matched to a second receiving section (13) of the tray (5) to accept a so-called mini-CD. The outer diameter (14) thus corresponds to the smaller standard diameter of a mini-CD of 80 mm.

25 The tray (5) has a first receiving element (15) which is concentric to the second receiving element (13) and which has an inner diameter matched to the compact disk. As a rule, the trays (5) have a U-shaped slit (16) in their longitudinal direction.

The ring piece (12) rises in a bead-like manner on the lower side (7). The ring piece (12) thus has a convexly shaped cross-section (17). The width (18) of the cross-section (17) is approximately 0.5 mm and a height (19) of the cross-section (17) is approximately 0.8 mm.

In accordance with an embodiment, the carrier body (2) is formed as a so-called shaped CD (20) with a free outline (21).

10 In accordance with another embodiment, the carrier body (2) is formed as a business card (22) with a substantially rectangular outline (23).

In accordance with a further embodiment, the carrier body (2) is formed as an admission ticket (24). The carrier body (2) or the admission ticket (24) has at least one separable cancellation section (26, 26') at its periphery (25). The cancellation section (26', 26'') has a pre-formed fracture groove (27) in the direction toward the carrier body (2). The cancellation section (26) is connected to the carrier body (2) via a web (28). It is, however, also possible to connect the cancellation section (26') to the carrier body (2) via two webs (29). The two webs (29) are arranged at the extreme ends (30) of the cancellation sections (26'). The carrier body (2) can have one cancellation section (26, 26') at one side, two cancellation sections (26a', 26b') at two sides, three cancellation sections (26a', 26b', 26c') at three sides or four cancellation sections (26a', 26b', 26c', 26d') at its four outer sides. It is, however, generally also possible to arrange two cancellation sections at one outer side.

An injection molding form (31) for the manufacture of the digital data carrier (1) or its carrier body (2) essentially comprises a two-part injection molding tool (32) which has a first mold (33) and a second mold (34) containing the die. On the die side, the second mold (34) has ring pieces (35) machined in as a concave negative mold of the ring pieces (12). The digital information is also arranged on the die as a negative mold in the form of so-called lands and pits.

For the manufacture, plastic is pressed into the first mold (33) at high pressure and slung against the die of the second mold (34). The die or the second mold (34) is subsequently retracted and the formed carrier body (2) removed.

In a further working step the carrier body (2) is coated with a conventional aluminum film and then lacquer-coated. Finally, the upper side (9) or the front side of the digital data carrier has information (10) printed on it. The finished digital data carrier (1) can then be inserted into a standard CD drive (6), for example of a computer (not shown), such that its ring pieces (12) center the carrier body (2) in the second receiving section (13) of the tray (5).

Fig. 14 shows, viewed from the bottom, i.e. in the direction of the optical reading 28 (Fig. 15), a data carrier 110 in accordance with the invention in a card format with a one-piece dual molding 110 with a central centering bore or inner opening 104, said dual molding 110 being composed of an optical memory molding 102 in accordance with Fig. 17 and a functional card molding 103 in accordance with Fig. 18. The largest diameter D_{max} of the carrier body or data carrier 101 is more than 81 mm, i.e. it extends

beyond the receiving circle 105a with a diameter of approximately 81 mm of an optical reading device for the mini-CD format. The example of Fig. 14 corresponds, for example, to the widespread ISO check card/chip card format with $B \times L = 54 \times 86$ mm. The optical memory molding 102 has at least one annular optically readable memory region 108 with an optical carrier layer 111, a data layer 112 and a reflection layer 113 (as is explained in Fig. 23).

The memory area 108 has an inner diameter $D2$ and an outer diameter $D2$. To achieve its large memory range, the diameter $D3$ preferably corresponds approximately to the card width B . The one-piece dual molding 110 of the data carrier 101 has a positioning shoulder 105 for receiving and centering in an optical reading device for the mini-CD format, i.e. the positioning shoulder 105 (with diameter $D4$) corresponds to the receiving circle 105a of a mini-CD drive. The data carrier 101 has an additional electronically readable functional element 120 with access authorization for an associated functional station 130. The functional card molding 103 or its shape and contour and the arrangement of the functional element 120 in the dual molding 110 correspond to the boundary conditions of the functional station 130 (see Fig. 32), with the functional element 120 being arranged outside the optical reading area 128, e.g. adjacent to this area or on the rear of a one-sided optical memory area 108. All edges 106 of the optical memory area 102 are preferably sealed at the sides. The thickness H of the data carrier 101 is at most 1.2 mm and the card or the optical molding 102 have a planar base surface 109 for optimum optical readability. It is also important that the whole data carrier 101, including the functional element 120, is balanced with respect to the central inner opening 104, again for perfect optical

readability and smooth running – particularly at high reading speeds. In this example, the positioning shoulder 105 is formed by the edge 106 of the optical memory molding 102 in the form of two sectors of a circle 116.

5 Figs. 15 and 16 show a cross-section along the line XV – XV of a digital data carrier in accordance with Fig. 14 with two possible embodiments of the one-piece dual molding. The dual molding 110 in Fig. 15 is manufactured in one piece, i.e. the two moldings 102 and 103 are manufactured together as one piece. The example of Fig. 16, in contrast,
10 shows a dual molding of the same outer dimensions which is assembled from two separate moldings 102, 103 to form a one-piece dual molding. This design of the dual molding and also the integration of functional elements 120, which can consist of a plurality of parts, is further illustrated and executed with reference to Figs. 23 to 25.

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To achieve the largest possible storage capacities, the annular optical memory area 108 can also be enlarged beyond the conventional ISO check card format with a width B of 54 mm. Fig. 19 illustrates an example where the outer diameter D3 of the memory area 108 extends beyond the
20 standard card format in the form of bulges in the shape of sectors of circles. Different shapes are naturally also possible such as the drawn alternative data carrier contour 101a. Depending on the purpose, data carrier cards with a larger diameter D3 can also be made rectangular with corresponding widths B of more than 54 mm up to, for example, a
25 maximum of 70 mm.

Fig. 20 shows a further example with a circular (119) optical memory molding 102 with a diameter D3 corresponding to the card width B (Fig.

21). This results in the smallest possible area of the optical molding 102 for the desired memory area 108, which requires correspondingly less optical material and which can also result in advantages for the flexible design of the outer areas 107 of the card molding 103 – in accordance
5 with the desired use.

Figs. 21 and 22 show a data carrier from below and in cross-section along the line XXII – XXII, said data carrier having a circular optical molding 102 in accordance with Fig. 20 and a card molding 103 which contains
10 the positioning shoulder 105. The positioning shoulder 105 can be formed here by two sectors of circles 116 analog to the example of Fig. 14, as is drawn as an alternative in Fig. 21. With this example, a data carrier 101 can be realized which has, on the one hand, a relatively small, compact and absolutely planar, mechanically stable optical molding 102 and, on
15 the other, a relatively large, thinner and more flexible outer region 107 of the functional molding 103 of the card. The one-piece dual molding is here preferably formed from the two separate parts 102 and 103, with a one-piece (127) manufacture of the dual molding 110 of this kind naturally also being possible for an application of a correspondingly different design.

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Figures 23 to 25, which substantially correspond to the examples of Figs. 14, 16 and 22, illustrate the layer design of the data carrier 101 or of the dual molding 110 in accordance with the invention in greater detail. The optical memory molding 102 substantially comprises an optical carrier
25 layer 111, one or more data layers 112 with reflection layers 113 and a top layer 114 to protect data and reflection layers against corrosion and other degrading influences. All lateral edges 106 of the information and reflection layers 112 and 113 are also preferably sealed for this purpose in

a suitable manner (115). A seal 115 is also present at inner edges, for example in Fig. 23, where a functional element 120 is integrated into the dual molding 110. Said seal 115 abuts the edges 106 of the optical molding 102 in Figs. 24 and 25.

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Fig. 23 shows a one-piece dual molding 110, in which the shape of the two moldings 102 and 103 is made as one part 127, e.g. by pressing the dual molding 110 in a corresponding mold tool. In the examples of Figs. 24 and 25, two separate moldings 102 and 103 are first manufactured and these
10 are then put together (bonding or welding) in the one-level dual molding 110. In addition, the functional elements 120, 121, 122 are also integrated into the dual molding.

A particularly simple method of manufacture is to integrate the functional
15 elements 120 or parts thereof directly in the manufacture of a one-piece dual molding 127, for example by insertion into the mold tool and subsequent injection molding or pressing. Flat functional elements such as contact electrodes 121, magnetic strips 125 or barcodes 126 can also be applied to the rear side of the optical molding 102, i.e. behind the
20 reflecting layer 113. This is shown, for example, by Figs. 18 and 25 with a magnetic strip 125 on the rear or by Fig. 23 with a contact electrode 121 which is also applied on top of the reflection layer 113 and the top layer 114 (and so outside the reading area 128).

25 In an alternative shape 103a in Fig. 25, the functional card molding can be made thicker within the positioning shoulder 105 than in the outer region 107.

Irrespective of whether the two moldings 102 and 103 are for a one-piece (127) or for a two-piece dual mold 110, they must meet different demands: the optical memory molding 102 must allow optically perfect reading in a corresponding drive; it must also have a mechanically stable, planar base surface 109 and be made of a suitable material.

The functional card molding 103 must accordingly allow functionality in the associated functional station 130, for instance the card guiding and positioning with matched arrangement of the functional element 120 on the data carrier 101, and it must allow the practical handling of the card in general.

These different demands are met by the dual molding in accordance with the invention having a positioning shoulder and by the further features of claim 12. The outer region 107 of the functional card part with a reduced layer thickness HT as it were protects the inner, stiffer optical molding 102 or the optical memory area 108 so that this remains planar and undisturbed, while outer mechanical stresses, including light bends, can be absorbed by the increased flexibility of the thinner outer regions 107.

The layer thicknesses H, HO, HT are therefore selected correspondingly, with the total thickness H being a maximum of 1.2 mm, i.e. at the most corresponding to the thickness of the flat part of a CD-ROM, but without a stacking ring. However, a lower total thickness H from 0.8 to 1.0 mm is often needed. Since the optical memory area 108 is substantially smaller than a normal CD-ROM with a diameter of 120 mm, adequate mechanical stability and planarity can nevertheless also be achieved in this area with a reduced layer thickness of the optical memory area 102 of, for example, HO = 0.7 to 1.0 mm. The total layer thickness H is preferably in a range

between 0.8 and 1.1 mm. For this purpose, it is necessary for the outer region 107 of the functional card molding 103 to have a reduced layer thickness HT of preferably 0.5 to 0.7 mm and for the height of the positioning shoulder HA correspondingly to be at least 0.3 mm, preferably,
5 however, 0.4 to 0.5 mm.

The total height H comprises $H_O + H_D$, i.e. with in all cases an additional layer thickness H_D for the arrangement of functional elements (Fig. 23) or, in the case of a two-piece double layer for a continuous rear top layer, as
10 an additional layer 114a (Figs. 24 and 25). On the other side, the height is also $H = H_A + H_T$, with the ratio H_T/H preferably being between 0.5 and 0.6 in order to put the stability and planarity of the optical memory area 108 into a favorable ratio in comparison with the flexibility of the outer area 107. The positioning shoulder 105 therefore not only ensures the
15 positioning of the data carrier 101 in a corresponding drive, it also achieves the required mechanical properties of the dual molding.

Relatively stiff polymers such as polycarbonate, acrylic polymers, polyethylene terephthalate PET or also blends thereof are, for example,
20 suitable as materials for the optical memory molding. The separate functional molding of the card can, in contrast, be made of more flexible materials. In the case of one-piece dual moldings made of a homogeneous material, the higher flexibility of the outer region 107 is, as already explained, realized by correspondingly lower layer thicknesses HT. These
25 data carrier materials can contain transparent or dyed polymers and also, for example be dyed differently in different regions and naturally also be printed for the purpose of a more appealing visual design.

Figs. 26 and 27 show an example of a data carrier 101 with a functional element 120 which is formed as a contact-free identification medium 123 and which comprises a microprocessor chip 122 and an antenna 124 associated therewith. Such identification media contain in a manner and application known per se different identification and security functions with approval or access authorizations, identification and security codes and also with paycard functions which are stored in a memory of the chip 122, for example in the form of an EEPROM with 1 – 4 kbyte capacity. What is now new is the inventive combination of these functions of an identification medium 123 with the memory capacity of the optical memory area 108– or its data – greater by a number of orders of magnitude. A wide range of completely new combined applications is opened up in this way, as will be further illustrated in the examples. In an advantageous embodiment, the identification medium 123 is integrated into the dual molding as a circular disk inside the optical area 108, i.e. inside the diameter D2. The disk-shaped identification medium 123 here contains a microprocessor chip 122 and a circular antenna 124 for contact-free communication, which can take place here to both sides, i.e. to the top and to the bottom, unhindered by the optical area.

This is also possible in a further variant 122a, 124a, which is shown as an alternative in Figs. 26 and 27. In this case, an antenna 124a with the largest possible area extends along the periphery of the card 1, mainly outside the optical memory area 108. The antenna 124a with a very flat design only extends through the edge of the area 108 at the center. However, it does so only on the rear side of the data carrier card 1, i.e. behind the reflection layer 113 of the area 108, so that the optical reading area 128 is not impaired. The associated microprocessor chip 122a is

naturally arranged outside the area 108 (or outside the reading area 128). This results in an increased communication range of the identification medium 122a, 124a.

- 5 Identification media and data carriers with contacts 121 can naturally also be used as functional elements.

Different possibilities exist to increase the optical memory capacity of the area 108 in addition to the enlarging of the boundary diameter D2 in
10 accordance with Fig. 19 as already illustrated. For instance, as illustrated in Fig. 28, further data areas 108.2 can be provided in addition to the annular memory area or data area 108.1, for example as segments or sectors of a circle adjacent to the area 108.1 which can extend to the positioning shoulder 105 or receiving circle 105 of the mini-CD format.

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A further possibility of increasing the optical memory capacity comprises carrying out data compression by means of a corresponding associated software.

- 20 The optically readable memory area 108 or the optical memory medium can basically have any form. Depending on the application purpose, for example a simple CD-ROM, a recordable CD-R or a rewritable CD-RW.

The medium can also be formed as a DVD data carrier for a substantial
25 increase in information capacity.

This is illustrated by Figures 29 and 30 which contain DVD data carriers readable on both sides as the optical memory 108. These dual-sided DVD

data carriers contain information which can be read from two sides, i.e. from the bottom (a) and from the top (b) in the figures. With a lower memory area 108a, which can be read from the bottom in the reading area 128a, and an upper memory area 108b, which can be read from the top in the reading area 128b.

The data carrier 101 with its dual molding 110 is naturally formed correspondingly: with open, optically flawless planar base surfaces 109a and 109b of the optical functional molding 102 and by all functional elements 120, 121, 122 being arranged outside both reading areas 128a and 128b.

As the examples show, with DVD data carriers the one-piece dual molding 110 can also be made in one piece (127) or two pieces.

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Fig. 29 shows a one-piece embodiment in which the two moldings 102 and 103 are again produced together in one manufacturing process; and Fig. 30 shows a possible example of a two-piece embodiment with a separate optical memory molding 102 and an outer functional card molding 103 into which the molding 102 is placed and inserted. The positioning shoulder 105 is formed here by the molding 103 which also contains a functional element 120, for example a microprocessor chip 122. A further flat part of the functional element, for example contact electrodes 121, can here also be attached partially over the optical molding 102. However, it bounds the optical memory area 108b in the example of Fig. 30. These DVD layers also have a sealing 115 at all side edges (106) for the prevention of corrosion and degrading influences.

A further method of satisfying the object is proposed for applications or functional stations which do not require a card format with the largest diameter $D_{\max}$ of more than 80 mm: an optically readable data carrier in a (shaped) mini-CD format in which a functional element 120 having
5 identification functions, i.e. an identification data carrier or identification carrier medium 123, is integrated, with the functional element being arranged outside the optical reading area 128. These data carriers do not require a card dual molding and their positioning shoulder 105 is formed by parts of the outer contour within the mini-CD format. Functional
10 elements having identification functions allow higher grade functions which require, for example, demanding security codes (which is not required, for example, for the known simple phonecards). The combination of the identification functions with the large storage capacity of the optical memory area also results in a wide field of new combined applications
15 with such a data carrier in mini-CD format, as will be illustrated in the following.

Fig. 31 shows an example of an optically readable data carrier 102, whose largest diameter $D_{\max}$ (of approximately 80 mm) corresponds to a mini-
20 CD drive, having at least one annular optically readable memory area 108 which extends approximately to the card edge and which has an optical carrier layer 111, a data layer 112 and a reflection layer 113, and having a central inner opening 104 for the drive pin of an optical reading device. The data carrier 102 has an outer shape having at least two circle sectors
25 16, 17 as ring pieces 12' for receiving and centering in an optical reading device for the mini-CD format and an identification medium 123 as an additional functional element 120 for an associated functional station 130. The functional element is arranged outside the optical reading area 128

and corresponds to the boundary conditions of the functional station. The data carrier has a planar base surface 109 (no stacking ring) and it is balanced as a whole, including the integrated functional element 120, with respect to the central inner opening 104.

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Such data carriers 202 having identification media can be made both in contact-free form and with contact electrodes 121. Contact-free identification media 123, where the shape of the data carrier is freely selectable to a high degree or which are directed to the design of the transmission antennas 124 for contact-free communication with the functional stations 130, are naturally particularly interesting. A data carrier is illustrated in Fig. 31 having contact-free identification media 123 (similar to the example of Fig. 26, but in a different form) with two circle sectors 116 as the outer contour and as the positioning shoulder 105 for mini-CD drives and with a wide-area antenna 124 along the outer contour of the data carrier 202 and with a microprocessor chip 122 as the identification data carrier 123 outside the optical memory area 108. The antenna 124 is attached on the rear side behind the optical data layer and the reflection layer and is thus also outside the optical reading area 128 (see Fig. 27). A circular contact-free identification carrier 123a having chip 122a and antenna 124a inside the optical memory area 108 is also shown as an alternative variant in Fig. 31. Flat parts (such as contact electrodes 121, antenna 124, magnetic strip 125) of functional elements 120 can also be arranged on the rear side of one-sided optical memory areas with such data carriers 202 in the mini-CD format. Analog considerations to the data carrier cards 101 or to their optical memory molding 102 also apply to the thickness H of the data carrier, which is preferably 0.8 to 1.1 mm and to the thickness of the optical layer H₀ of 0.7 to 1.0 mm. CD-ROM, CD-R,

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CD-RW or DVD data carriers can also be used as the optical storage medium 108 in this case.

The data carrier functional card 101 in accordance with the invention can
5 basically combine any card functions and optically readable information.

The card functions 40 of the functional elements 20 allow corresponding services to be purchased, for example
42 authorization, access and admission tickets,
10 43 identification security cards and authorization cards,
44 paycards: cashcards, phonecards and parking cards;
45 account cards, customer cards, credit cards.

The representation of the optical information of the memory area 109 can
15 be carried out directly or selectively, alternatively, by menu control and
interactively – also in combination with card functions. Data regions 148
of the memory area 108 protected by a code of the card function can also
be realized so that, for example, personal data can only be read therefrom
with an authorization code.

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In additive applications of card functions and optical information, these
are executed or represented consecutively, at different points and not
simultaneously.

25 In combined applications, both can be executed and represented at one
station simultaneously and also interactively.

The large field of completely innovative application possibilities opened up with the data carrier card in dual molding form in accordance with the invention is illustrated with reference to some application examples in the following:

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Fig. 32 illustrates such a system having data carriers 101 with electronically readable functional elements 120 and associated functional stations 130 at which the card functions 140 can be executed, and with the optical memory areas 108 of the data carrier cards additionally also
10 being able to be read and represented at separate optical reading stations 135.

In application A, the data carrier cards 101 are read and represented at optical reading stations 135 by means of a screen 136. Moreover, a
15 connection to the internet 150 can be realized. In application B,* functions 140 are executed in simple functional stations 130 with the card 101, e.g. access to a certain area without the display of optical information. In application C of the data carrier cards 101 in a combined station 130, which also contains a reading station 135 and a screen 136, optical
20 information is represented and corresponding functions 142, 143, 144, 145 executed. As will be illustrated in the examples, application systems can have any combination of these three kinds A, B, C.

Fig. 33, as a combined application example, illustrates a phonecard data
25 carrier 131 having a value region for phoning and an optical memory area 108 for a correspondingly equipped telephone station 138. This contains a

* Translator's note: the words "die Karten" meaning "the cards" were omitted here as they obviously did not fit in with the construction of the sentence.

function station 130 for the function of phoning and has a screen for the display and finding of telephone numbers from an electronic file. In addition, an optical drive and reading device 135 is integrated in the functional station 130 having an internal memory 134 (e.g. in the form of
5 RAM chips or a hard disk) for the downloading of information from the optical memory area 108 of the phonecard 131. When the card 131 is inserted into the station 130, the access authorization is read first (i.e. a check is made as to whether an amount for telephoning is present); then the card is read in the optical drive 135 and its information loaded into
10 the internal memory 134. Now, during the phoning procedure and while the value amount is deducted from the card, the stored optical information from the memory 134 can simultaneously be played on the screen 136 (e.g. company information or PR data of the issuer of the phonecard).

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A modified further application for mobile phones having high-resolution screens can be represented by a phonecard data carrier 131, on which, for example, personal data are stored optically with a photo and the telephone number of members of a company or a club. In this way, the card owner
20 can read the optical information of the card into an internal memory of the mobile phone, using, for example, a PC, and thus then display and use this information for phoning (e.g. phone number and photo of the desired party) on the display of the mobile phone.

25 A further example is a resort card data carrier having card functions for the purchase of services of the most varied kind in a resort area and having information on this resort area and its range of services in the optical memory area 108 of the card. In this way, it is possible to see and

select what is on offer (hotels, railways, sports and leisure activities, etc.) and even to make any reservations required at home on a PC (with or without internet connection), for example, before the trip to the resort area. Services can be purchased alternately in the resort region such as
5 skiing, swimming, cinema, restaurant, events and cashcard withdrawals, etc. and information on such services and the booking of individual services can be made.

Analog to this and as a further example, club card data carriers can, for
10 example, in the form of annual cards for members of a leisure club, show the range of services of the club on the one hand and allow the purchase of the different services by the card having the integrated functions on the other hand.

15 As a further example of use, the data carrier functional cards in accordance with the invention can, for example, be used for different authorization, access and purchasing functions at big events such as fairs or exhibitions and the optical memory area 108 can contain the personal data of all the event personnel with photographs. As a result, a member of
20 staff can obtain, for example, code-protected access at a functional station and additionally be checked with respect to the personal data, including photograph of the person, from the optical memory. This forms an additional security function.

25 The personal data, with photograph, of the employees of a company with global activities can naturally be recorded in the same way in the optical memory area 108 of the data carrier card and thus a person be identified by his personal data with photograph when carrying out card functions for

the company at different places around the world. A non-authorized user of such a (e.g. stolen) data carrier can thus also be checked by means of these personal data and photograph and be detected as non-authorized.

Patent claims

1. Digital data carrier with a carrier body having an outline which deviates from the standard outer diameter, for playing in a standard CD-drive having an ejectable tray which has a first receiving section for data carriers with a larger standard diameter and a second receiving section for data carriers with a smaller standard diameter, said digital data carrier having a centering aid on the lower side of the carrier body facing towards the tray for centering in the second receiving section, characterized in that the centering aid (11) consists of two ring pieces (12) which are located opposite each other and which are matched to the second receiving section (13).
2. Digital data carrier in accordance with claim 1, characterized in that the ring pieces (12) have a bead-like cross-section (17).
3. Digital data carrier in accordance with claim 1 or claim 2, characterized in that the ring pieces (12) have a width (18) between 0.3 to 1.0 mm.
4. Digital data carrier in accordance with claim 3, characterized in that the ring pieces (12) have a width (18) of approximately 0.5 mm.
5. Digital data carrier in accordance with claim 1, characterized in that the ring pieces 12' form a positioning shoulder (105) and have a width (18') which is bounded outwardly by an outer

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diameter (14) corresponding to a smaller standard diameter and inwardly by the inner diameter of the centering bore (4, 104).

6. Digital data carrier in accordance with any one of the claims 1 to 5, characterized in that the ring pieces (12) have a height (19) between 0.3 to 1 mm.
7. Digital data carrier in accordance with claim 6, characterized in that the ring pieces (12) have a height (19) of approximately 0.8 mm.
8. Digital data carrier in accordance with any one of the claims 1 to 7, characterized in that the ring pieces (12, 12') have an outer diameter (14) of 80 mm corresponding to a mini-CD.
9. Digital data carrier in accordance with any one of the claims 1 to 8, characterized in that the lower side (7) has information in digitized form which can be read by the standard CD drive (6); and in that an upper side (9) which faces away from the lower side (7) contains information (10) in printed form for visual inspection.
10. Digital data carrier in accordance with any one of the claims 1 to 9, characterized in that the carrier body (2, 101) has at least one circular optically readable memory area (108) which reaches approximately up to the edge of the card and has an optical carrier layer (111), a data layer (112) and a reflection layer (113).

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11. Digital data carrier in accordance with any one of the claims 1 to 10, characterized in that the carrier body (2, 101) has at least one optical memory molding (102) and a functional card molding (103) which are integrated into a single-piece dual molding (110).
12. Digital data carrier in accordance with any one of the claims 1 to 11, characterized in that the carrier body (2, 101) has at least one additional functional element (120) for an associated functional station (130), with the functional card molding (103) and the arrangement of the functional element (120) corresponding to the geometrical boundary conditions of the functional station (130).
13. Digital data carrier in accordance with claim 12, characterized in that the functional element (120) is arranged outside the optical reading area (128).
14. Digital data carrier in accordance with any one of the claims 5 to 13, characterized in that the carrier body (2, 101) has a thickness (H) which amounts at most to 1.2 mm and a planar base surface (109).
15. Digital data carrier in accordance with any one of the claims 12 to 14, characterized in that the carrier body (2, 101) with the functional element (120) is balanced with respect to the centering bore (104).
16. Digital data carrier in accordance with any one of the claims 1 to 15, characterized in that the card format corresponds to the ISO

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check card format of 54 x 86 mm and all edges of the optical memory region are sealed off (115).

17. Digital data carrier in accordance with any one of the claims 1 to 16, characterized in that the optical memory region (108) has a diameter (D3) between 54 mm and 70 mm.
18. Digital data carrier in accordance with any one of the claims 11 to 17, characterized in that additional data regions (108.2) are provided in the optical memory molding (102) outside the circular memory region (108.1).
19. Digital data carrier in accordance with any one of the claims 11 to 18, characterized in that the optical memory molding (102) is bounded by two circular sectors (116) with 80 mm diameter.
20. Digital data carrier in accordance with any one of the claims 11 to 18, characterized in that the optical memory molding (102) is made circular (119) with a diameter (D3) which corresponds to the card width (B) and with the positioning shoulder (105) being formed by the card molding (103).
21. Digital data carrier in accordance with any one of the claims 11 to 20, characterized in that the positioning shoulder (105) is formed by the card molding (103).
22. Digital data carrier in accordance with any one of the claims 11 to 21, characterized in that the dual molding (110) is manufactured

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in a single piece (127).

23. Digital data carrier in accordance with any one of the claims 11 to 22, characterized in that the data carrier (101) is assembled from at least two separate parts (102, 103) to make the dual molding (110).
24. Digital data carrier in accordance with any one of the claims 11 to 23, characterized in that the height (HA) of the positioning shoulder (105) amounts to 0.3 mm to 0.5 mm.
25. Digital data carrier in accordance with any one of the claims 11 to 24, characterized in that the thickness (H) of the carrier body (101) amounts to 0.8 mm to 1.1 mm, the thickness (HO) of the optical molding (102) amounts to 0.7 to 1.0 mm and the thickness (HT) of the outer region (107) of the card molding (103) amounts to 0.5 to 0.7 mm.
26. Digital data carrier in accordance with any one of the claims 1 to 25, characterized in that the optical memory region (108) or the carrier body (101) respectively is formed as a CD-ROM, CD-R, CD-RW or DVD data carrier.
27. Digital data carrier in accordance with any one of the claims 1 to 26, characterized in that the carrier body (2, 101) or the optical memory region (108) respectively has a data compressing by means of associated software.

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28. Digital data carrier in accordance with any one of the claims 12 to 27, characterized in that at least parts of the functional element (120) are integrated into a single-piece dual molding (127).
29. Digital data carrier in accordance with any one of the claims 12 to 28, characterized in that the functional element (120) is formed as a magnetic strip or bar code.
30. Digital data carrier in accordance with any one of the claims 12 to 29, characterized in that the functional element (120) has a microchip (122).
31. Digital data carrier in accordance with claim 30, characterized in that the functional element (120) has a contact chip as a microchip (122) and contact elements (121).
32. Digital data carrier in accordance with claim 30, characterized in that the microchip (122) is formed as a contact-free chip.
33. Digital data carrier in accordance with claim 30, characterized in that the microchip (122) is formed as a biochemical chip.
34. Digital data carrier in accordance with claim 30, characterized in that the microchip (122) is formed as a ball chip.
35. Digital data carrier in accordance with claim 30, characterized in that the microchip (122) is formed as an electronic chip.

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36. Digital data carrier in accordance with any one of the claims 29 to 35, characterized in that the microchip (122) is formed as a memory chip.
37. Digital data carrier in accordance with any one of the claims 29 to 36, characterized in that the functional element (20) is formed as a contact-free identification medium (23) with an antenna (24) and with identification functions.
38. Digital data carrier in accordance with any one of the claims 10 to 37, characterized in that the reflection layer is formed as an antenna.
39. Digital data carrier in accordance with claim 38, characterized in that the reflection layer is reinforced with an additional metallic layer.
40. Digital data carrier in accordance with any one of the claims 1 to 39, characterized in that the carrier body (2, 101) has additional layers with additional functions.
41. Digital data carrier in accordance with claim 40, characterized in that the additional layers form a battery which has an insulation layer between adjacent layers of different metallic alloys.
42. Digital data carrier in accordance with claim 40 or claim 41, characterized in that regions of the carrier body (2, 101) have additional layers of different alloys adjacently to one another.

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43. Digital data carrier in accordance with any one of the claims 1 to 42, characterized in that the carrier body (2, 101) has a coating which can be rubbed off.
44. Digital data carrier in accordance with any one of the claims 1 to 43, characterized in that a circular contact-free identification data carrier is arranged within the optical memory region (108).
45. Digital data carrier in accordance with any one of the claims 12 to 44, characterized in that flat parts (121, 124, 125) of functional elements (120) are arranged in particular on the reverse side of single-sided optical memory regions (108).
46. Digital data carrier in accordance with any one of the claims 12 to 45, characterized in that the functional elements (120) have identification media with authorization and access functions (142), identification (143), account and credit card functions (145) and/or value card functions (144).
47. Digital data carrier in accordance with any one of the claims 12 to 46, characterized in that the optical memory region (108) contains data regions (148) which are legible only by means of a preferably coded authorization function of the functional element (120).
48. Digital data carrier in accordance with any one of the claims 12 to 47, characterized in that the functional element (120) defines a telephone card or a value card (144).

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49. Digital data carrier in accordance with any one of the claims 12 to 48, characterized in that the optical molding (102) contains polycarbonate, acryl polymers or PET.
50. Digital data carrier in accordance with any one of the claims 1 to 49, characterized in that the carrier body (2, 101) contains electronic components which are fed by a battery.
51. Digital data carrier in accordance with any one of the claims 1 to 50, characterized in that the carrier body (2, 101) contains electronic circuits.
52. Digital data carrier in accordance with any one of the claims 1 to 51, characterized in that the carrier body (2, 101) contains electronic components which are fed by a battery.
53. Digital data carrier in accordance with any one of the claims 1 to 52, characterized in that the carrier body (2, 101) contains at least one solar component.
54. Digital data carrier in accordance with any one of the claims 1 to 53, characterized in that the carrier body (2, 101) contains a liquid crystal display.
55. Digital data carrier in accordance with any one of the claims 1 to 54, characterized in that the carrier body (2, 101) contains a micro-objective.

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56. Digital data carrier in accordance with any one of the claims 1 to 55, characterized in that the carrier body (2, 101) contains an infrared transmitter.
57. Digital data carrier in accordance with any one of the claims 1 to 56, characterized in that the carrier body (2, 101) contains an infrared receiver.
58. Digital data carrier in accordance with any one of the claims 1 to 57, characterized in that the carrier body (2, 101) contains applied security features.
59. Digital data carrier in accordance with any one of the claims 1 to 58, characterized in that the carrier body (2) is formed as a shaped CD (20) with a free outline (21).
60. Digital data carrier in accordance with any one of the claims 1 to 58, characterized in that the carrier body (2) is formed as a business card.
61. Digital data carrier in accordance with claim 60, characterized in that the calling card (22) has a substantially rectangular outline (23).
62. Digital data carrier in accordance with any one of the claims 1 to 58, characterized in that the carrier body (2) is formed as an admission ticket (24).

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63. Digital data carrier in accordance with claim 62, characterized in that the carrier body (2) has at its periphery (25) at least one separable cancellation section (26, 26', 26'').
64. Digital data carrier in accordance with claim 63, characterized in that the cancellation section (26, 26') has a preformed fracture groove (27) in the direction towards the carrier body (2).
65. Digital data carrier in accordance with claim 63 or claim 64, characterized in that the cancellation section (26, 26') is connected to the carrier body via at least one web (28, 29).
66. Digital data carrier in accordance with claim 65, characterized in that the cancellation section (26') is connected to the carrier body (2) via at least two webs (28, 29) which are arranged at its outer ends (30).
67. Digital data carrier in accordance with any one of the claims 63 to 66, characterized in that the carrier body (2) has a substantially rectangular outline (25), at the sides of which the cancellation sections (26, 26') are arranged.
68. Digital data carrier in accordance with any one of the claims 5 to 67, characterized in that the positioning shoulder (105) forms the carrier body (202) and has a functional element (120) with identification function (123).

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69. System comprising a data carrier (101) in accordance with any one of the claims 1 to 68 and comprising associated functional stations (130), characterized in that the card functions (140) can be exercised at the functional stations (130); and in that the optical memory regions (108) can also be read by optical reading stations (135).
70. System in accordance with claim 69, characterized in that card functions (140) can be exercised at the functional stations (130) and optical information can also be read out of the memory region (108) and displayed by means of optical drives and reading stations (135).
71. System in accordance with claim 70, characterized in that the functional stations also have an internal memory (134) in which optical information can be read out of the memory region (108).
- ~~72. Method for the use of data carriers in accordance with any one of the claims 1 to 71 at a functional station (130), characterized in that first the access authorization to the functional station is checked, then the optical information is read out of the memory region (108) into an internal memory (134) of the functional station (130) and then the card function (140) is again exercised.~~
73. Method for the manufacture of a digital data carrier in accordance with any one of the claims 1 to 68, characterized in that the ring pieces (12) are manufactured through high pressure injection molding of the carrier body (2, 101) in an injection molding tool

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(32) which has the ring pieces (12) as a negative mold.

74. Method in accordance with claim 73, characterized in that the outline (3, 21) is manufactured in the same work step through a correspondingly shaped injection molding tool (32).
75. Method in accordance with claim 73, characterized in that the outline (3, 21) is manufactured in a later work step by punching out from a round carrier body (2).
76. Injection mold for the manufacture of a digital data carrier (1) in accordance with any one of the claims 1 to 68, characterized in that the injection molding tool (32) contains ring pieces (35) which are worked in as a negative mold.

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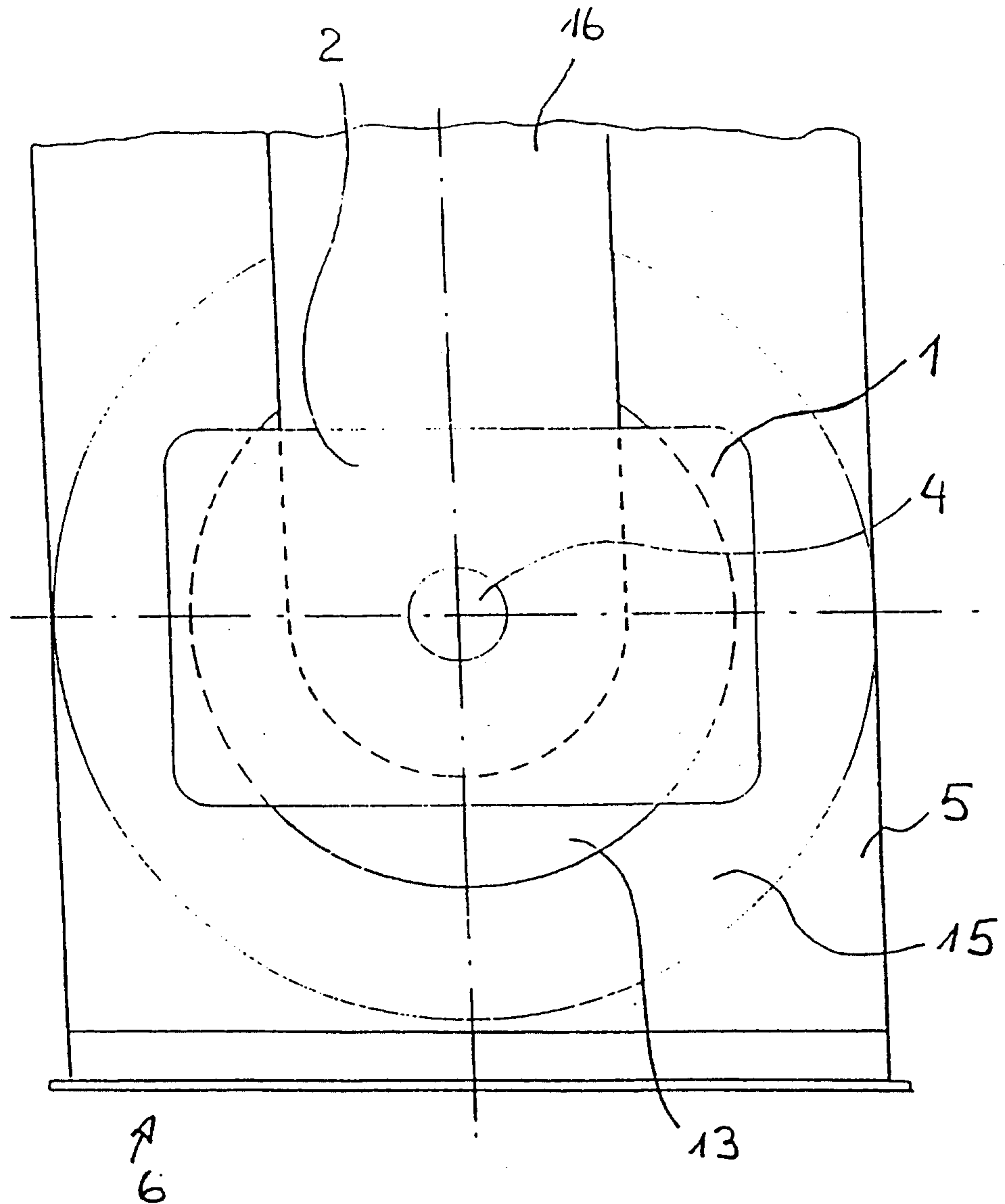


Figure 1

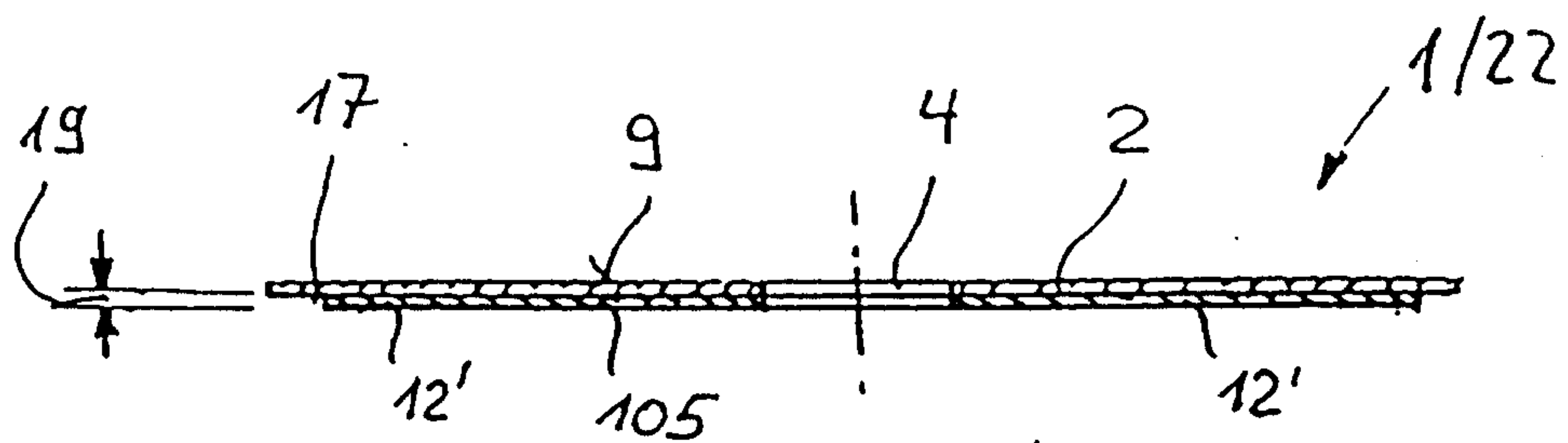


Figure 13

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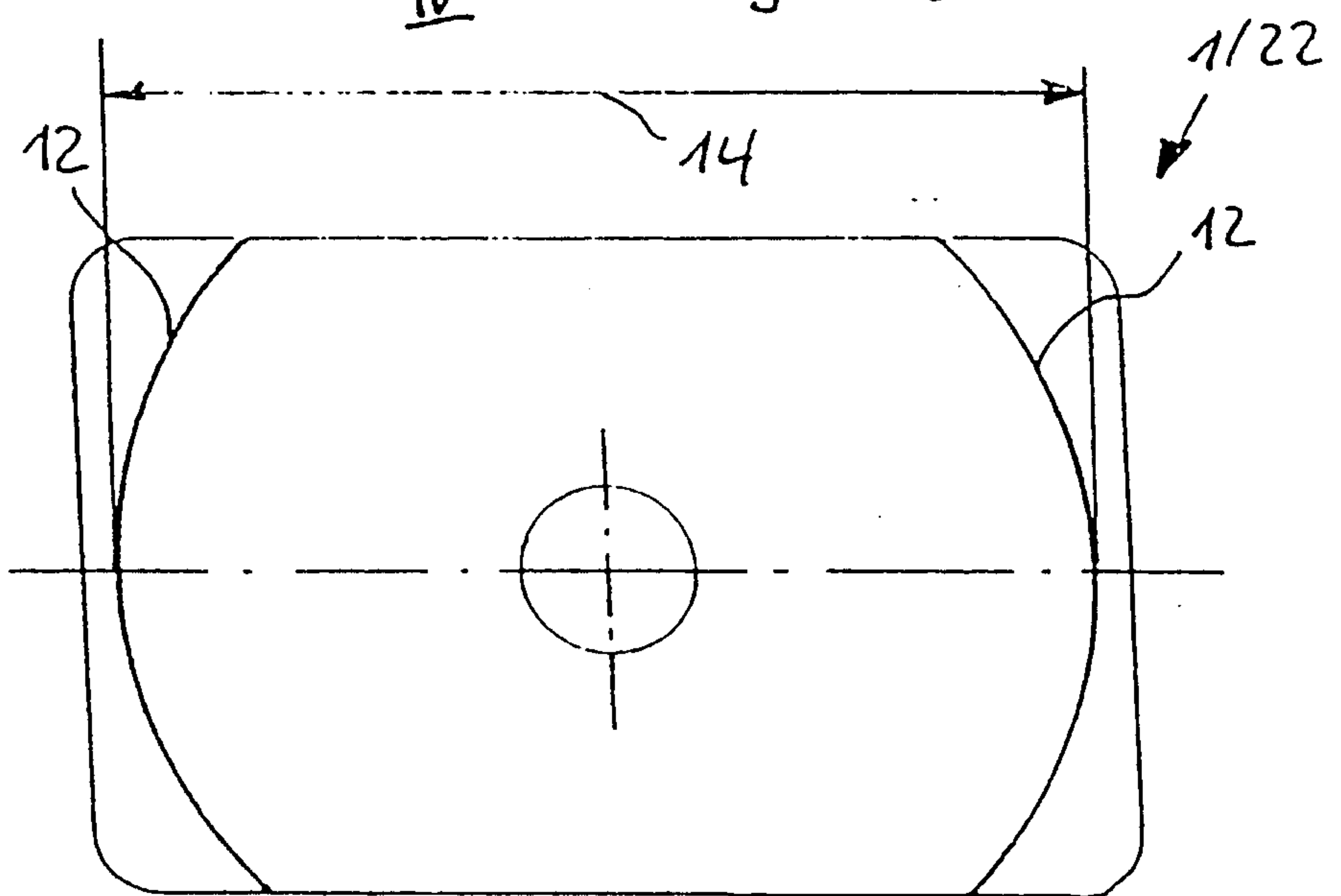
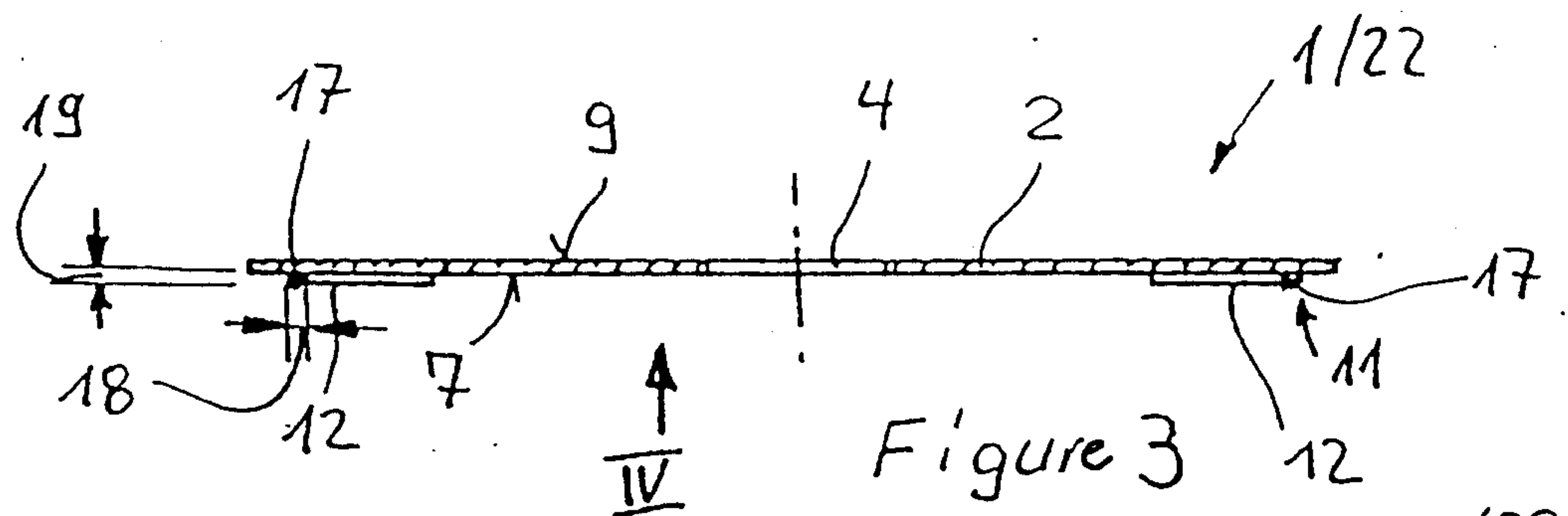
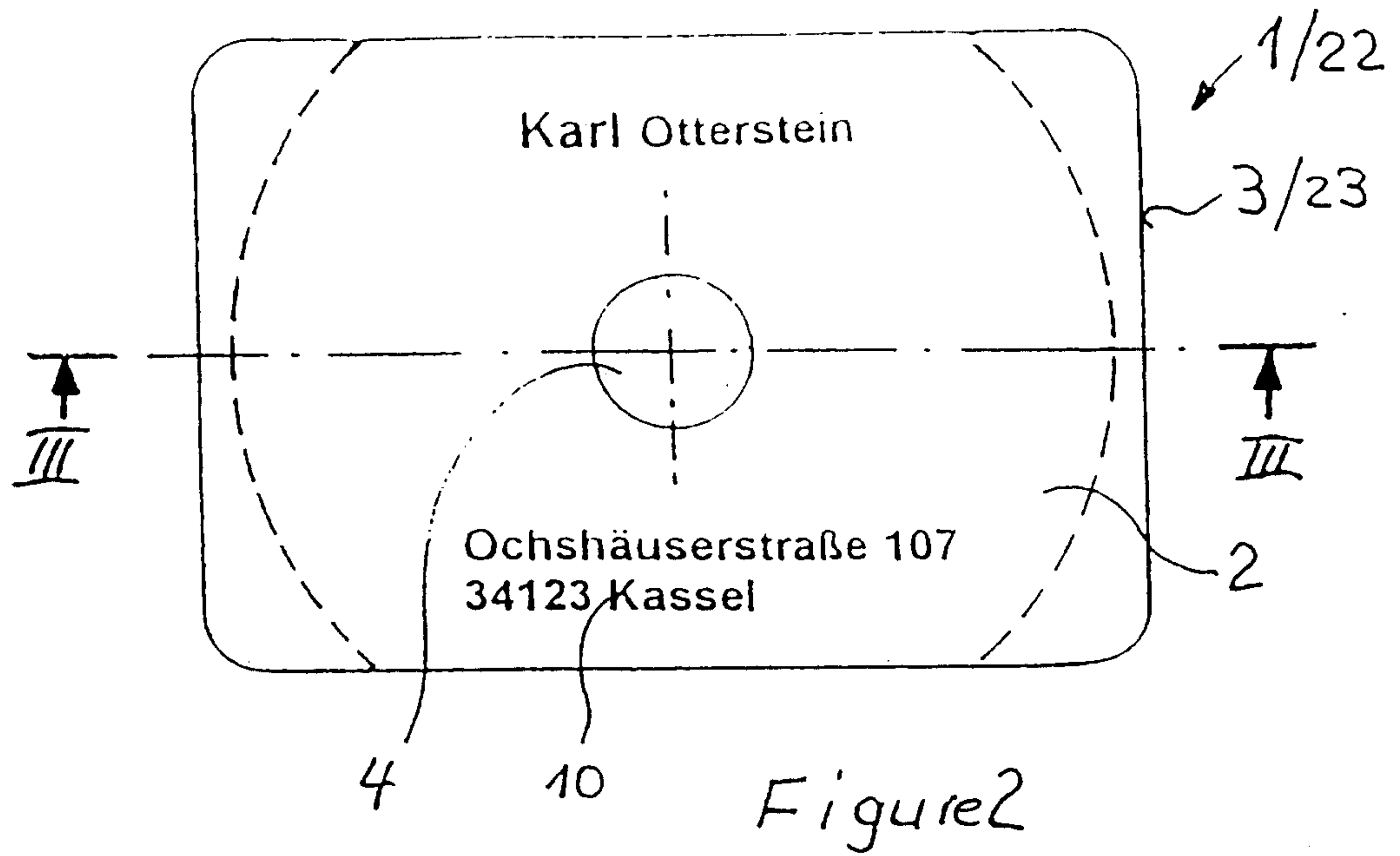
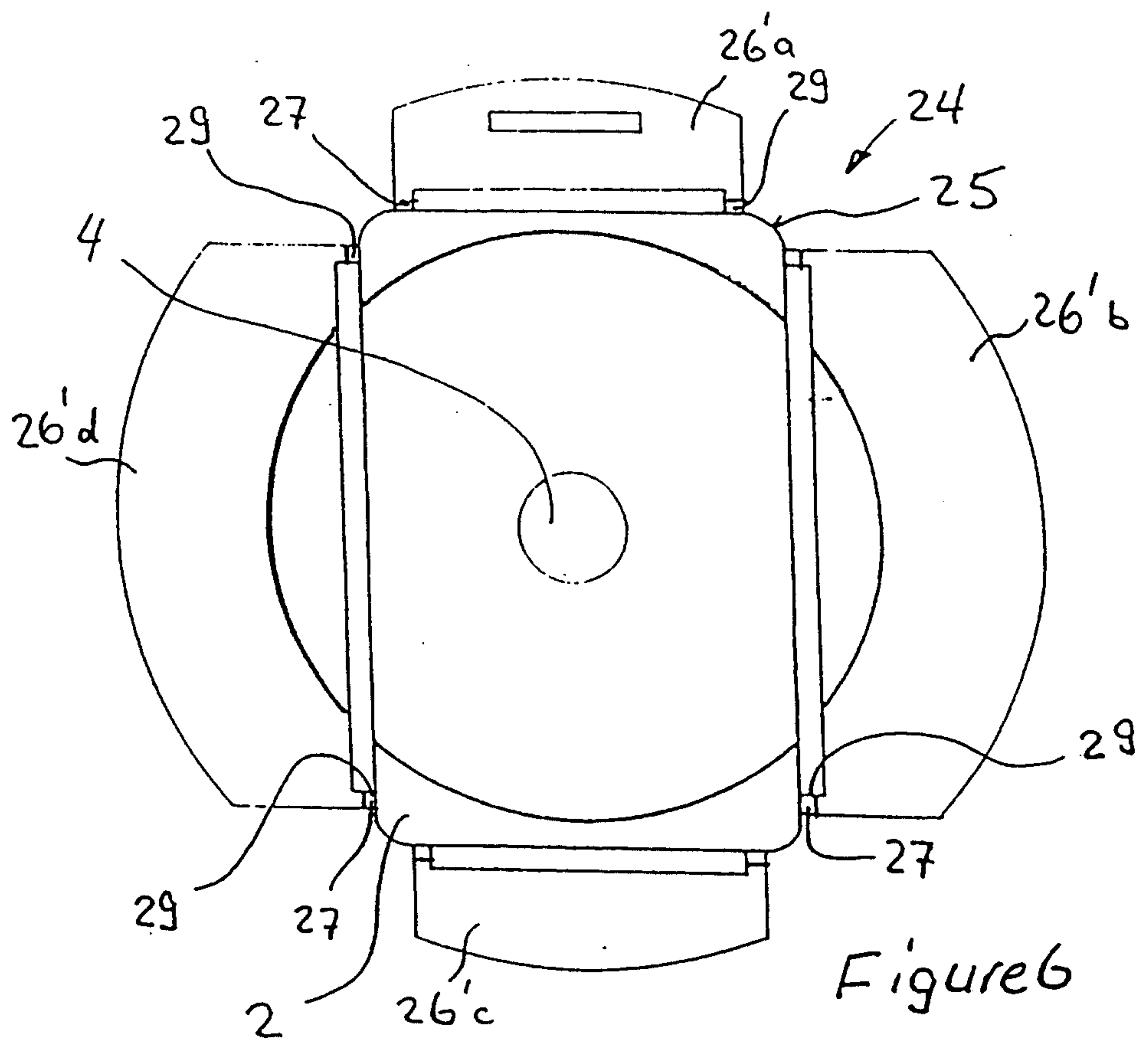
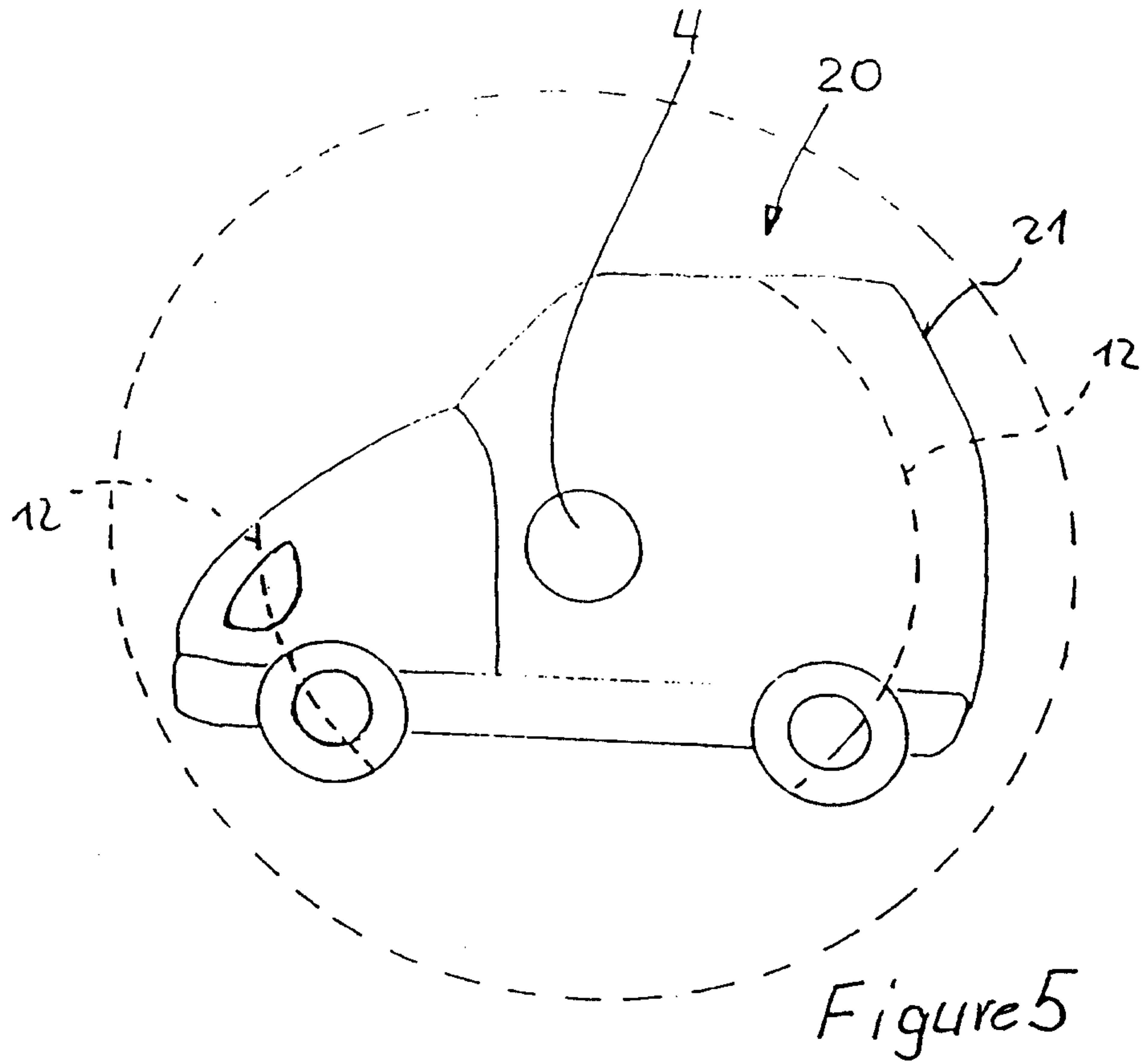


Figure 4

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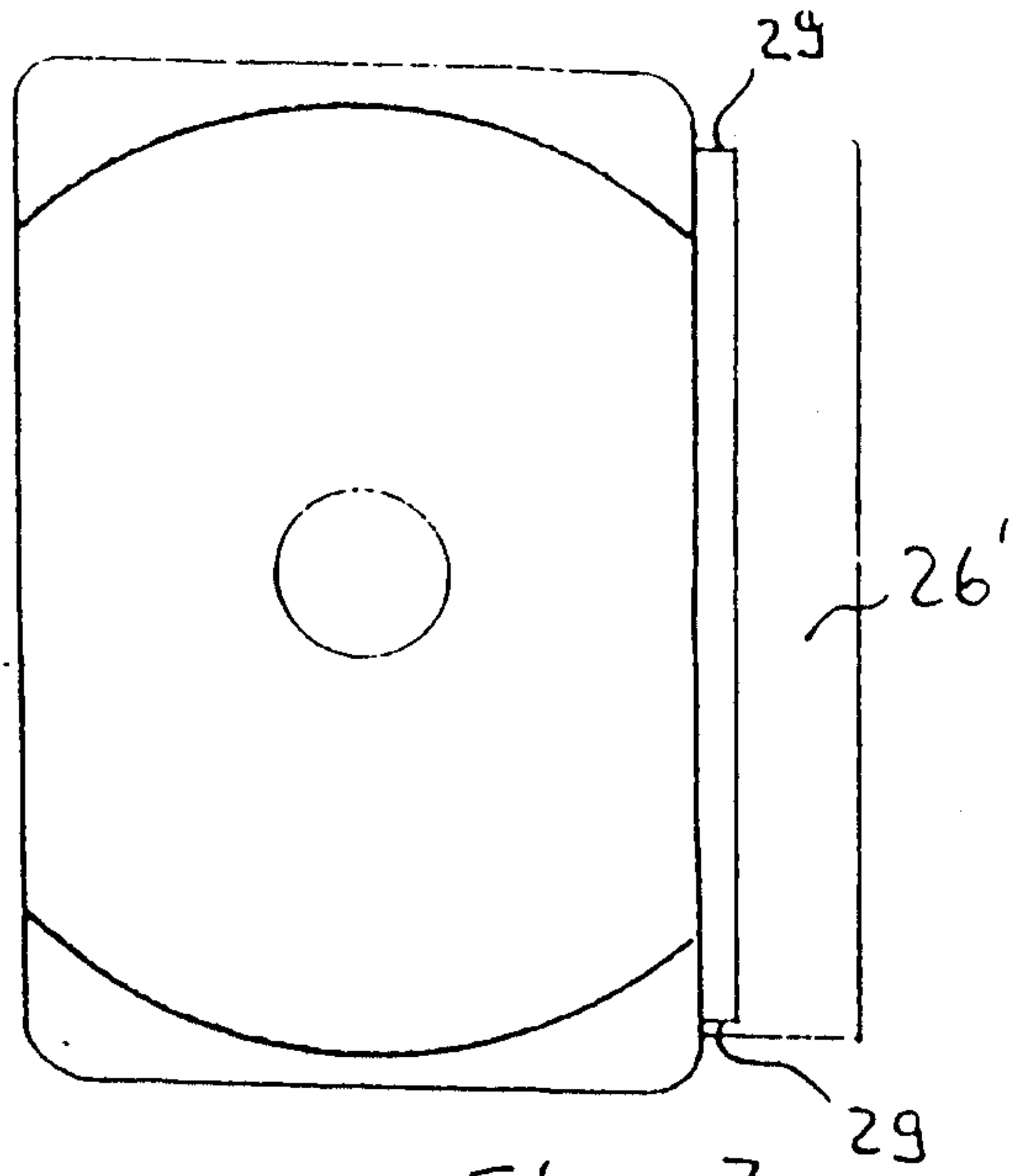


Figure 7

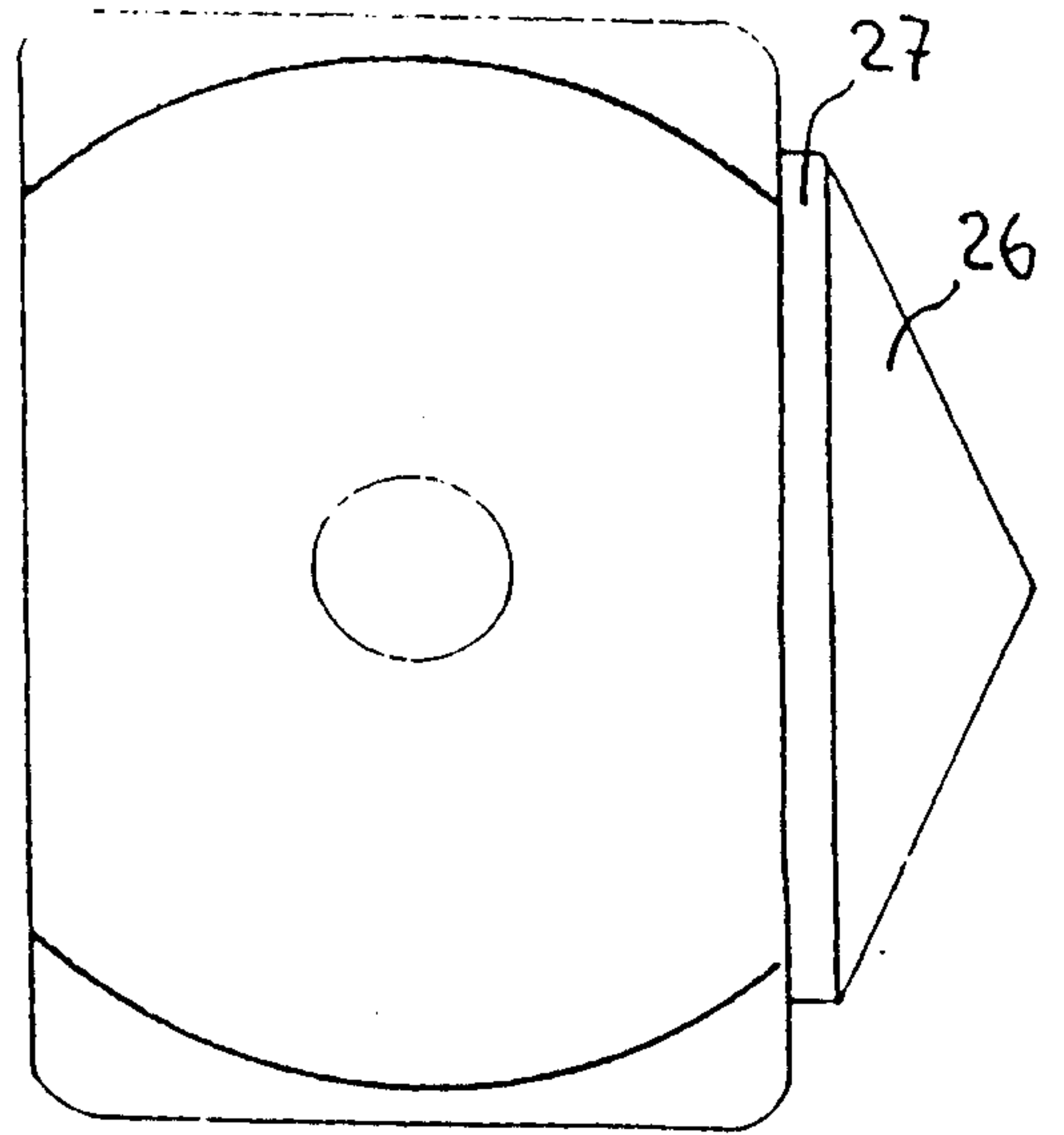


Figure 8

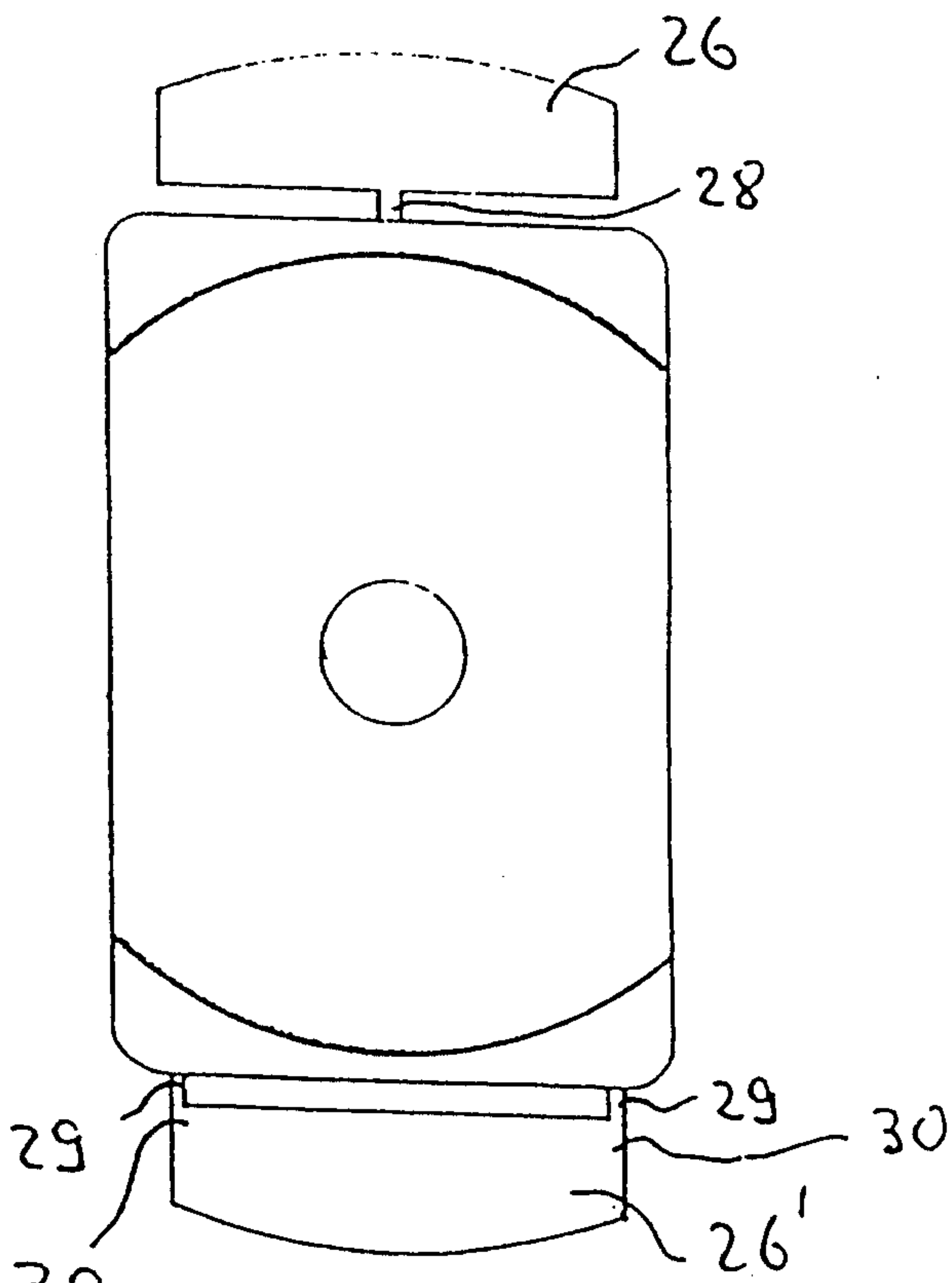


Figure 10

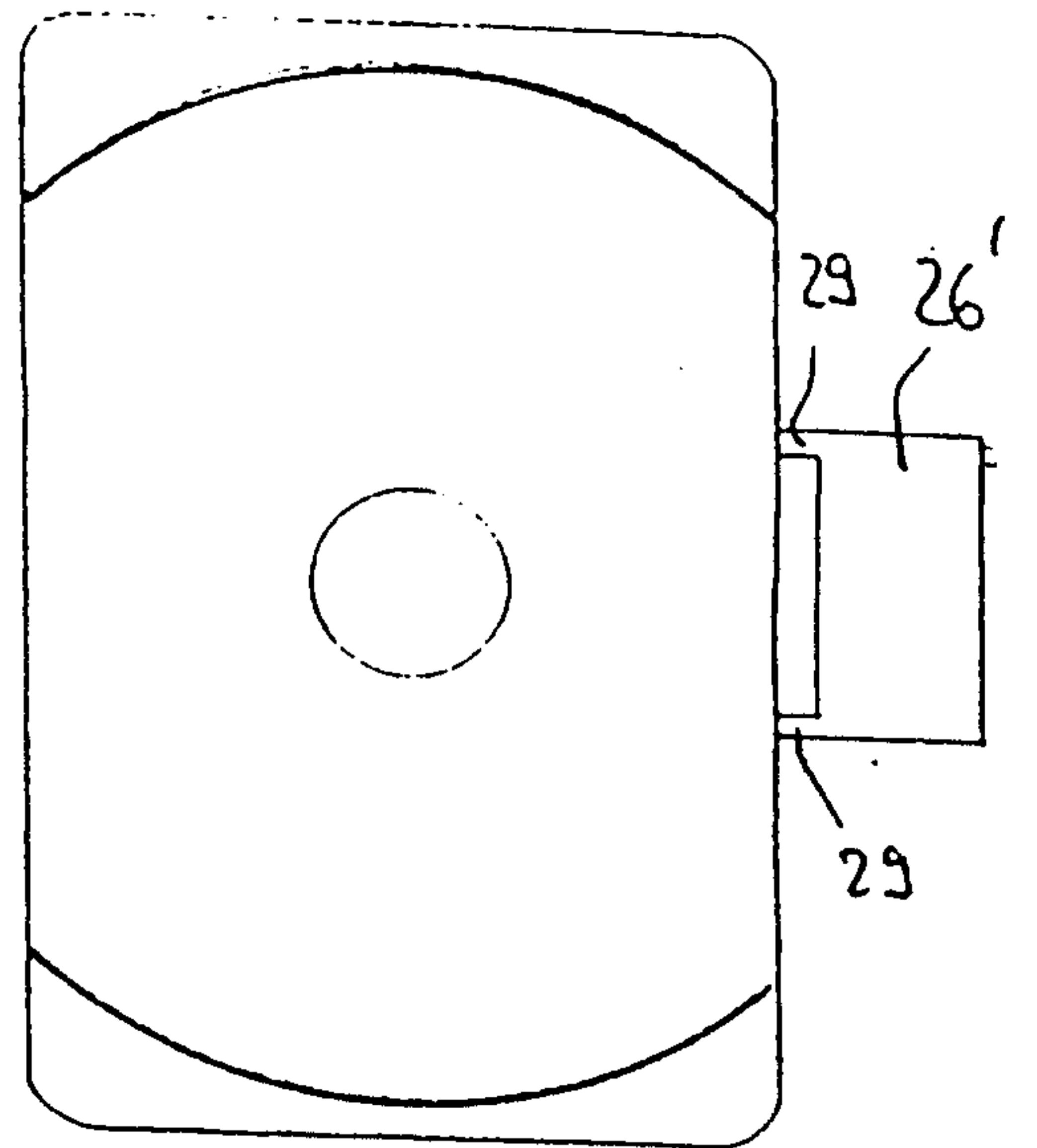


Figure 9

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Figure 11

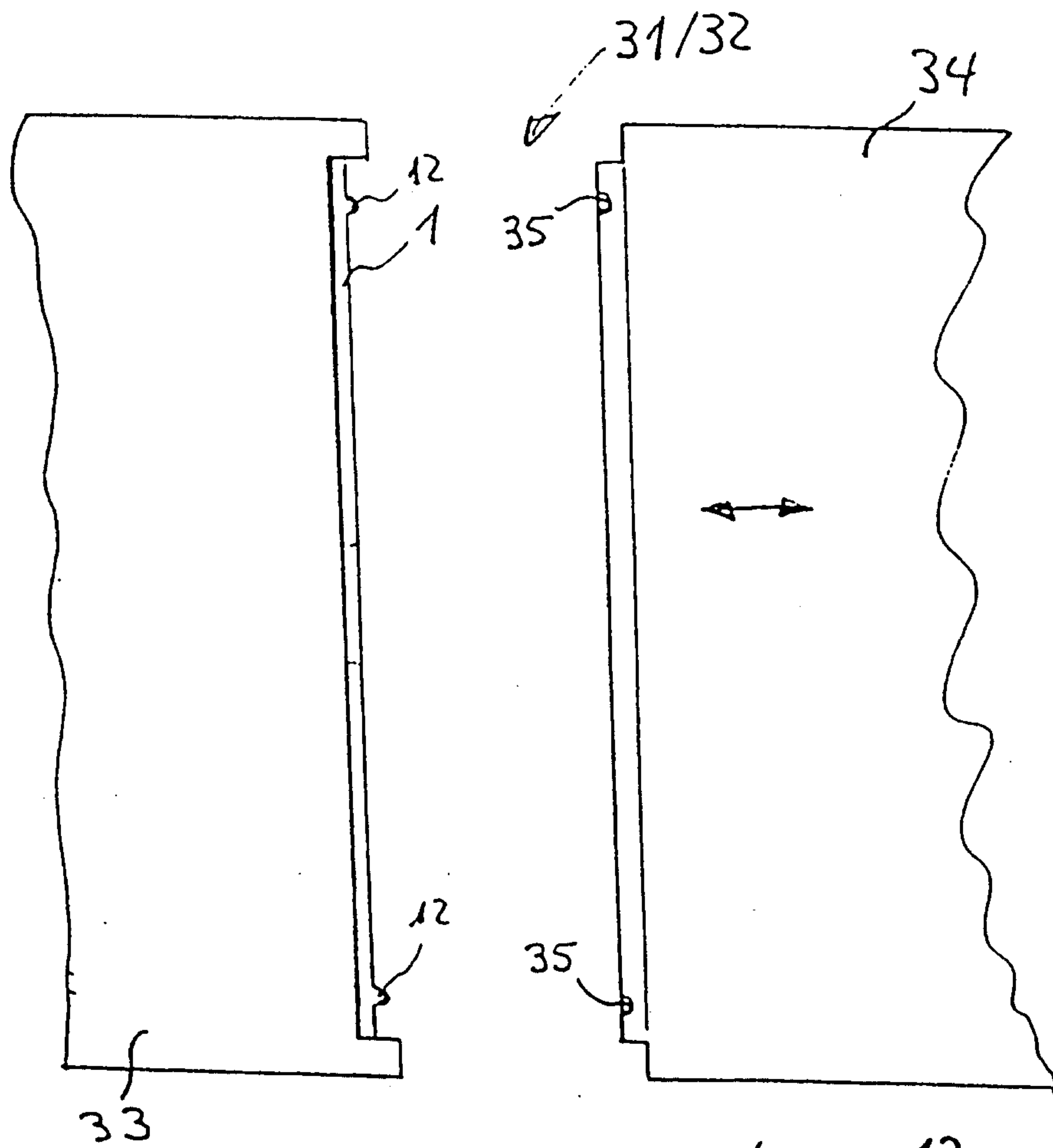
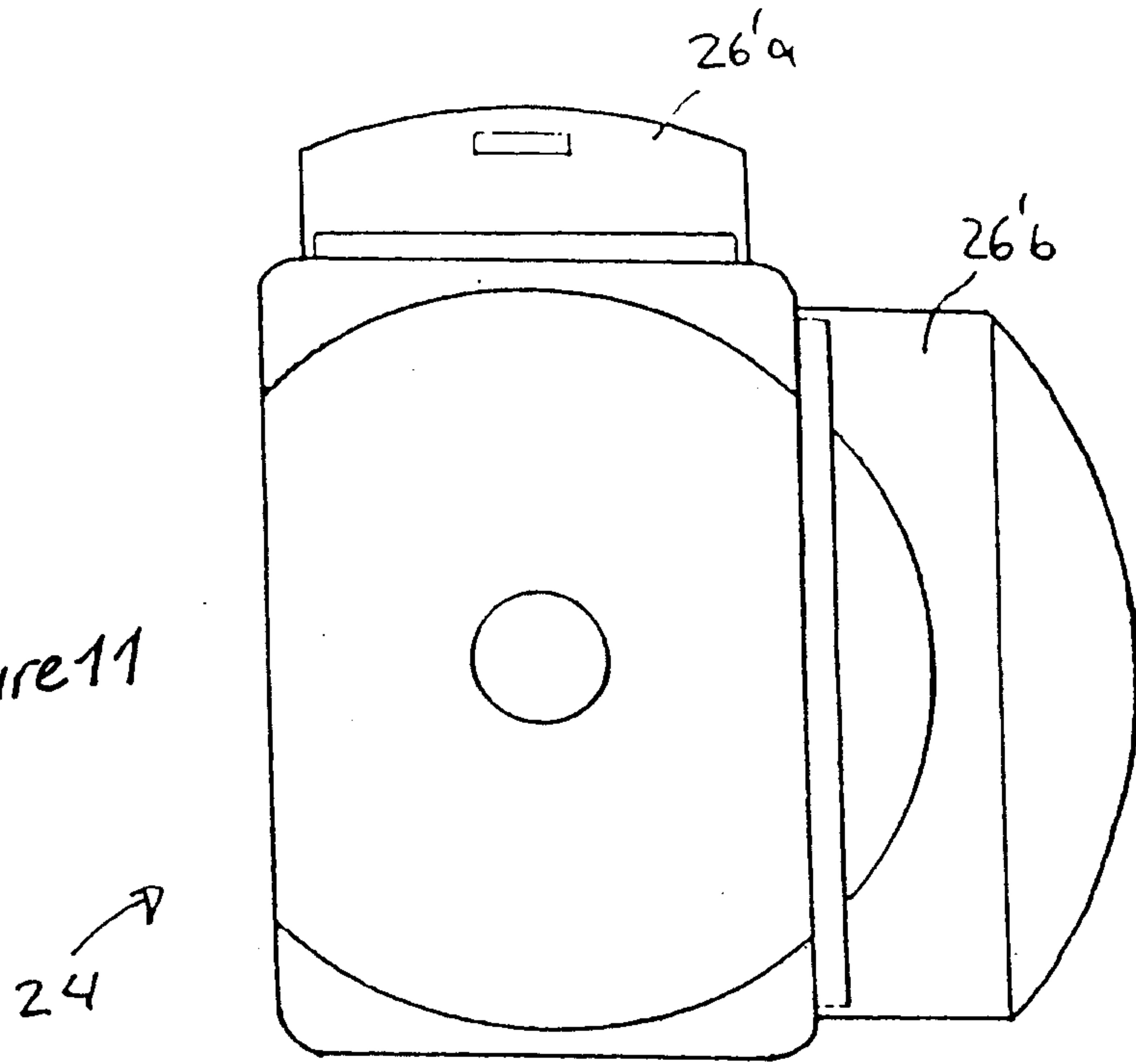


Figure 12

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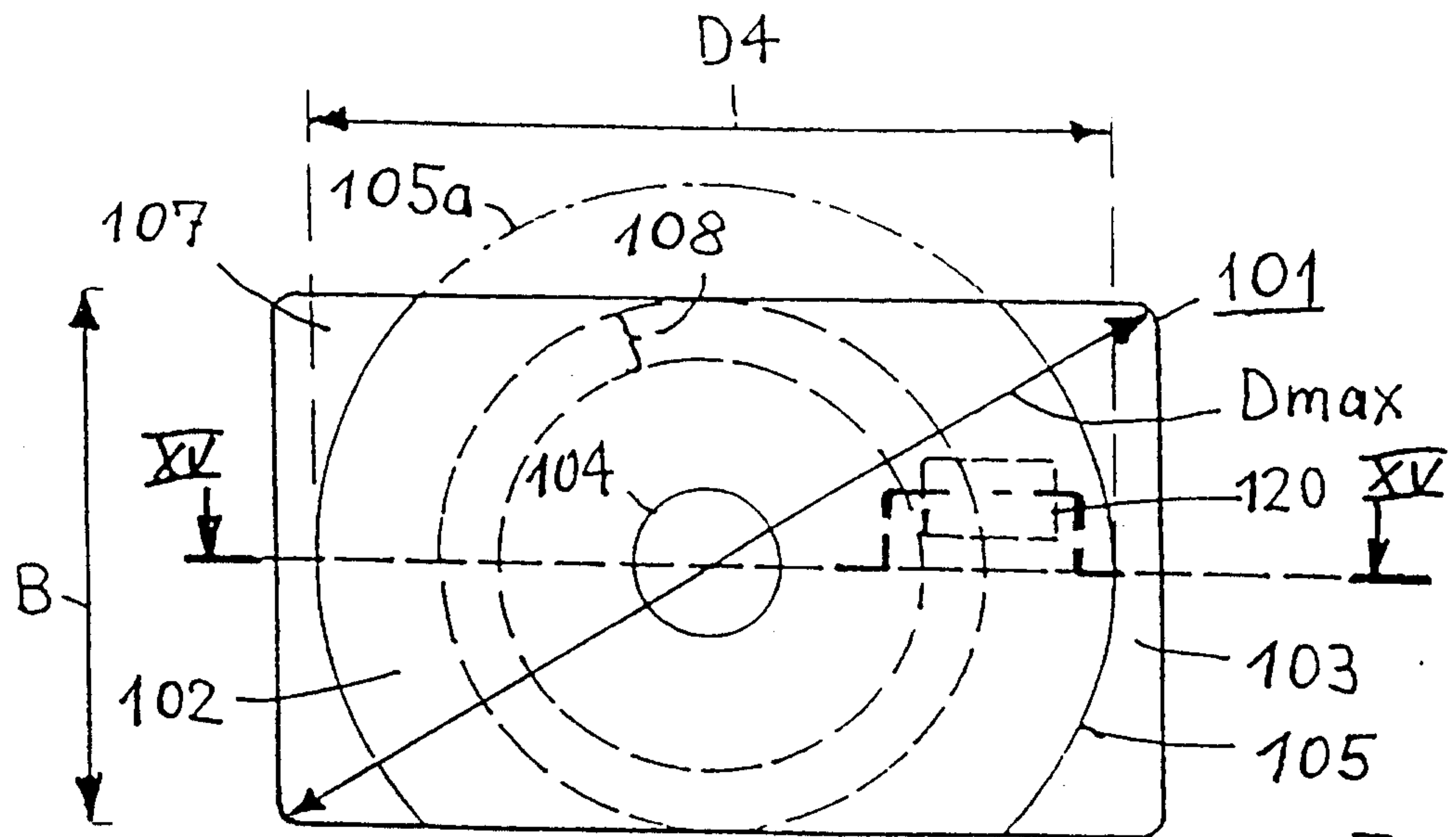


Fig. 14

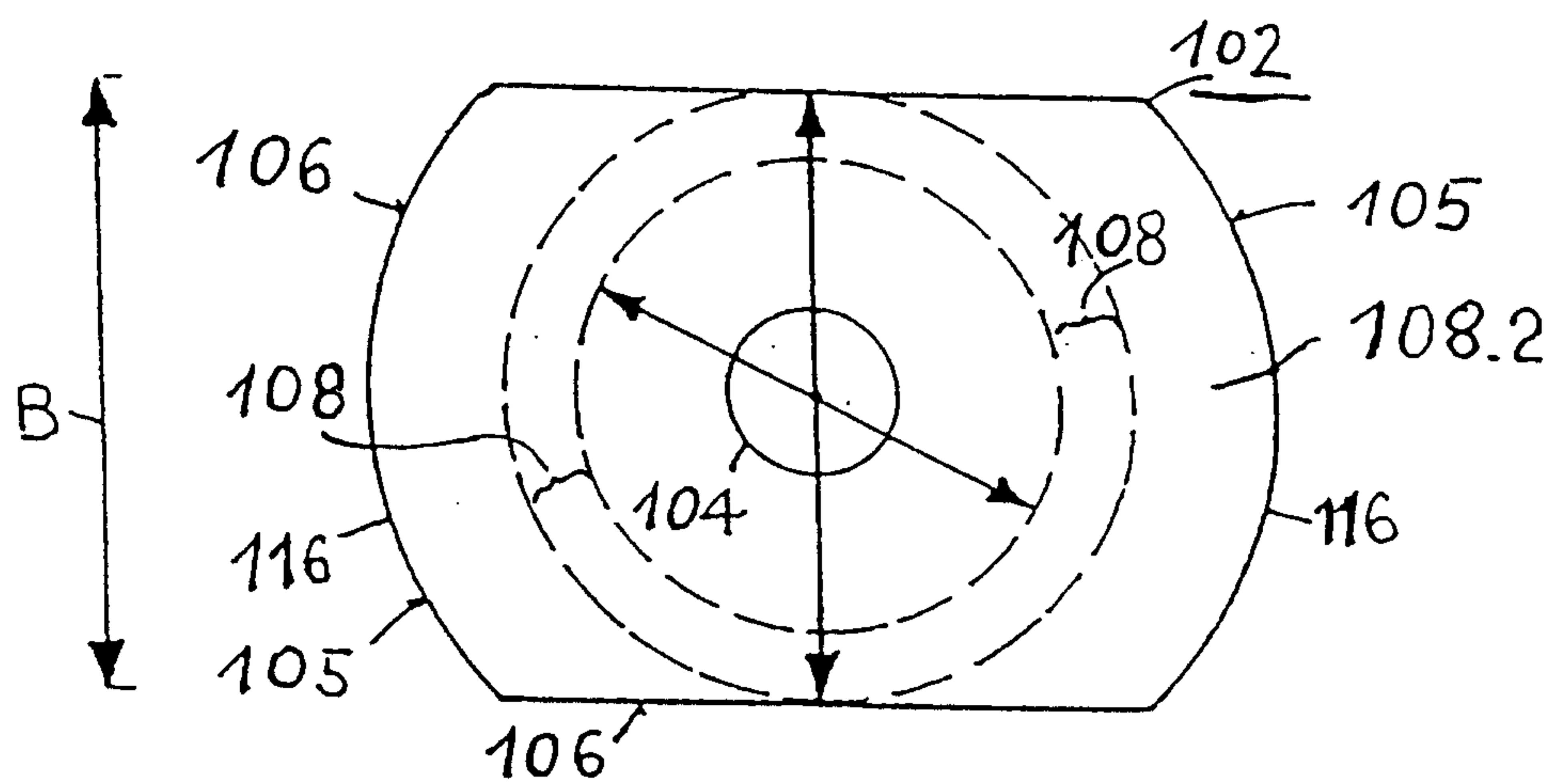


Fig. 17

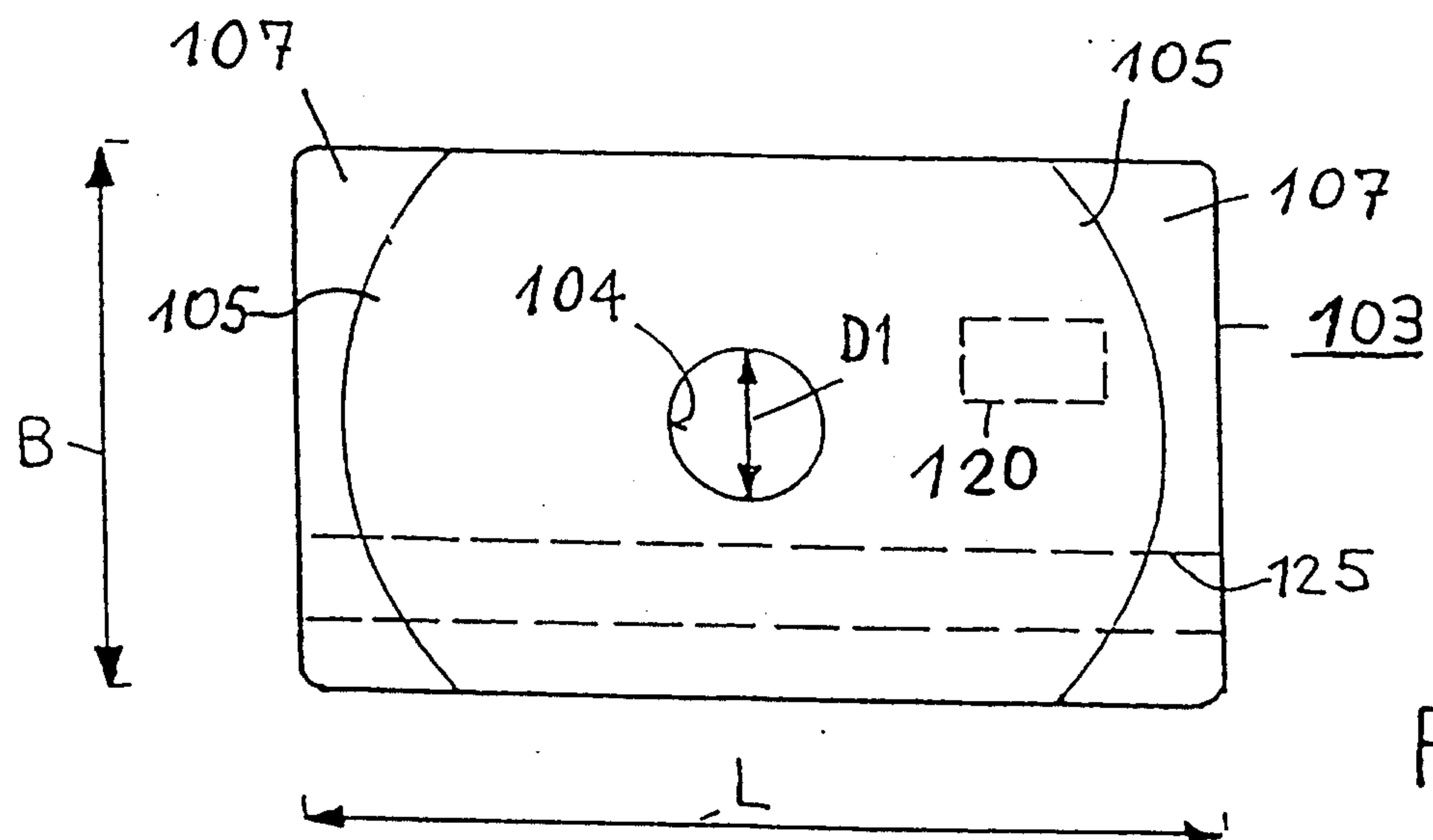


Fig. 18

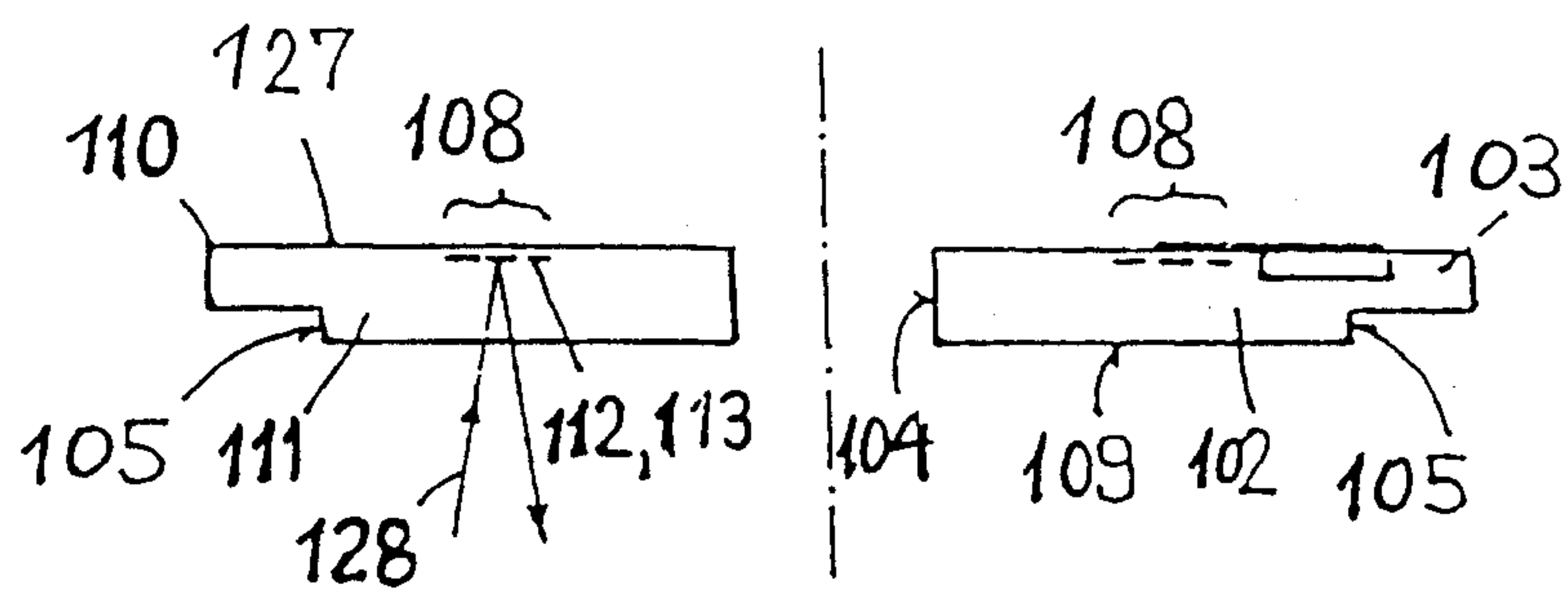


Fig. 15

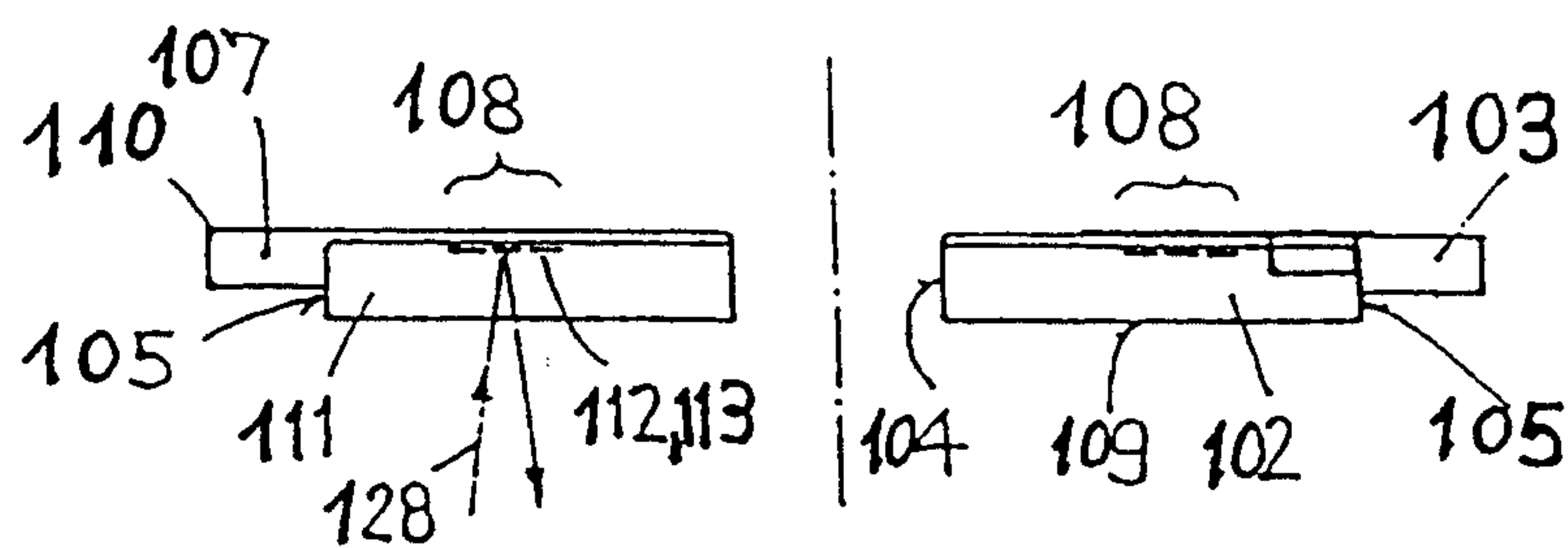


Fig. 16

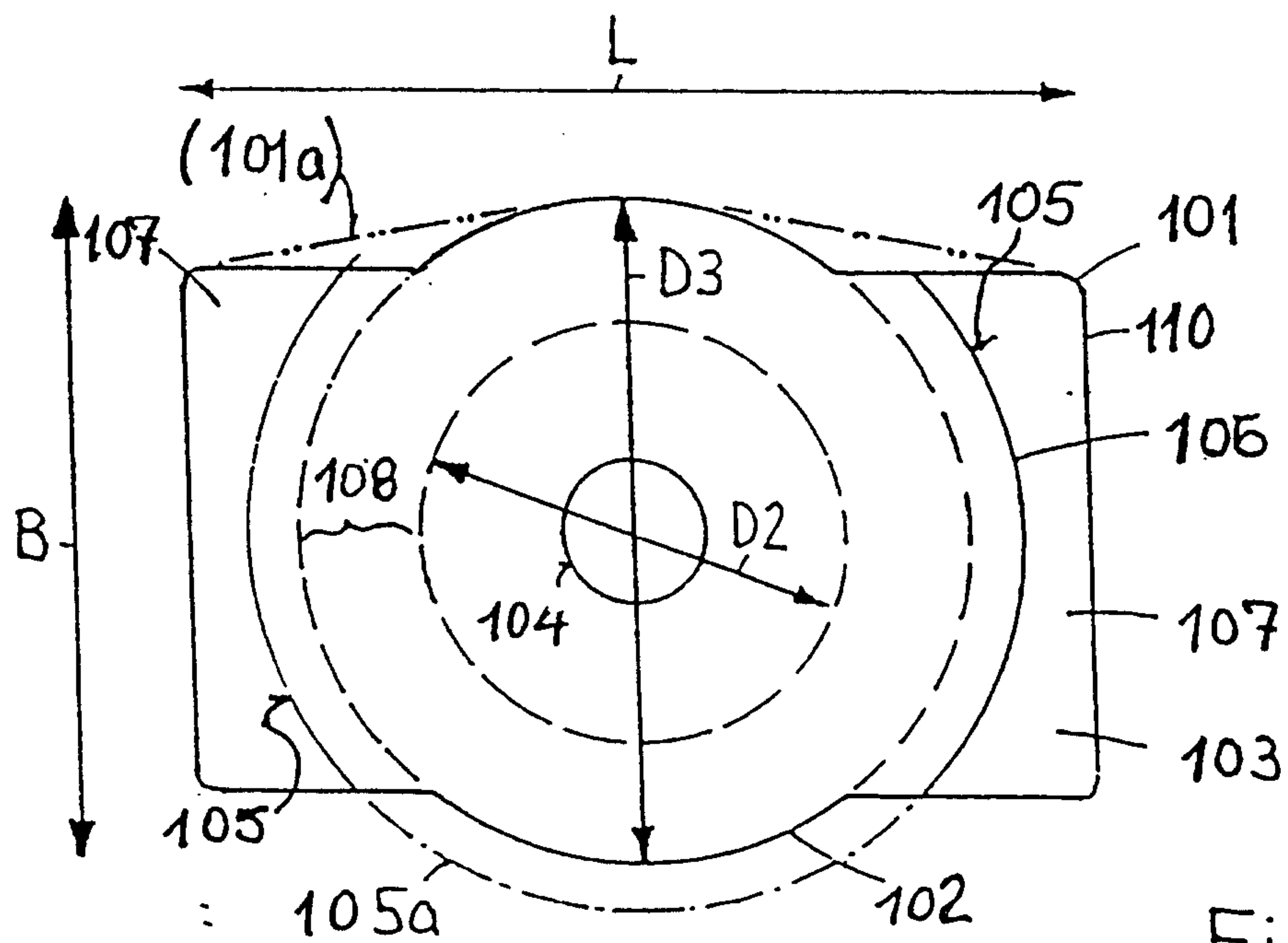


Fig. 19

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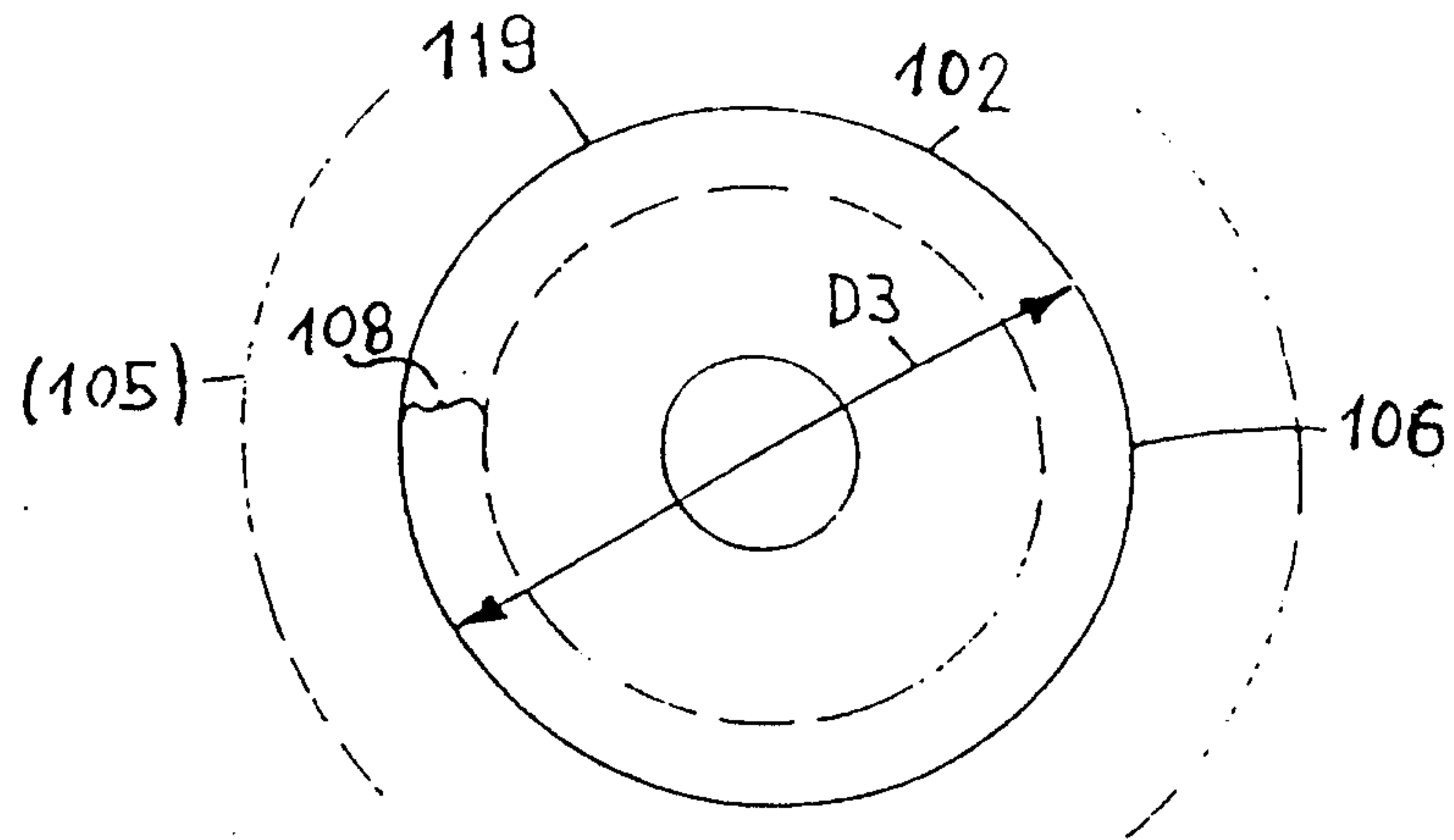


Fig. 20

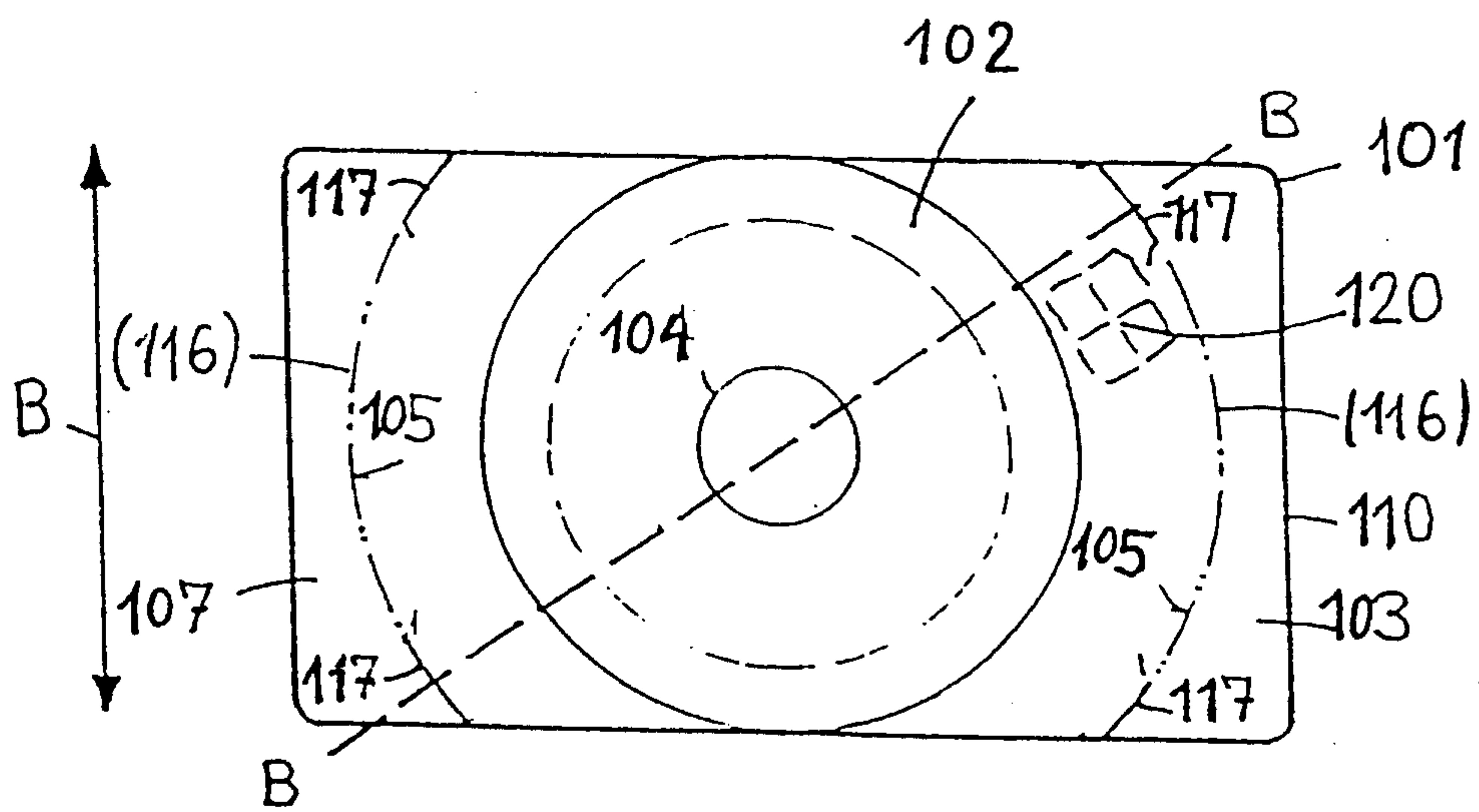


Fig. 21

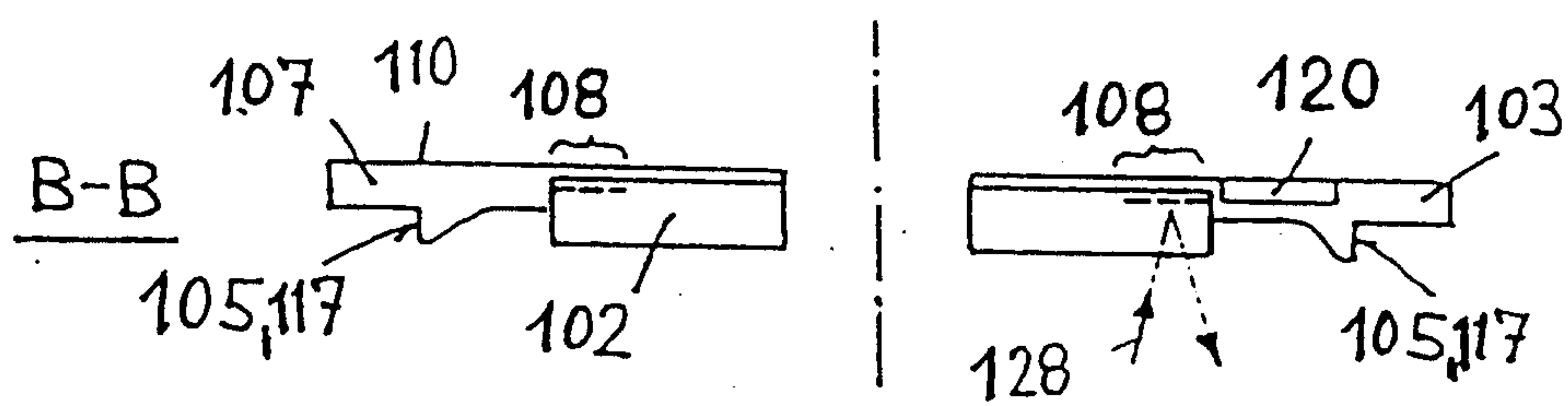


Fig. 22

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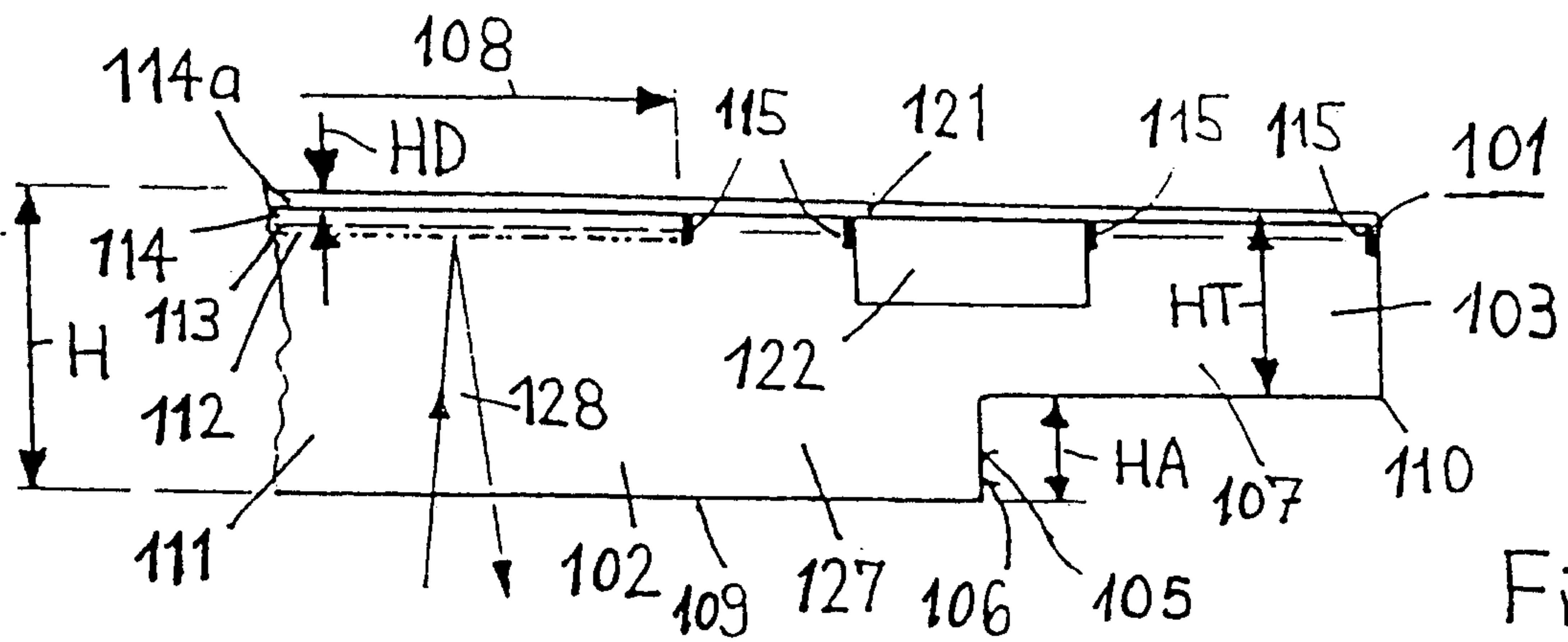


Fig. 23

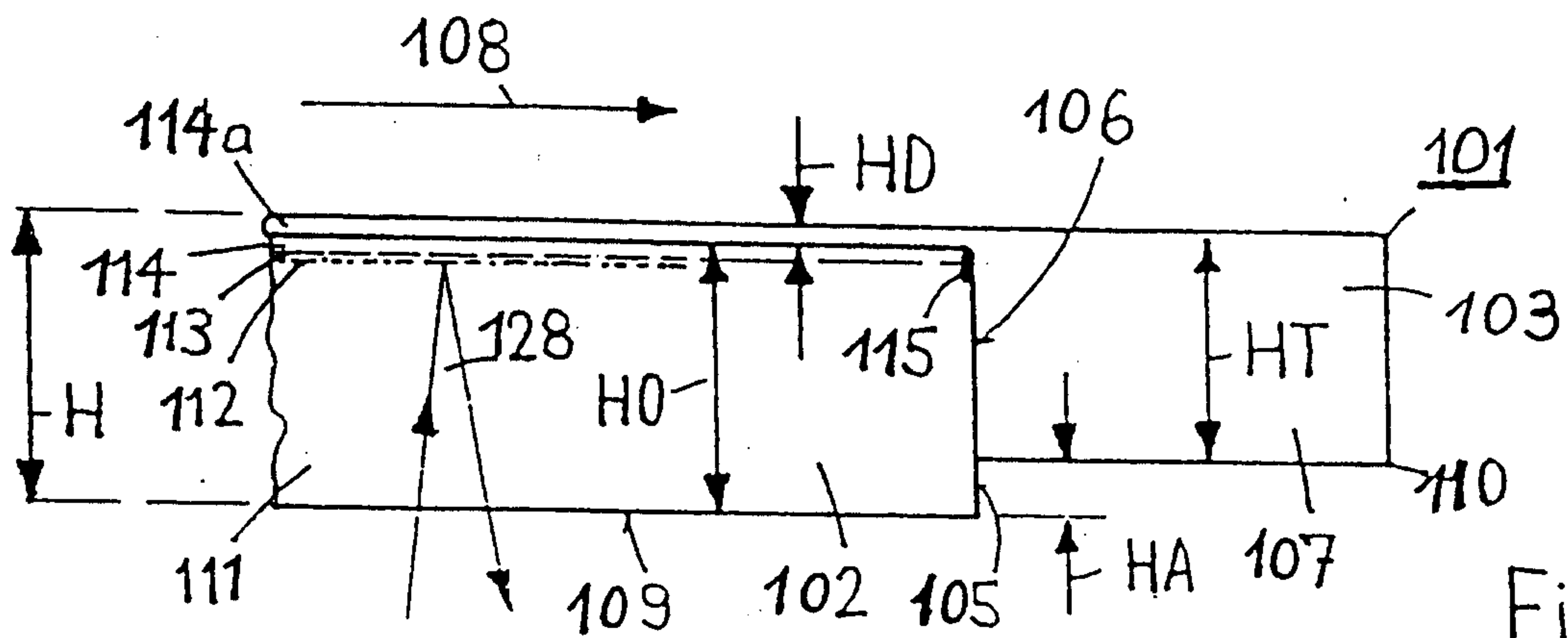


Fig. 24

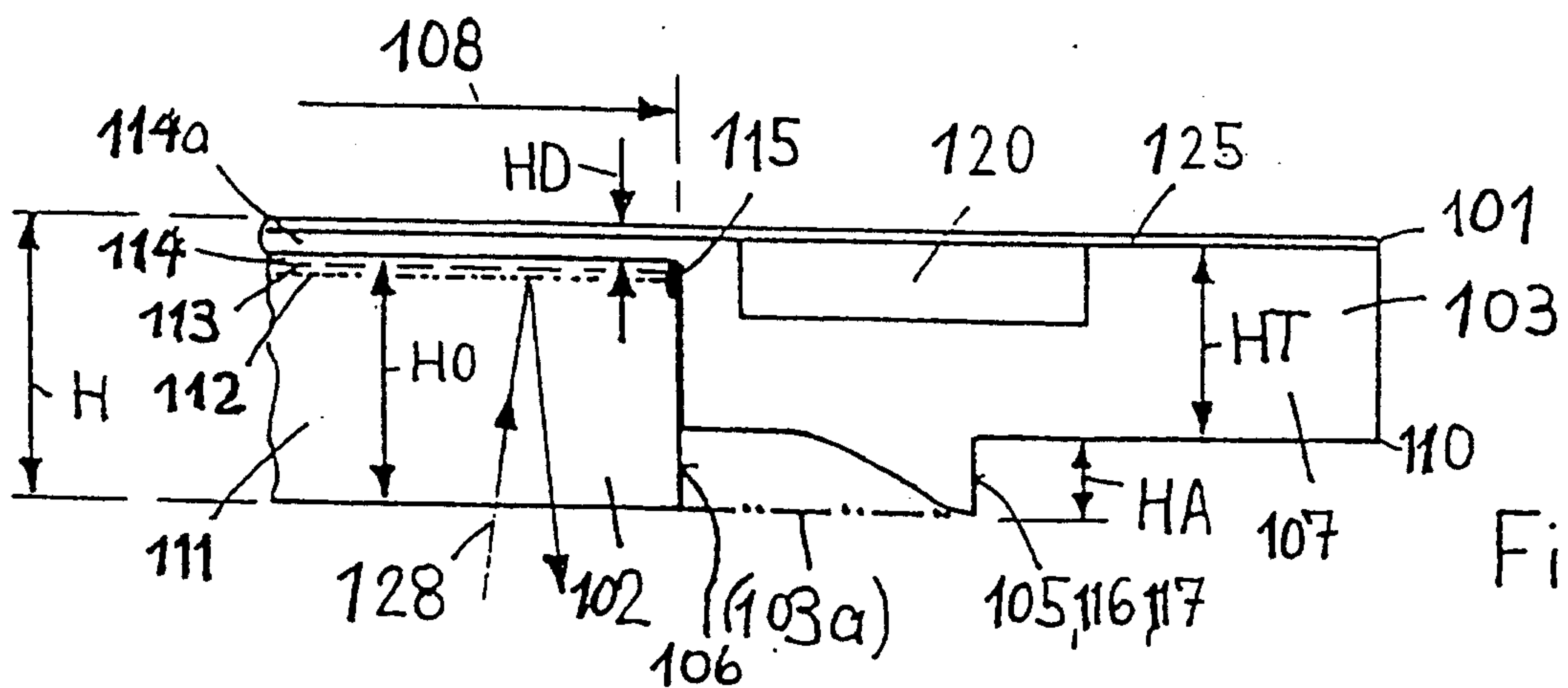
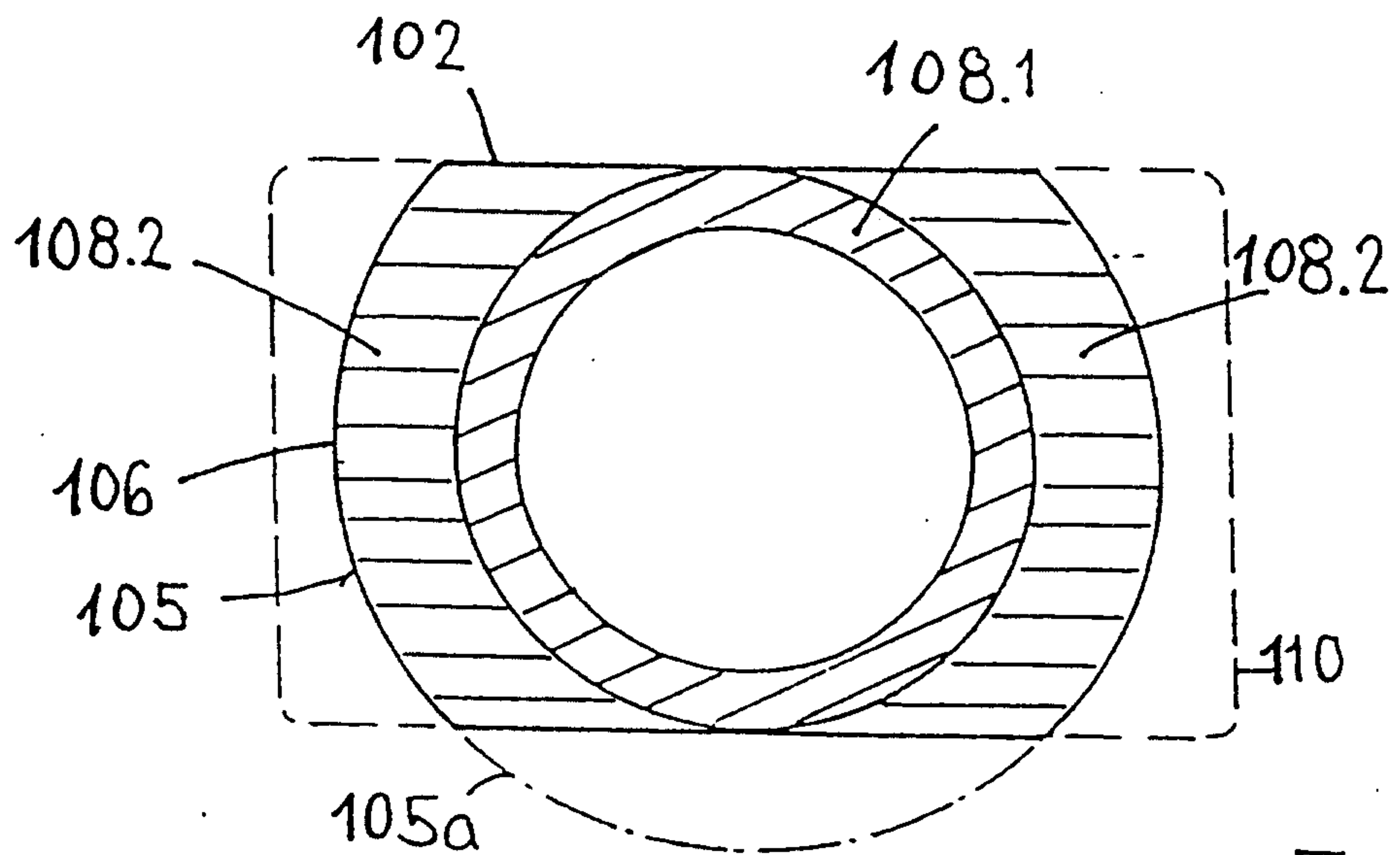
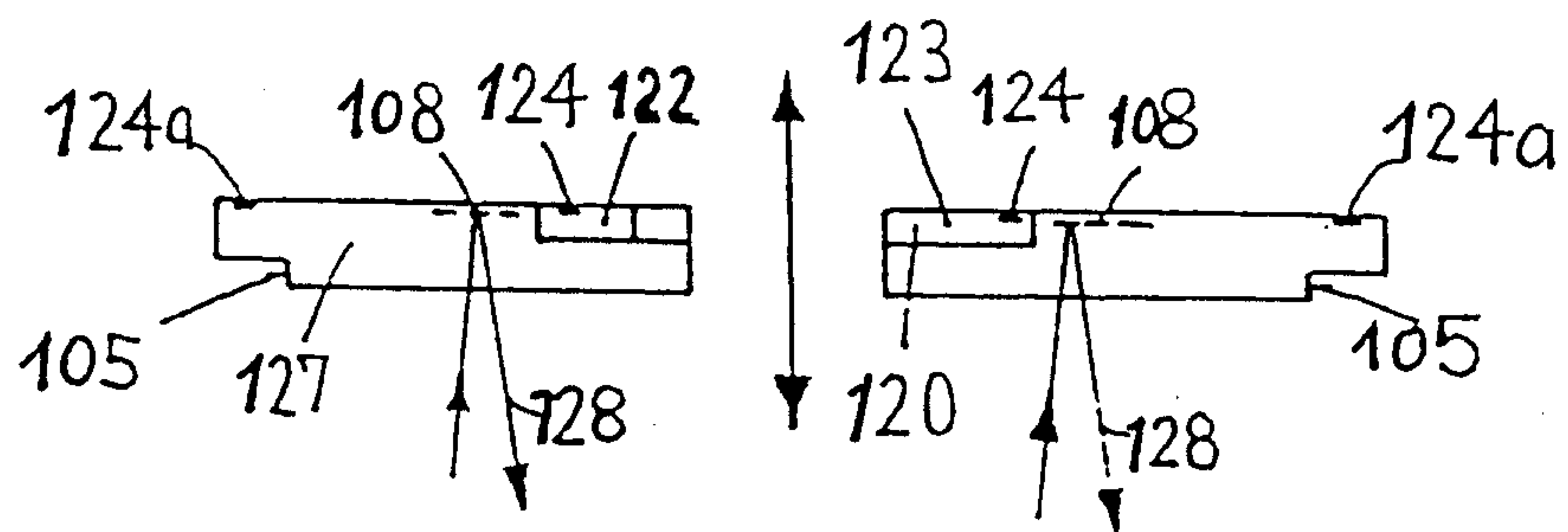
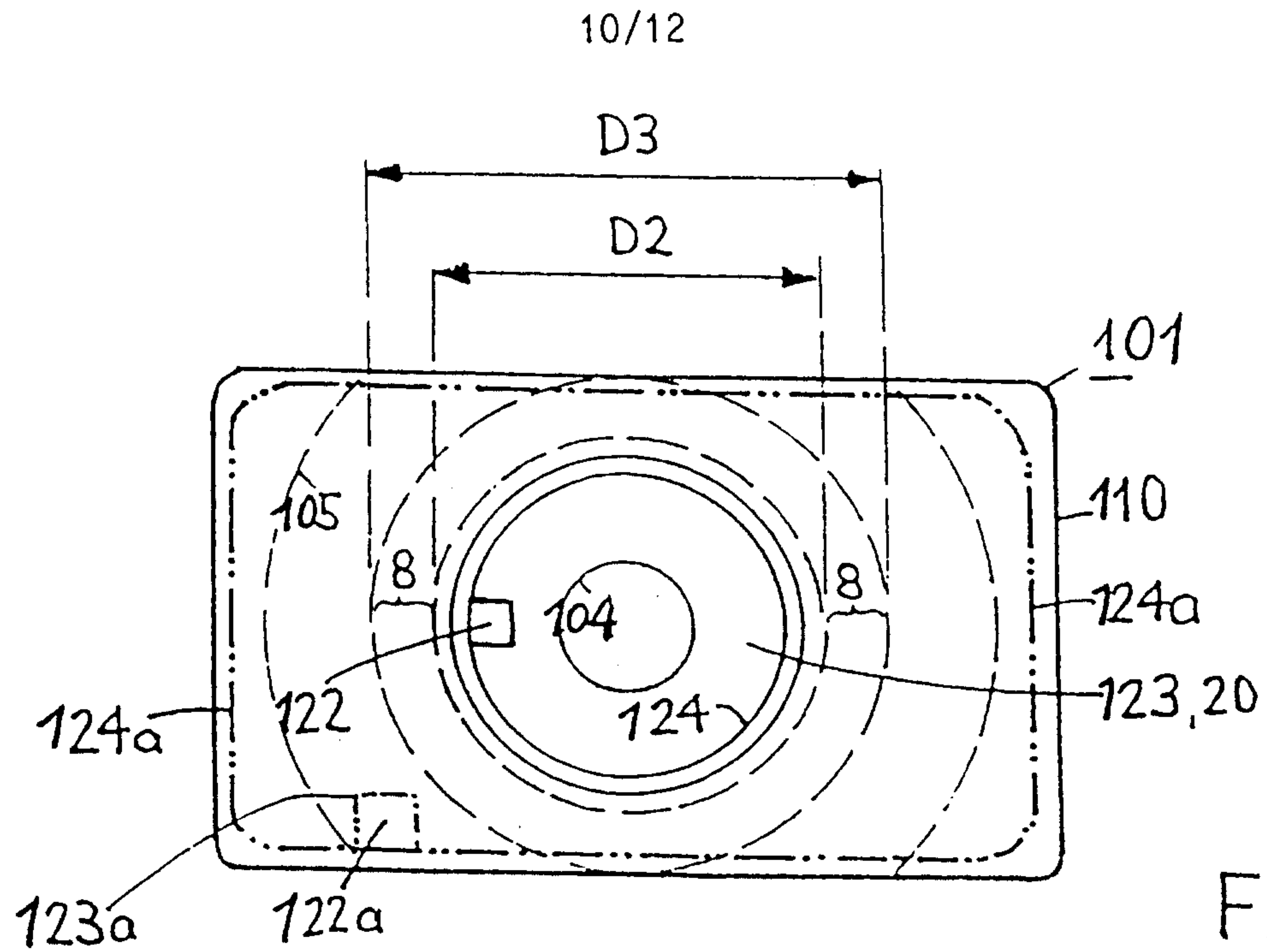


Fig. 25

$$H = H_0 + HD = HT + HA$$



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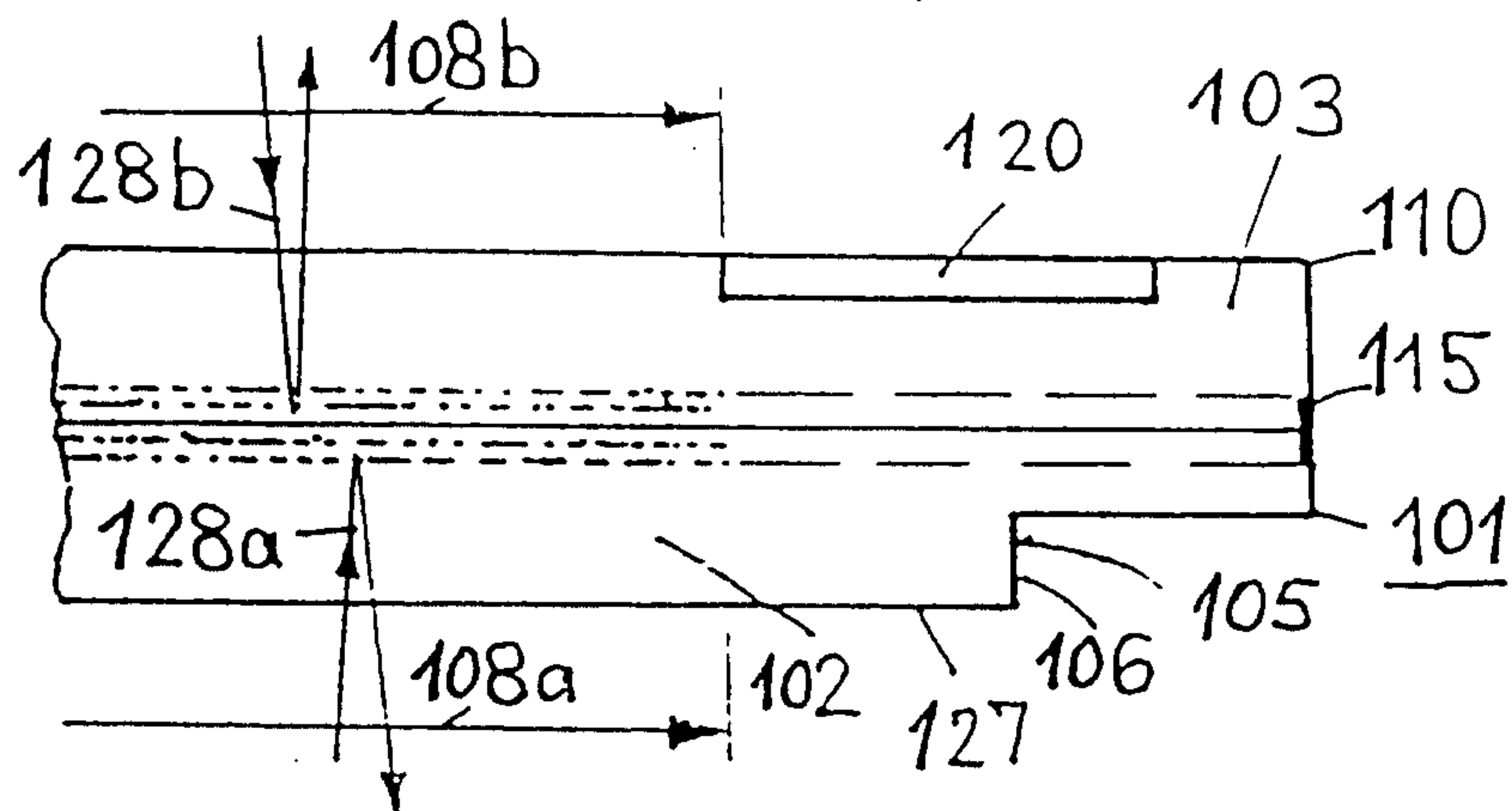


Fig. 29

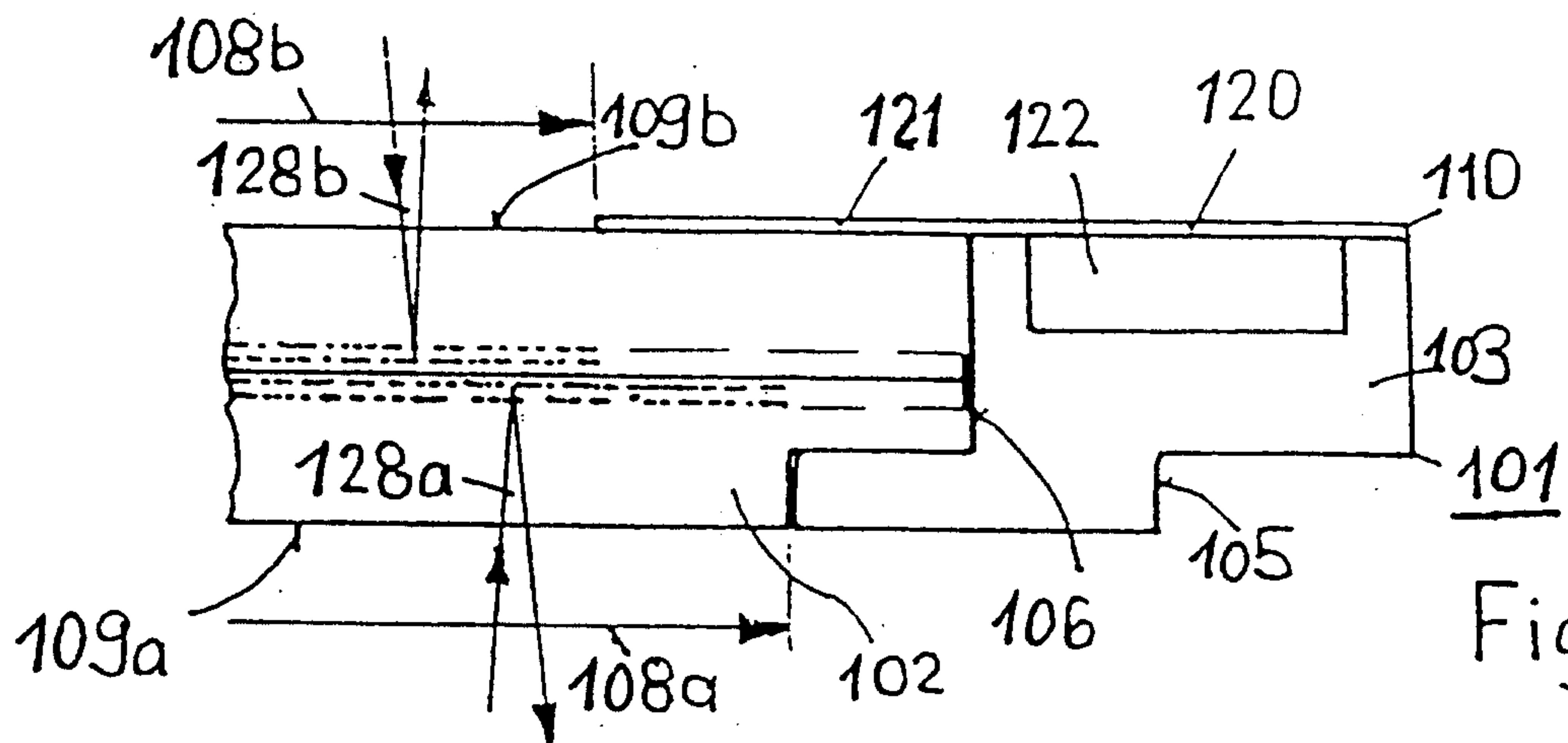


Fig. 30

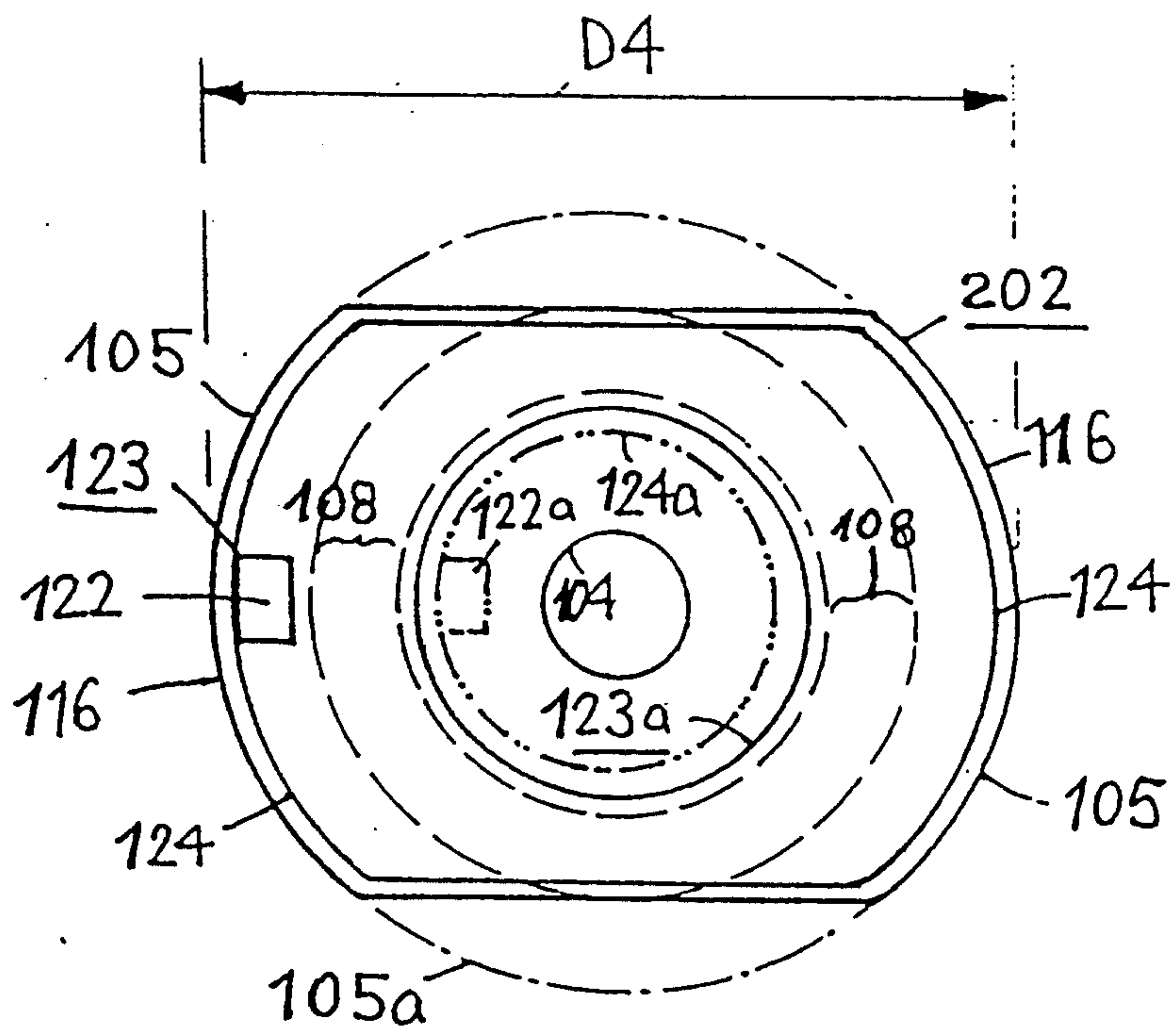


Fig. 31

