



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.12.2020 Bulletin 2020/51

(51) Int Cl.:
H01H 83/14 (2006.01) **H01H 71/12** (2006.01)
H01H 71/00 (2006.01) **H01R 13/713** (2006.01)

(21) Application number: **19179212.6**

(22) Date of filing: **10.06.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **JOKELA, Mikko**
01510 VANTAA (FI)
• **JÄNTTI, Tommi**
01510 VANTAA (FI)

(74) Representative: **Papula Oy**
P.O. Box 981
00101 Helsinki (FI)

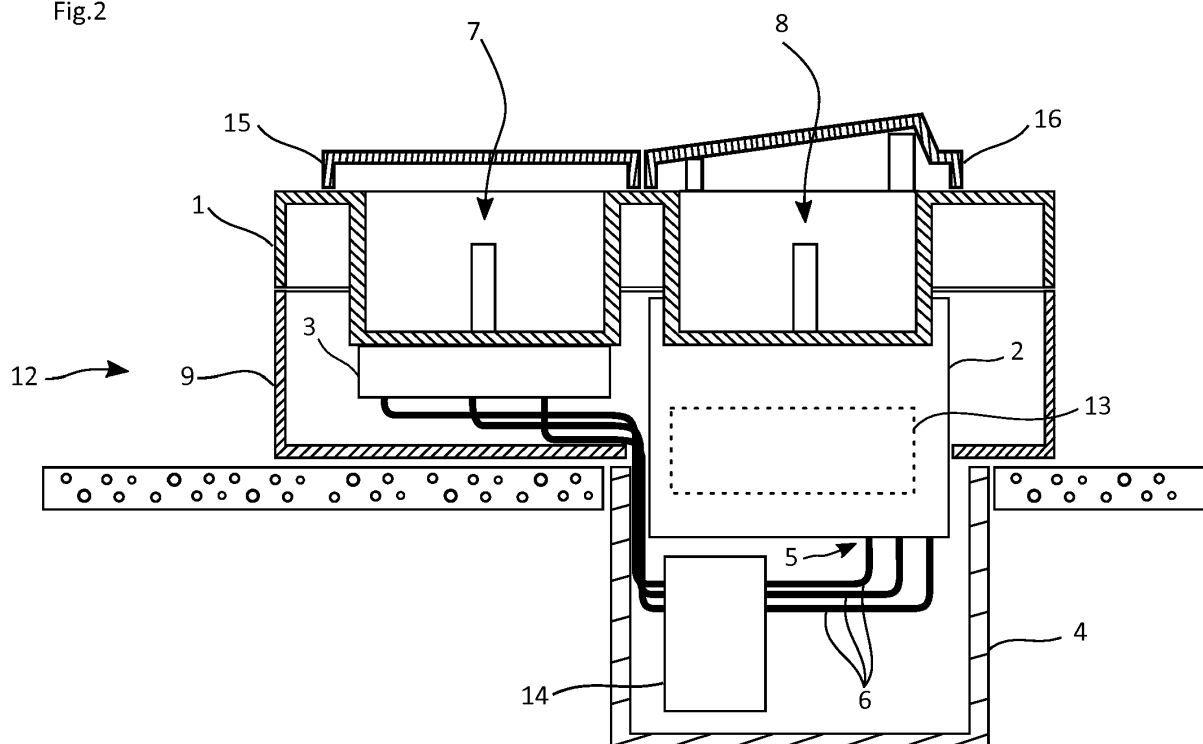
(71) Applicant: **Etherma Skandinavia Oy**
01510 Vantaa (FI)

(54) **SOCKET UNIT**

(57) A flush mounting, double socket unit (12) to be installed in a single junction box (4), which socket unit comprises a casing part (1, 9) in which a socket (2) is arranged, in which socket is an integral residual current circuit-breaker (13). A second socket (3) is also arranged

inside the casing part (1, 9), the second socket being connected with leads (6) to the output connectors (5) of the socket (2), in which case both the socket (2) and the second socket (3) are protected against residual current.

Fig.2



Description

[0001] The object of the invention is a socket unit comprising an enclosure, inside which enclosure is arranged a socket, the socket comprising an integral residual current circuit-breaker.

[0002] A residual current circuit-breaker is a sensitive protective device, which in dangerous operating conditions supplements the protection provided by fuses. A residual current circuit-breaker trips to de-energize the current circuit quickly, if an insulation fault starts to occur in electrical equipment or electrical wires, which fault could produce leakage current that is dangerous to a person. An ordinary fuse is not able to detect and trip this kind of low current defect. At the moment when the amount of fault current reaches a dangerous limit or exceeds it, residual current protection disconnects the current supply very quickly, within less than 30 ms. Thus, even in the worst fault situation a person will not receive a life-threatening electric shock. Fault currents can travel to ground also in other ways than through people or animals, e.g. as surface discharge currents in parts of the building. In this case there is always the risk of a fire.

[0003] A residual current circuit-breaker operates as follows. When the electrical device functions normally, the electric current going into it and coming out of it is of the same magnitude. Differences between the ingoing and outgoing electric current arises when a fault current phenomenon occurs. A residual current circuit-breaker monitors the amount of current entering the electrical device and leaving it. As long as these currents are of the same magnitudes, the passage of the electric current is unimpeded. If a part of the electric current travels to earth as fault current, the residual current circuit-breaker then detects a difference between the incoming and outgoing current amounts. At the moment when the amount of fault current reaches a dangerous limit or exceeds it, the current supply is disconnected. A residual current circuit breaker comprises a magnetic tripping device or corresponding electronic circuit controlling a relay.

[0004] Known in the art are single sockets with residual current protection that can be installed as separate units, from the output connectors of which sockets supply leads can be led to a second separate socket. This type of solution is technically awkward and time-consuming in the installation phase because both sockets have their own installation box, and separate wiring must be installed between these boxes.

[0005] The aim of the present invention is to provide an improved double socket unit to be flush mounted in single junction box, the socket unit being provided with a residual current circuit-breaker.

[0006] The aim of the invention is achieved with a socket unit according to claim 1. The double socket unit according to the invention comprises a casing part, inside which is arranged a socket, the socket comprising an integral residual current circuit-breaker. Additionally, a second socket is arranged inside the same casing part,

which second socket is connected to the output connectors of the socket provided with residual current protection, in which case both sockets inside the casing part have residual current protection.

[0007] The socket unit according to the invention has many advantages. In the solution according to the invention both the socket provided with a residual current circuit-breaker and the second socket are installable into a single junction box, in which case two separate junction boxes are not needed nor are conductors connecting them.

[0008] The wiring connecting the socket of the socket unit provided with residual current protection and the second socket can be provided with an external actuator with which the current supply to the second socket can be controlled. Thus, the current supply of the second socket can, if necessary, be disconnected at the same time as the voltage in the socket provided with residual current protection is maintained. The actuator of the external control can be placed below the socket unit, inside its junction box or inside the casing part of the socket unit, in which case the actuator is placed in connection with the second socket.

[0009] The single sockets on the market have a fixed conductor between the sockets, generally with uninsulated copper busbars, in which case external control of only the second socket, according to the invention, cannot be implemented.

[0010] In the following, the invention will be described by the aid of some embodiments of it with reference to the attached drawings, wherein

Fig. 1 presents a schematic view of a flush mounting socket unit according to one embodiment of the invention installed in a mounting box,

Fig. 2 presents a schematic view of a flush mounting socket unit according to a second embodiment of the invention, the unit being provided with external control,

Fig. 3 presents a schematic view of a socket unit according to a third embodiment of the invention, the unit being provided with a surface mounting box, and

Fig. 4 presents a schematic view of a socket unit according to a fourth embodiment of the invention, the unit being provided with a casing part, onto the lid part of which casing part a surface mounting box is fastened.

[0011] The drawings present schematic views of partially-sectioned, flush-mounted, double socket units 12. The socket unit 12 comprises a casing part 1, 9 in which a socket 2 is arranged, in which socket is an integral residual current circuit-breaker 13. The socket 2 is protectively earthed. The protectively earthed output of the socket 2 is presented with the reference number 8. The

residual current circuit-breaker 13 is integrated into the socket 2 in such a way that the electric current travels via the residual current circuit-breaker 13 to the output connectors 5 of the socket 2 and to the output 8. The casing part comprises a lid part 1 and a base part 9.

[0012] The socket unit 12 is installable in a junction box 4 (Fig. 1) to be sunk into a wall or into some other mounting base.

[0013] The residual current circuit-breaker 13 can be either of the voltage-dependent type or of the voltage-independent type.

[0014] A voltage-independent residual current circuit-breaker only trips in a fault current situation, but the controllable output contact does not open in conjunction with e.g. a voltage outage, and thus does not need re-adjustment when the voltage has returned. Residual current protection can be used e.g. to protect the sockets of a freezer. The device connected to the socket operates normally when the voltage has returned.

[0015] A voltage-dependent residual current circuit-breaker also trips only in a fault current situation, but the controllable output contact opens in conjunction with e.g. a voltage outage, and thus requires re-adjustment of the residual current circuit-breaker when the voltage has returned. This kind of residual current circuit-breaker cannot be used e.g. to protect the sockets of a freezer. The device connected to the socket does not operate normally when the voltage has returned.

[0016] Voltage-dependent residual current circuit-breakers can be made to be substantially smaller in size than voltage-independent models, but their use is more restricted, as described above.

[0017] The socket unit 12 comprises a second socket 3 that is connected to the output connectors 5 of the socket 2. In this case, the residual current circuit-breaker 13 disconnects the current supply both to the socket 2 and to the second socket 3 if the electrical device connected to either one enters a fault situation in which the residual current circuit-breaker 13 trips. Thus, both sockets 2, 3 have residual current protection. The second socket 3 does not comprise its own separate residual current circuit-breaker. The second socket 3 is connected to the output connectors 5 of the socket 2 with conductors 6, e.g. with wires. Also the second socket 3 is protectively earthed. The protectively earthed output of the second socket 3 is presented with the reference number 7. The second socket 3 is situated inside the same casing part 1, 9 as the socket 2.

[0018] The conductors 6 can be provided with an external actuator 14, as presented in Figs. 2, 3 and 4. The current supply to the second socket 3 can then be disconnected and connected. The actuator 14 can be a relay or some other switch suited to the purpose. The actuator 14 of the external control can be disposed below the socket unit 12, inside its installation mounting box 4 (Fig. 2). The actuator 14 of the external control can also be disposed inside the surface mounting box 10 (Fig. 3) or inside the surface mounting enclosure 11 replacing the

base part 9 of the casing part, being thus situated in connection with the second socket 3, (Fig. 4). The actuator 14 can be provided with wireless control.

[0019] The double sockets on the market are implemented with a fixed busbar between the sockets, generally with uninsulated copper conductors, in which case external control, according to the invention, of only the second socket cannot be implemented.

[0020] In the embodiment according to Fig. 3, a surface mounting box 10 is connected to the base part 9 of the casing part 1, 9 in which case a surface-mounted assembly is formed from the socket unit 12.

[0021] In the embodiment according to Fig. 4, a separate surface mounting enclosure 11 is connected to the lid part 1 of the casing part, the enclosure replacing the base part 9, in which case a surface-mounted assembly is formed from the socket unit 12.

[0022] In the embodiment according to Figs. 1, 2, 3 and 4, on top of the second socket 3 of the socket unit 12 is a flip lid 15 forming IP 44 enclosure class protection and on top of the socket 2 is a flip lid 16 forming IP 44 enclosure class protection.

Claims

1. A flush mounting, double socket unit (12) comprising a casing part (1, 9) inside which is arranged a socket (2), the socket comprising an integral residual current circuit-breaker (13),
characterized in that a second socket (3) is arranged inside the casing part (1, 9), the second socket being connected with wires (6) to output connectors (5) of the socket (2), in which case both the socket (2) and the second socket (3) are protected against residual current.
2. Socket unit (12) according to claim 1, **characterized in that** the socket unit (12) is installable in a single junction box (4) to be sunk into a wall or into some other mounting base.
3. Socket unit (12) according to claim 1, **characterized in that** an external actuator (14) can be connected to the wires (6) for controlling the current supply to the second socket (3).
4. Socket unit (12) according to claim 3, **characterized in that** the external actuator (14) can be a device functioning with wireless or wired control.
5. Socket unit (12) according to any of the preceding claims, **characterized in that** a surface mounting box (10) can be fastened to a base part (9) of the casing part (1, 9), in which case the socket unit (12) is surface-mountable on a wall surface or on some other mounting surface.

6. Socket unit (12) according to any of the preceding claims, **characterized in that** a surface mounting box (11) can be fastened to a lid part (1) of the casing part (1, 9), in which case the socket unit (12) is surface-mountable on a wall surface or on some other mounting surface. 5

10

15

20

25

30

35

40

45

50

55

Fig.1

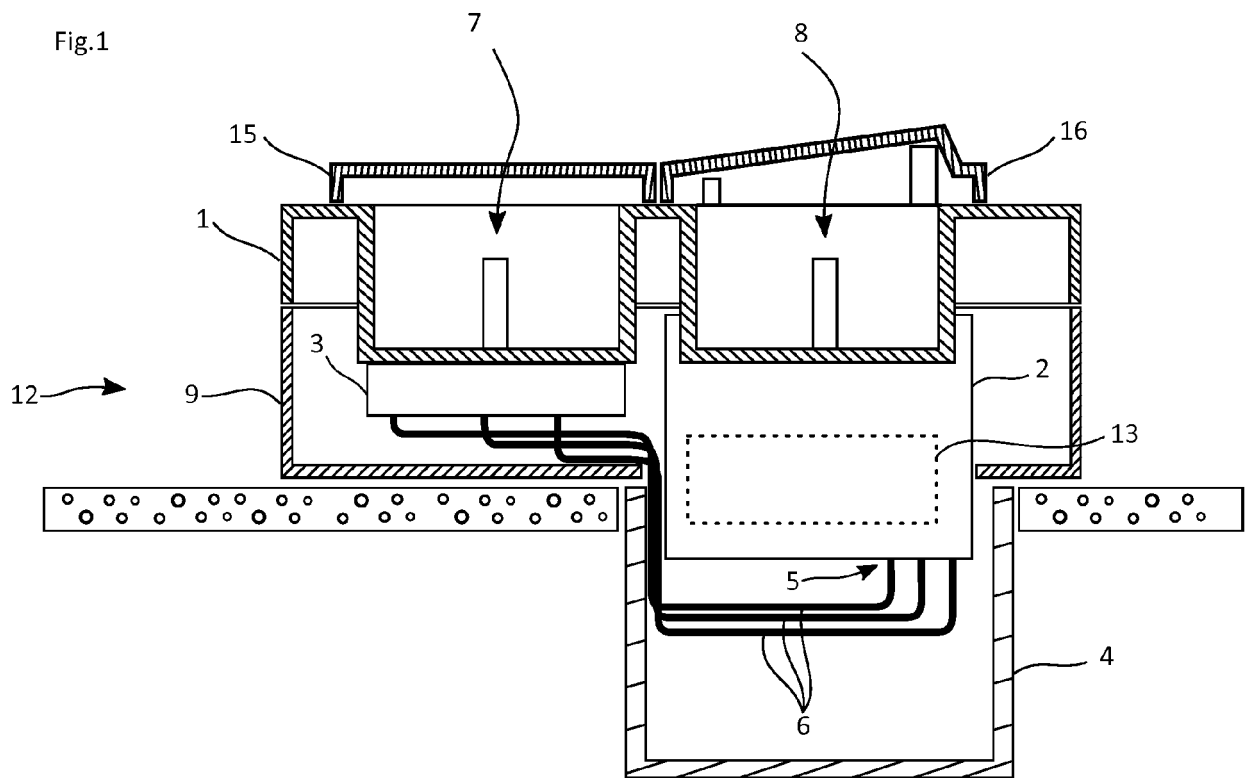


Fig.2

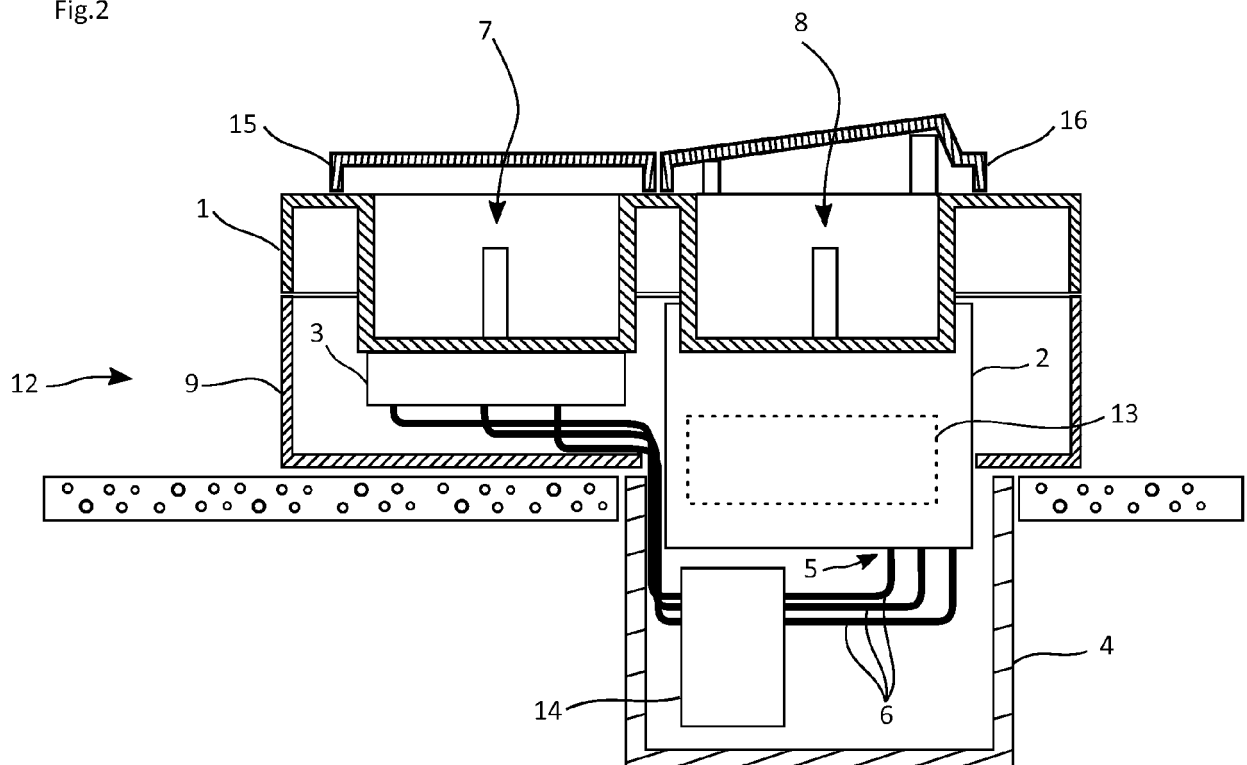


Fig.3

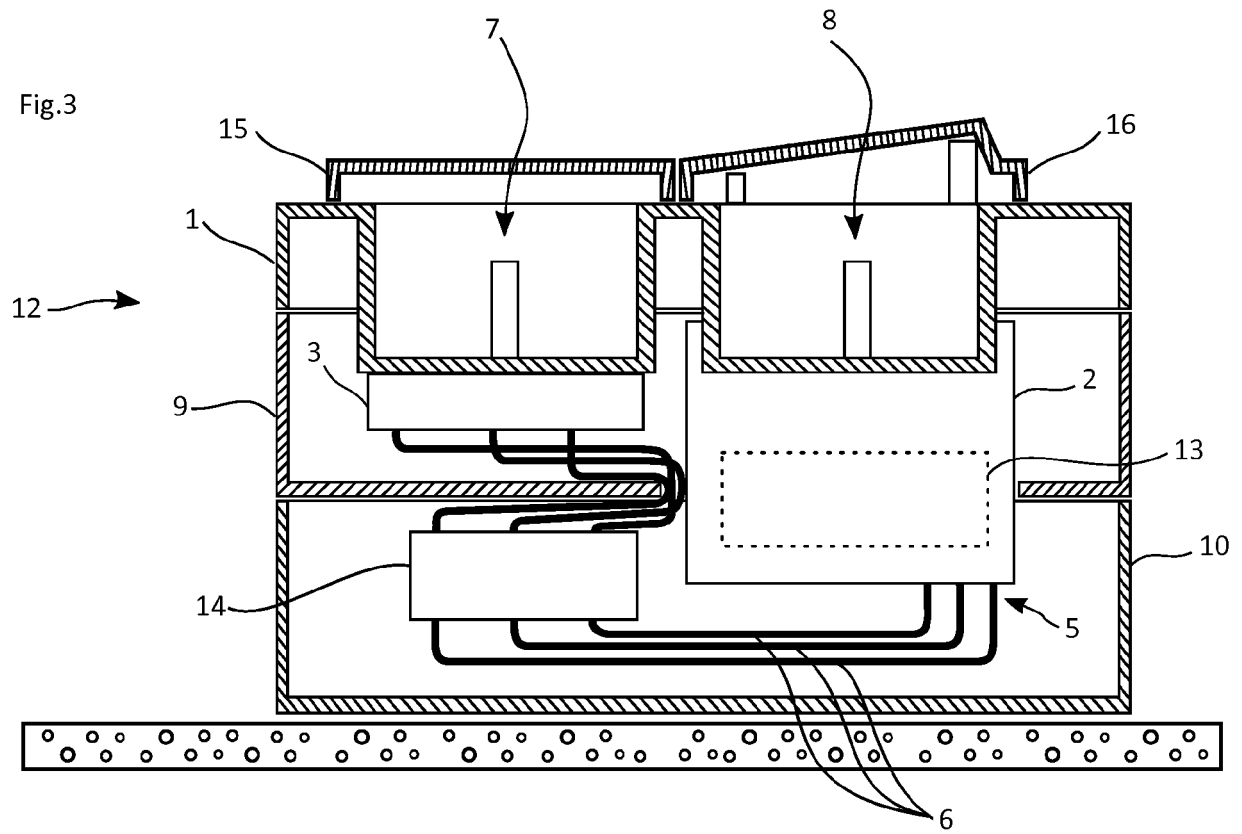
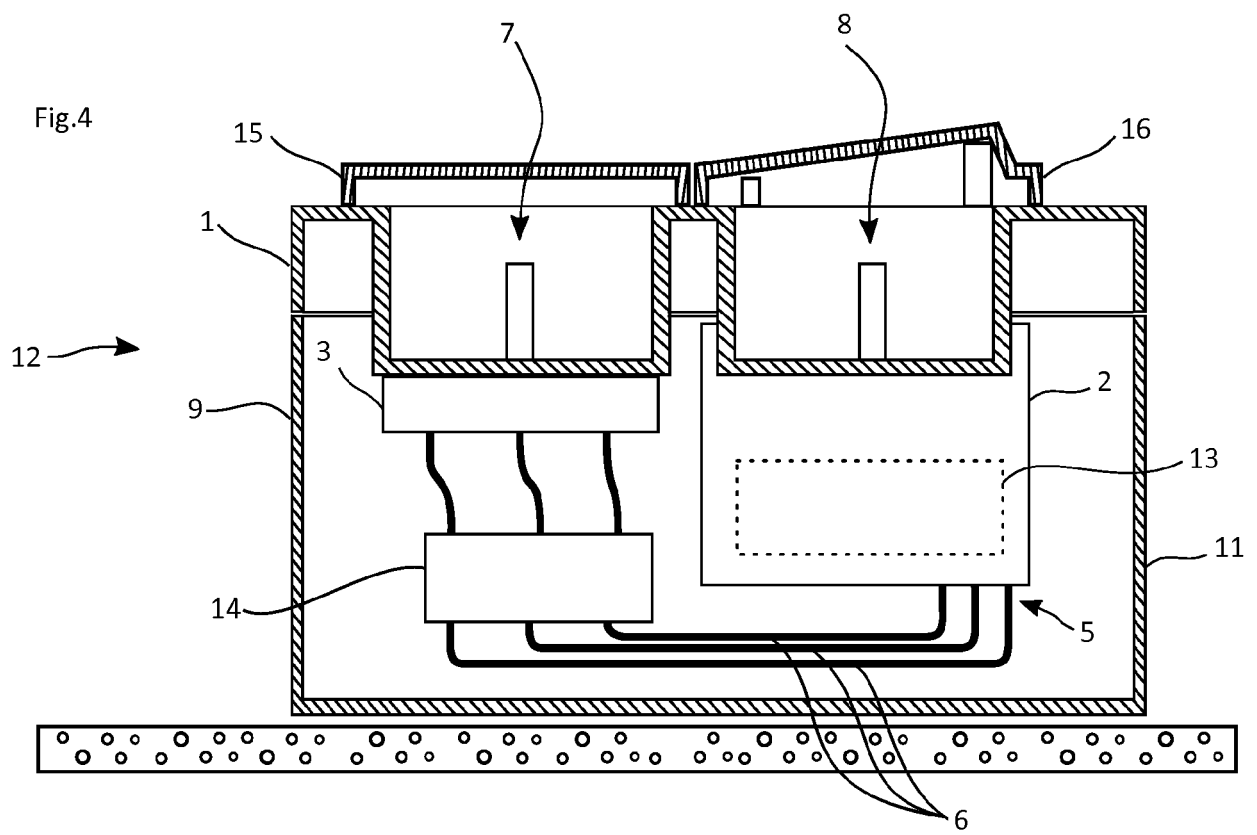


Fig.4





EUROPEAN SEARCH REPORT

 Application Number
 EP 19 17 9212

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2009/137817 A1 (OUTSMART POWER SYSTEMS LLC [US]; JOHNSON KEVIN M [US] ET AL.) 12 November 2009 (2009-11-12) * page 16, paragraph 0038 - page 19, paragraph 0046; figures 9,15-19 *	1-6	INV. H01H83/14
X	CN 101 226 861 A (GUI CHEN [CN]) 23 July 2008 (2008-07-23) * page 9, paragraph 4 - page 15, paragraph 2; figures 1,3,8,10 *	1-6	ADD. H01H71/12 H01H71/00 H01R13/713
X	EP 2 783 435 A1 (ETHERMA SKANDINAVIA OY [FI]) 1 October 2014 (2014-10-01) * page 4, paragraph 0031 - page 5, paragraph 0041; figures 4-11b *	1,2,5,6 3,4	
X	CN 201 532 918 U (SHANGHAI ELE MFG CORP) 21 July 2010 (2010-07-21) * page 6, paragraph 0060 - page 8, paragraph 0076; figures 2,6 *	1,2,5,6 3,4	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01H H01R
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 November 2019	Examiner Pavlov, Valeri
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 17 9212

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-11-2019

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009137817 A1	12-11-2009	US 2011109301 A1 WO 2009137817 A1	12-05-2011 12-11-2009
-----	-----	-----	-----
CN 101226861 A	23-07-2008	NONE	
-----	-----	-----	-----
EP 2783435 A1	01-10-2014	EP 2783435 A1 FI 20116176 A WO 2013076375 A1	01-10-2014 28-02-2013 30-05-2013
-----	-----	-----	-----
CN 201532918 U	21-07-2010	NONE	
-----	-----	-----	-----

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82