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(71) Applicant: **Teleste Oyj**  
**20660 Littainen (FI)**  
(72) Inventor: **WELTER, Samuel**  
**4052 Beaufays (BE)**  
(74) Representative: **Berggren Oy, Tampere**  
**Visiokatu 1**  
**33720 Tampere (FI)**

(54) **ATTACHMENT ARRANGEMENT FOR A CATV MODULE**

(57) An adapter plate (200) for attaching a CATV module to a wall outlet (220) terminating a coaxial cable, the wall outlet comprising a first (222) and a second (224) RF connector; wherein the adapter plate comprises a hole (202) for insertion of a RF connector of the CATV module, a rotatable plate (204) comprising a cylindrical member (206) substantially orthogonal to a surface of the rotatable plate, wherein an axis of rotation of the cylindrical member is displaced from a center of the rotatable

plate; said cylindrical member is designed to fit into the first RF connector of the wall outlet, wherein the cylindrical member being fit into the first RF connector forms an axis of rotation of the circular plate, wherein a distance between the cylindrical member and the hole is adjustable by rotating the rotatable plate such that the hole is co-locatable with the second RF connector of the wall outlet.

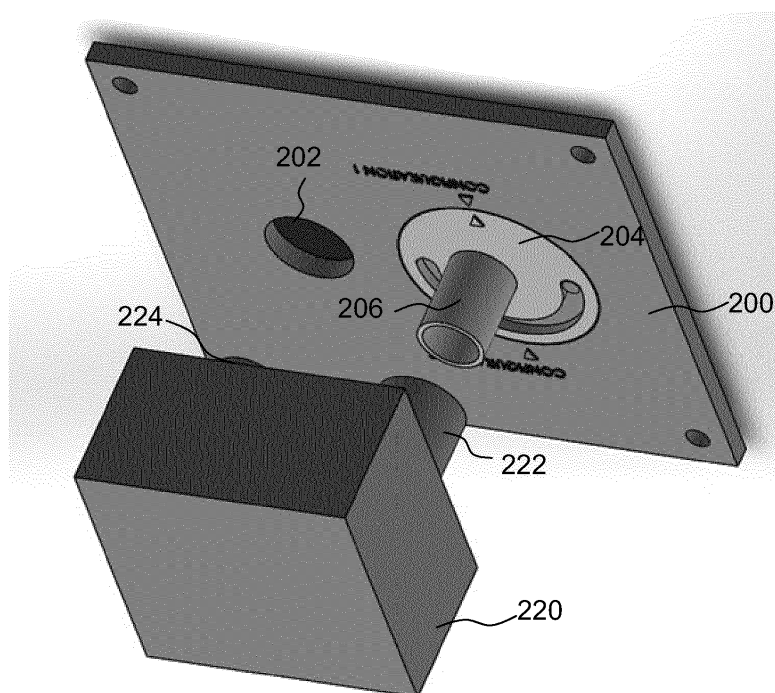


Fig. 2

## Description

### Field of the invention

**[0001]** The invention relates to an arrangement for attaching a CATV module to a wall outlet of a cable television network.

### Background of the invention

**[0002]** Various kinds of CATV (Common Antenna Television or Cable Television) modules are used for distributing an output signal from a CATV wall outlet to one or more receiving equipment, for example at home. A CATV module typically comprises an input port for connecting the CATV module to a connector of the wall outlet so as to receive an RF signal (e.g. television, data and/or radio) from the CATV network, and at least one, but typically a plurality (e.g. 2 - 8) of output ports for distributing the RF signal to the plurality of receiving equipment. For dividing the RF signal suitably for the output ports, the CATV module typically comprises various kinds of filter and/or splitter circuitry. The RF signal may comprise one or more television signals, data signals and/or radio signals modulated on their own frequency band, and the task of CATV module is to filter and/or split the each of the signals to the respective output port.

**[0003]** EP 1755198 discloses a locking mechanism for a filter and/or splitter module, where the module is attached to a wall outlet by introducing an electrical terminal of the module to a terminal on the wall outlet and using this connection of terminals as a centre of rotation, a projection extending from the module is rotated into a slot in the wall outlet to lock the module to the wall outlet.

**[0004]** However, such a mechanism requires a specifically designed front side of the wall outlet, having the slot corresponding to the projection of the module. Therefore, it does not suffice to have the module re-designed, but also the front side of the wall outlets needs to be changed to the corresponding design. Moreover, in most CATV wall outlets, there are typically at least two IEC 169-2 standard connectors, and the design of EP 1755198 cannot be used therein without significant changes in the front side of the wall outlet.

**[0005]** EP 2685567 introduced an improved mechanism for attaching the CATV module into a wall outlet, especially a wall outlet comprising at least two IEC 169-2 standard connectors. An adapter plate with a specifically designed dummy plug addressing the problem of various types of wall outlets used in different countries, wherein different distances between the at least two connectors are used, was introduced in EP 2685567.

**[0006]** Nevertheless, while providing a simple push-in solution for attaching the CATV module into a wall outlet, EP 2685567 has the problem that it is limited to be applied only at two different fixed distances between the connectors. However, the distance between the connectors is not standardized and different wall outlet manufacturers

may want to use different distances between the connectors.

### Brief summary of the invention

**[0007]** Now, an improved arrangement has been developed to reduce the above-mentioned problems. As aspects of the invention, we present an adapter plate for attaching a CATV module, which is characterized in what will be presented in the independent claim.

**[0008]** The dependent claims disclose advantageous embodiments of the invention.

**[0009]** According to the invention, there is provided an adapter plate for attaching a CATV module to a wall outlet terminating a coaxial cable, the wall outlet comprising a first and a second RF connector; wherein the adapter plate comprises a hole for insertion of a RF connector of the CATV module; a rotatable plate comprising a cylindrical member substantially orthogonal to a surface of the rotatable plate, wherein an axis of rotation of the cylindrical member is displaced from a center of the rotatable plate; said cylindrical member is designed to fit into the first RF connector of the wall outlet, wherein the cylindrical member being fit into the first RF connector forms an axis of rotation of the circular plate, wherein a distance between the cylindrical member and the hole is adjustable by rotating the rotatable plate such that the hole is co-locatable with the second RF connector of the wall outlet.

**[0010]** According to an embodiment, the cylindrical member is designed to fit into a recess between a pin and a circular wall of the first connector.

**[0011]** According to an embodiment, the rotatable plate comprises a curved groove and a guide support designed to fit in said groove for guiding the rotation of the rotatable plate.

**[0012]** According to an embodiment, the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a first type of wall outlet, when a first end point of the curved groove is arranged in contact with the guide support, and the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a second type of wall outlet, when a second end point of the curved groove is arranged in contact with the guide support.

**[0013]** According to an embodiment, in the first type of wall outlet, a distance between pins of the first and second RF connector is substantially 25 mm, more preferably 25,4 mm; and in the second type of wall outlet, a distance between pins of the first and second RF connector is substantially 30 mm, more preferably 30,0 mm.

**[0014]** According to an embodiment, the rotatable plate is circular and the adapter plate comprises a circular aperture for fitting the rotatable circular plate substantially into same plane with adapter plate.

**[0015]** According to an embodiment, the rotatable plate is arranged on the surface plane of the adapter

plate.

**[0016]** According to an embodiment, the first and the second RF connectors are Belling-Lee connectors (IEC 169-2), wherein the first RF connector is intended for FM radio signal and the second connector is intended at least for television signal.

**[0017]** According to an embodiment, the adapter plate comprises means for connecting the adapter plate to the CATV module.

**[0018]** According to an aspect of the invention, there is provided a CATV module suitable for attaching to a wall outlet terminating a coaxial cable, which CATV module comprises an adapter plate according to any of above embodiments.

**[0019]** According to an embodiment, the adapter plate is attached to the CATV module as a back plate.

**[0020]** According to an embodiment, the CATV module is a filter and/or splitter module, a cable modem, an amplifier or an Ethernet-over-coax equipment.

**[0021]** The other aspects, embodiments and advantages will be presented later in the detailed description of the invention.

### Brief description of the drawings

**[0022]** The invention will now be described in more detail in connection with preferred embodiments with reference to the appended drawings, in which:

- Fig. 1 shows a typical wall outlet having two RF connectors;
- Fig. 2 shows an adapter plate according to an embodiment to be inserted into a first type of wall outlet;
- Fig. 3 shows an adapter plate according to an embodiment; and
- Fig. 4 shows an example of adjusting the distance between the cylindrical member and the hole of the adapter to fit into different types of wall outlet according to an embodiment.

### Detailed description of the embodiments

**[0023]** Figure 1 shows a typical wall outlet having a first connector for FM radio signal implemented as a female-type IEC 169-2 connector and a second connector for TV signal implemented as a male-type IEC 169-2 connector. However, in contemporary cable TV networks the connector for FM radio signal is typically not used anymore, and only the connector of the TV signal is in use.

**[0024]** Even though the connectors are standardized to ensure interconnection between the cable TV network and the receiving equipment, the distance between the connectors is not regulated by any standard. Thus, there are various types of wall outlets used in different countries, wherein the distance between the connectors may

be different between the wall outlet types. For example, in a certain type of wall outlet the distance between the signal pins of the TV and FM connectors is 25,4 mm, whereas in another type of wall outlet it is 30,0 mm. Moreover, the wall outlet manufacturers may have different reasons to use any other (a proprietary) distance between the pins.

**[0025]** For attaching a CATV module to a wall outlet irrespective of the distance between the signal pins, an adapter plate to be used together with the CATV module is introduced in Figure 2. The wall outlet 220 comprises a first 222 and a second 224 RF connector. The adapter plate 200 comprises a hole 202 for insertion of a RF connector of the CATV module, a rotatable plate 204 comprising a cylindrical member 206 substantially orthogonal to a surface of the rotatable plate, wherein an axis of rotation of the cylindrical member is displaced from a center of the rotatable plate, said cylindrical member 206 is designed to fit into the first RF connector 222 of the wall outlet, wherein the cylindrical member being fit into the first RF connector forms an axis of rotation of the rotatable plate, wherein a distance between the cylindrical member and the hole is adjustable by rotating the rotatable plate 204 such that the hole 202 is co-locatable with the second RF connector 224 of the wall outlet.

**[0026]** The rotatable plate 204 may preferably, but not necessarily, be circular. It is noted that while the appended Figures illustrate the rotatable plate as circular and the description refers to a rotatable circular plate, other forms of rotatable plates may be used in some embodiments, as will be described further below.

**[0027]** As mentioned above, the FM radio signal connector is not used anymore; thus, the adapter plate 200 comprises the cylindrical member 206 which is designed to fit into the first RF connector 222 of the wall outlet, i. e. the FM radio signal connector. The cylindrical member does not have to be capable of transferring electrical signals, but the purpose of the cylindrical member is to provide strong mechanical contact for keeping the CATV module firmly attached with the wall outlet, on one hand, and forming an axis of rotation for the circular plate, on the other hand.

**[0028]** According to an embodiment, the cylindrical member is designed to fit into a recess between a pin and a circular wall of the first connector. In many countries, the RF connectors used in wall outlets as shown in Figure 1 are so-called Belling-Lee connectors (a.k.a. TV aerial plug or PAL connector), which is more precisely specified in the standard IEC 169-2. In such a RF connector, but also in many other types of RF connectors, there is a recess between a pin and a circular wall of the RF connector. The wall around the recess provides improved mechanical contact and friction for keeping the cylindrical member firmly in its position.

**[0029]** Figure 3 shows an example of the adapter plate more in detail. Figure 3 shows how the axis of rotation of the cylindrical member 206, in the orthogonal direction to the plane of the circular plate 204, is displaced from

the center 204a of the circular plate 204. Thus, the fixed connection between the cylindrical member and the first RF connector 222 of the wall outlet form a new axis of rotation for the circular plate. In view of the new axis of rotation, the circular plate rotates in eccentric manner, causing the hole 202 to move further from or closer to the fixed connection between the cylindrical member and the first RF connector 222 of the wall outlet.

**[0030]** According to an embodiment, the rotatable plate comprises a curved groove 208 and a guide support 210 designed to fit in said groove for guiding the rotation of the rotatable plate. The rotation of the rotatable plate, such as the end points of rotation, may be controlled by the groove 208. The guide support 210 provides guidance for the rotation, and mechanical support with sufficient amount of friction for not letting the rotatable plate rotate freely.

**[0031]** According to an embodiment, the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a first type of wall outlet, when a first end point of the curved groove is arranged in contact with the guide support, and the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a second type of wall outlet, when a second end point of the curved groove is arranged in contact with the guide support.

**[0032]** Figure 3 shows an example, where the length of the groove corresponds substantially 180 degree rotation of the rotatable plate. The adapter plate 200 and the rotatable plate 204 may comprise indicators for the different types of wall outlet, indicating the locations where to rotate the rotatable plate such that the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of the desired type of wall outlet. In Figure 3, these indicators are shown as arrows "Configuration 1" and "Configuration 2" in the adapter plate 200, and an arrow in the rotatable plate 204.

**[0033]** According to an embodiment, in the first type of wall outlet, a distance between pins of the first and second RF connector is substantially 25 mm, more preferably 25,4 mm; and in the second type of wall outlet, a distance between pins of the first and second RF connector is substantially 30 mm, more preferably 30,0 mm.

**[0034]** Thus, the difference of the distance between pins of the first and second RF connector is 4,6 mm. Figure 4 illustrates an example where the distance is adjusted by a rotation of substantially 180 degree. In such rotation, the displacement of the axis of rotation of the cylindrical member from the center of the rotatable plate is 2,3 mm, which results in the adjustment of 4,6 mm with a rotation of substantially 180 degree.

**[0035]** The rotation of substantially 180 degree ensures that the horizontal alignment of the adapter plate is not changed. Nevertheless, it is possible to use any rotation angle between 0 and 180 degrees for adjusting the distance between the cylindrical member 206 and

the hole 202. Thus, by adjusting the displacement of the axis of rotation of the cylindrical member from the center of the rotatable plate appropriately, the adapter plate may be used for wall outlet configuration.

**[0036]** According to an embodiment, the adapter plate comprises a circular aperture for fitting the rotatable circular plate substantially into same plane with adapter plate. This embodiment is illustrated in Figure 2 where the rotatable circular plate 204 is inserted into an aperture in the adapter plate 200 such that the depth of the adapter plate, in the direction of the surface normal, is not increased.

**[0037]** According to an embodiment, the rotatable plate is arranged on the surface plane of the adapter plate. Thus, no aperture in the adapter plate 200 is needed, but the rotatable plate may be attached rotatably on the surface of adapter plate. While increasing the depth of the adapter plate, this embodiment may be easier to manufacture and install. Moreover, in the surface attachment of the rotatable plate is not limited to circular form, but any other form, such as an ellipsoid, may be used.

**[0038]** The adapter plate is attachable to a CATV module, for which purpose the adapter plate may, according to an embodiment, comprise means for connecting the adapter plate to the module. Referring back to Figure 3, the adapter plate 200 may comprise screw holes 212a, 212b, 212c, 212d for attaching the adapter plate to a CATV module. The material of the adapter plate is not relevant, as such, for the operation of the embodiments, but it may be, for example, zamak, sheet metal, brass or plastic.

**[0039]** According to an embodiment, the adapter plate may be arranged to form a back plate (back wall) of the casing of the CATV module.

**[0040]** The CATV module may be a filter and/or splitter module described above. Alternatively or in addition, the CATV module may be a cable modem, an amplifier, an Ethernet-over-coax equipment, or any other communication equipment connectable to a wall outlet terminating a coaxial cable.

**[0041]** It will be obvious for a person skilled in the art that with technological developments, the basic idea of the invention can be implemented in a variety of ways. Thus, the invention and its embodiments are not limited to the above-described examples but they may vary within the scope of the claims.

## Claims

1. An adapter plate for attaching a CATV module to a wall outlet terminating a coaxial cable, the wall outlet comprising a first and a second RF connector; wherein the adapter plate comprises a hole for insertion of a RF connector of the CATV module, **characterized in that** the adapter plate comprises a rotatable plate comprising a cylindrical member

- substantially orthogonal to a surface of the rotatable plate, wherein an axis of rotation of the cylindrical member is displaced from a center of the rotatable plate;  
 said cylindrical member is designed to fit into the first RF connector of the wall outlet, wherein the cylindrical member being fit into the first RF connector forms an axis of rotation of the circular plate, wherein a distance between the cylindrical member and the hole is adjustable by rotating the rotatable plate such that the hole is co-locatable with the second RF connector of the wall outlet.
2. The adapter plate according to claim 1, **characterized in that**  
 the cylindrical member is designed to fit into a recess between a pin and a circular wall of the first connector.
  3. The adapter plate according to claim 1 or 2, **characterized in that**  
 the rotatable plate comprises a curved groove and a guide support designed to fit in said groove for guiding the rotation of the rotatable plate.
  4. The adapter plate according to claim 3, **characterized in that**  
 the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a first type of wall outlet, when a first end point of the curved groove is arranged in contact with the guide support, and  
 the cylindrical member is insertable into the first RF connector and the hole is co-locatable with the second RF connector of a second type of wall outlet, when a second end point of the curved groove is arranged in contact with the guide support.
  5. The adapter plate according to claim 4, **characterized in that**  
 in the first type of wall outlet, a distance between pins of the first and second RF connector is substantially 25 mm, more preferably 25,4 mm; and  
 in the second type of wall outlet, a distance between pins of the first and second RF connector is substantially 30 mm, more preferably 30,0 mm.
  6. The adapter plate according to any preceding claim, **characterized in that**  
 the rotatable plate is circular and the adapter plate comprises a circular aperture for fitting the rotatable circular plate substantially into same plane with adapter plate.
  7. The adapter plate according to any of claims 1 - 5, **characterized in that**  
 the rotatable plate is arranged on the surface plane of the adapter plate.
  8. The adapter plate according to any of preceding claims, **characterized in that**  
 the first and the second RF connectors are Belling-Lee connectors (IEC 169-2), wherein the first RF connector is intended for FM radio signal and the second connector is intended at least for television signal.
  9. The adapter plate according to any of preceding claims, **characterized in that** the adapter plate comprises means for connecting the adapter plate to the CATV module.
  10. A CATV module suitable for attaching to a wall outlet terminating a coaxial cable, **characterized in that** the CATV module comprises an adapter plate according to any of claims 1 - 9.
  11. The CATV module according to claim 10, **characterized in that**  
 the adapter plate is attached to the CATV module as a back plate.
  12. The CATV module according to claim 10 or 11, **characterized in that**  
 the CATV module is a filter and/or splitter module, a cable modem, an amplifier or an Ethernet-over-coax equipment.

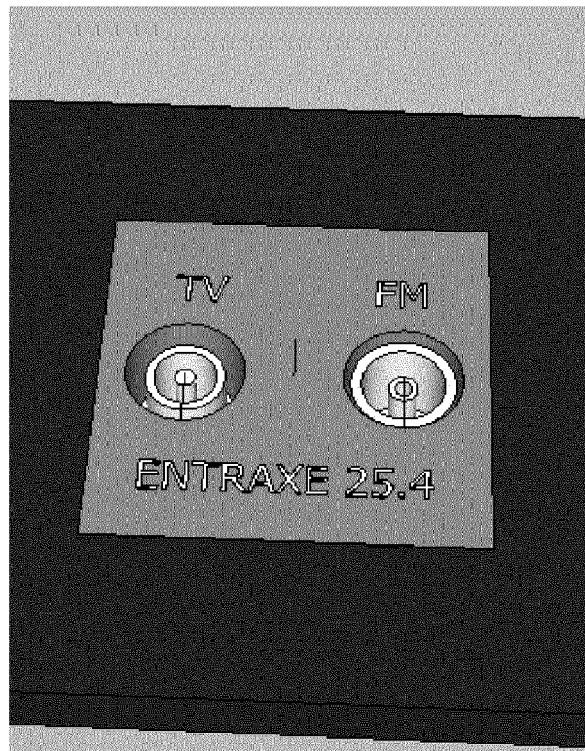


Fig. 1

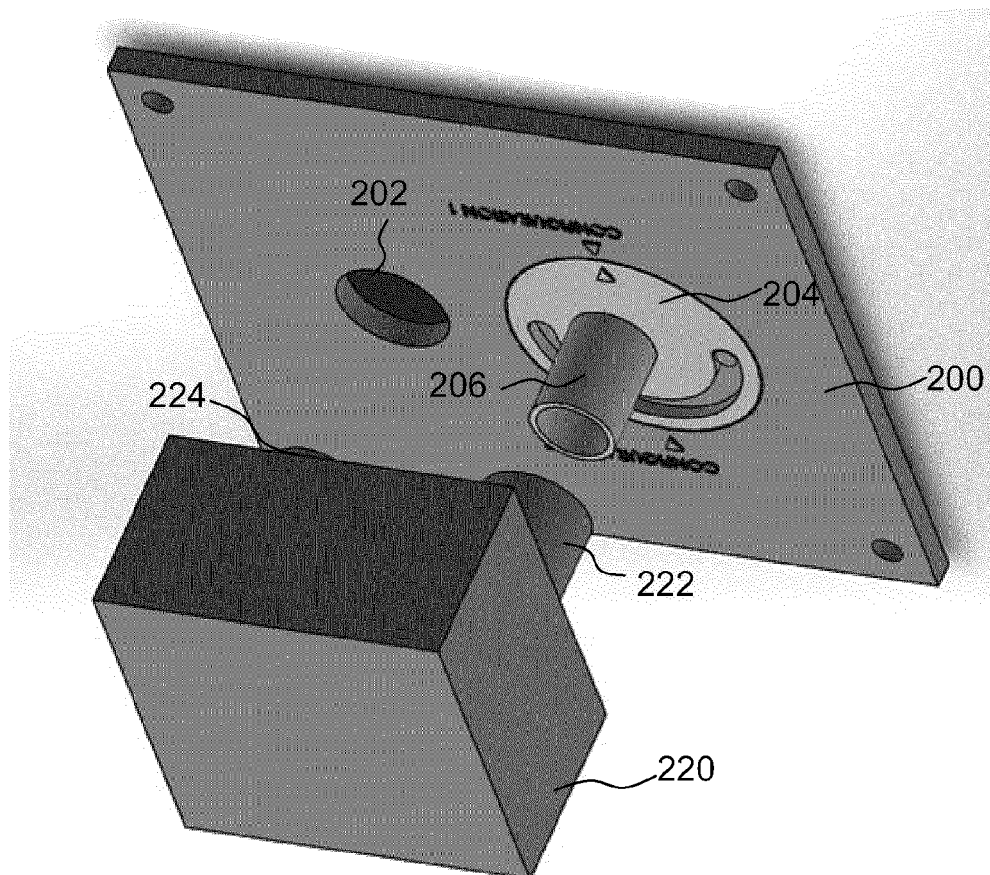


Fig. 2

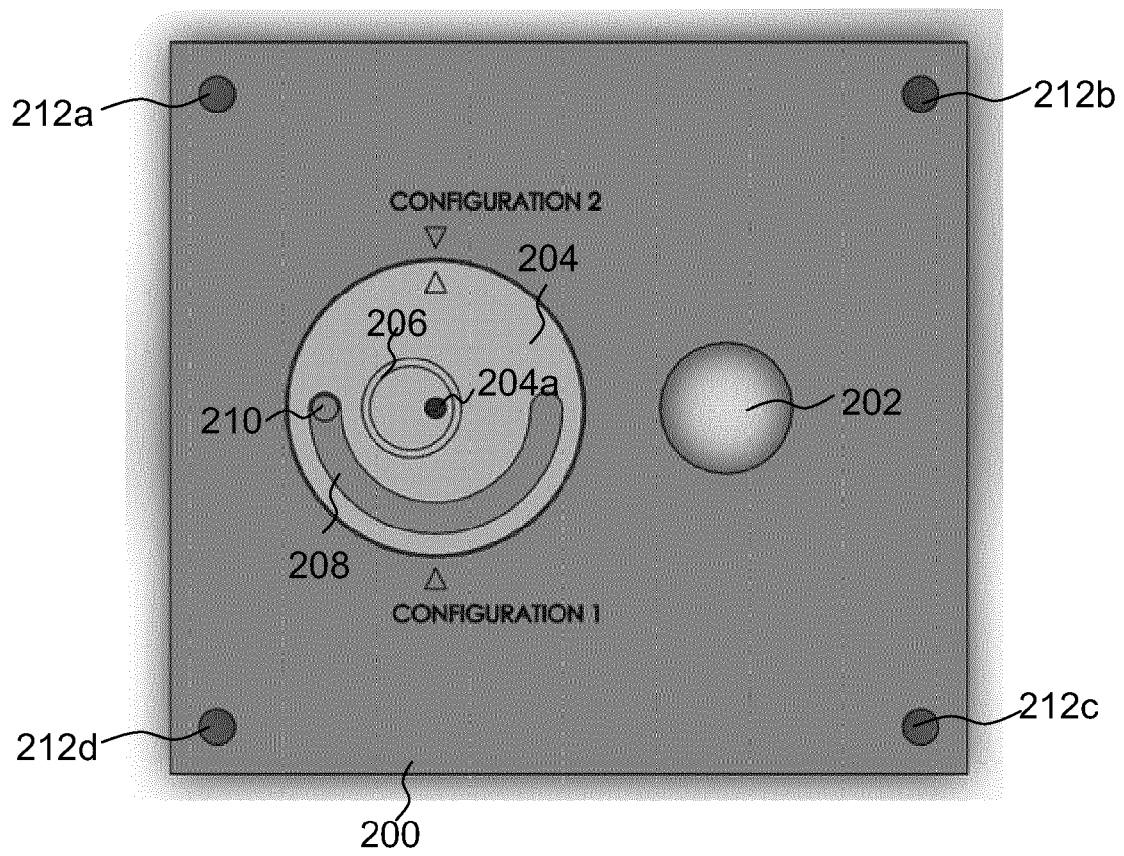


Fig. 3

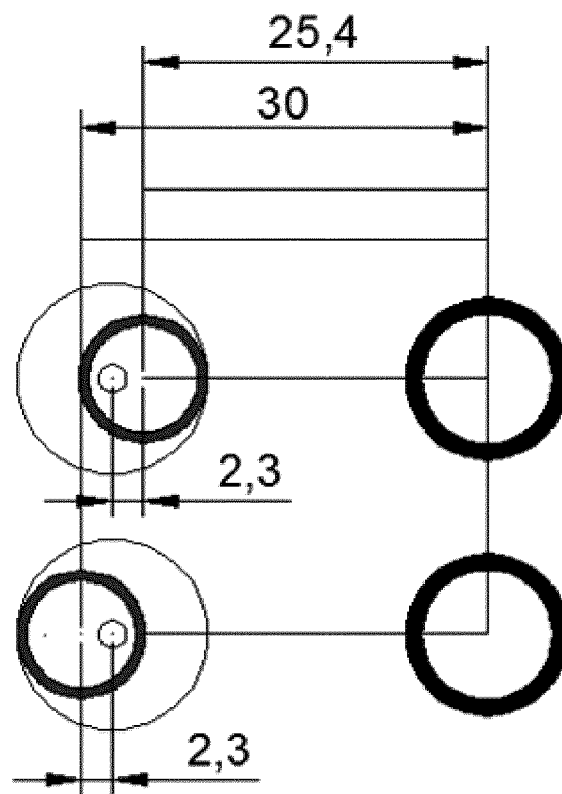


Fig. 4



## EUROPEAN SEARCH REPORT

Application Number  
EP 17 39 7519

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EPO FORM 1503 03.02 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
			H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 January 2018	Examiner Philippot, Bertrand
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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US 2008299823	A1	04-12-2008	NONE
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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