

(19) **DANMARK**



Patent- og
Varemærkestyrelsen

(12)

Oversættelse af europæisk patentskrift

(10) **DK/EP 3454441 T3**

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- (51) Int.Cl.: **H 02 G 3/16 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-08-23**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-05-19**
- (86) Europæisk ansøgning nr.: **18192930.8**
- (86) Europæisk indleveringsdag: **2018-09-06**
- (87) Den europæiske ansøgnings publiceringsdag: **2019-03-13**
- (30) Prioritet: **2017-09-08 DE 102017120824**
- (84) Designerede stater: **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**
- (73) Patenthaver: **Günther Spelsberg GmbH & Co. KG, Im Gewerbepark 1, 58579 Schalksmühle, Tyskland**
- (72) Opfinder: **Bierbaum, Volker, c/o, Günther Spelsberg GmbH & Co. KG, Im Gewerbepark 1, 58579 Schalksmühle, Tyskland**
EICHSTÄDT, Andreas, c/o Günther Spelsberg GmbH&Co. KG, Im Gewerbepark 1, 58579 Schalksmühle, Tyskland
Gembruch, Karsten, c/o, Günther Spelsberg GmbH & Co. KG, Im Gewerbepark 1, 58579 Schalksmühle, Tyskland
- (74) Fuldmægtig i Danmark: **Michalski Hüttermann & Partner Patentanwälte mbB, Speditionstraße 21, 40221 Düsseldorf, Tyskland**
- (54) Benævnelse: **ELEKTRISK SAMLEDÅSE**
- (56) Fremdragne publikationer:
CN-U- 205 863 832
FR-A1- 2 970 383
US-A- 2 788 188

Electrical junction box**Description**

The invention concerns an electrical junction box with a housing having a housing bottom and housing walls and a housing with a closeable cover and with a connecting element provided in the housing to connect together electrical circuits supplied by the housing and/or with other electrical or electronic devices, wherein the connecting element has connecting elements for the electrical connections of the circuits and a attachment section, at least one slotted guide system is provided in the housing bottom in the form of a groove and the attachment section has a engagement element which engages in the slotted guide system.

Electrical junction boxes are well known in practice. In particular, these types of electrical junction boxes are also known as electrical installation boxes. Electrical junction boxes are used in different areas of application to connect, to branch and/or to join electrical lines together or to use with other electrical or electronic devices, wherein, in particular, electrical terminals are used as devices to form electrical connections with the circuits. Electrical junction boxes are also known in the form of fire protection boxes which meet a defined fire protection class and are therefore guaranteed to operate for a predetermined period of time.

A typical terminal box is known from EP 0 307 360 A2 for those electrical installations in which the box base has rectangular or cruciform grooves with bulges around their edges and which serve to engage with self-tapping screws with which terminals, rails and other devices can be attached to the box base.

FR 2 970 383 A1 shows a device containing projections for the optional attachment of a connection inside a connection space in various positions. The projections extend into a bottom wall of a housing to attach the connection into the bottom wall where the longitudinal ends of a longitudinal terminal body are fastened by the projections to the connection. The projections are distributed around the periphery of a ring and the connection comprises elongated boreholes which are formed with varying gaps between each other. The connection, together with the projections, forms a bayonet catch.

US 2 788 188 A shows a device for electrical cabling and, in particular, a device to attach a plug to a wall structure.

CN 205 863 832 U shows a further device for electrical installation work.

With these as the starting point, the task of the invention is to produce a type of electrical junction box whereby the installation process of the connecting element with the connecting elements to the electrical connections of electrical circuits is simplified.

This task is resolved by the subject matter of the patent claim 1. Preferred further developments of the invention are described in the dependent claims.

Thus, according to the invention, an electrical junction box is provided with a housing having a housing bottom and housing walls and with a closeable cover and a connecting element provided in the housing to attach together electrical circuits supplied to the housing and/or to other electrical or electronic devices, wherein

the connecting element has connecting elements for the electrical attachments of the circuits and a attachment section,

at least one slotted guide system in the form of a groove is provided in the housing bottom and the attachment section has a engagement element which engages in the slotted guide system, characterised in that

a guiding device is arranged so that it extends into the interior of the housing at the housing bottom, and

the attachment section runs parallel to the housing bottom and has an elongated hole into which the guiding device extends.

Thus it is a significant point in the invention that the housing bottom of the electrical junction box according to the invention is provided with a guiding device which is inserted into an elongated hole which is provided in the attachment section of the attachment element. Thus the connecting element with its connecting elements can be moved in the housing during the installation process for the electrical connection of the electrical cables along its elongated hole, guided by the guiding device. This improves the handleability of the connection element during its installation since it is no longer possible to move it freely but it can be guided with the fastening portion interacting with the guiding device.

According to a first alternative preferred further development of the invention, the guiding device is formed by a screw by means of which the connecting element can be fixed with its attachment

section to the housing bottom. This means that the guiding device is not only a guide for the connecting element during its installation but, in addition, can serve to fix the connecting element when the correct position of the connecting element is located in the housing.

In this context, according to a further preferred form of the invention, it is further provided that the engagement element is designed as an engagement nose such that it is simply a guide although it does not permit any fixing in the slotted guide system. According to this preferred design of the invention, the fixing of the connecting element in the housing is accomplished, therefore, with the screw described above which also serves as a guiding device. Specifically therefore, according to this preferred design of the invention, the connecting element, on the one hand passed through the guiding device in the form of a screw and, on the other hand, passed through the engagement element in the form of an engagement nose, can be moved in the housing until the desired installation position of the connecting element is found. Then the screw serving as a guiding device is tightened so that the connecting element is fixed in the housing, in other words, where the attachment section of the connecting element running parallel to the housing bottom is pressed against the housing bottom.

In this first alternative design of the invention, provision can be made basically that the screw serving as a guiding device, by means of which the connecting element is fixed with its attachment section to the housing bottom, is itself screwed into the housing bottom. The thread for this screw can be provided in the housing bottom itself. However, according to a further preferred design of the invention, the screw is attached to a metallic attachment device provided on the outer side of the housing bottom, with which attachment device the housing is attached to a wall. According to this design, the screw is therefore passed through a hole provided in the housing bottom and is attached with the attachment device arranged on the outer side of the housing bottom. Preferably, this attachment device extends at least to one side with a section over the housing bottom so that the section of the attachment device extending over the housing bottom is accessible when the housing is attached to a wall.

This design makes it possible, for example, to be completely assembled beforehand and it can then be mounted on a wall with the cover closed already since the housing bottom no longer has to be accessible for mounting on to the wall. Instead, the section of the attachment device extending over the housing bottom, which, for its part, can be provided with a hole, can be accessed, said hole serving to enable the junction box to be attached to the wall by means of a screw. It is quite especially preferred if the attachment device does not have just one section, but to two sections,

each one on opposing sides, each extending over the housing bottom and with which the housing can be secured to the wall.

Furthermore, with this first alternative design of the invention, provision is made in a further preferred form that the attachment device is made out of a metallic material. Thus, if a fire occurs, it can be guaranteed, at least for a certain time, that the devices provided in the housing remain mounted on the wall even if the housing itself is made of plastic and is damaged due to the fire or disappears partly or totally. This aspect is explored again below.

According to a further preferred design of the invention provision is also made that the screw is passed in a sealed manner through the housing bottom to the outer side of the housing. By doing so, despite the screw passing to the outside, the junction box has a predetermined protection class, such as IP 65 or IP 68. In doing so, it is especially preferred, in sealing the housing, if the screw is surrounded by a sealing element which has an opening for actuating the screw wherein this opening can be closed off by means of a sealing cover. This design enables the screw, with the sealing cover removed, to be actuated, therefore to be tightened, for example, in order to fix the connecting element to the housing bottom. At the same time, however, after the installation of the connecting element, the complete sealing of the passage of the screw through the housing cover can be achieved by the replacement of the sealing cover. Preferably, the sealing cover is attached to the sealing element so that it cannot be lost, for example by an integral hinge.

According to a second alternative design of the invention, the guiding device is designed as a guide pin such that it merely provides a guide, but not an attachment, in the slotted guide system. In this context, it is particularly provided that the engagement element is designed as a screw which is self-tapping into the slotted guide system by means of which screw the connecting element with its attachment section can be fixed to the housing bottom. To this extent, therefore, this represents an alternative concept for a further preferred form of the invention other than, in this case, actually the guiding device simply as a guide and ensuring the fixing of the connecting element with at least one screw self-tapping into a slotted guide system.

In addition, it is further provided that, in the attachment section of the connecting element, at least one pair of boreholes is provided that are formed on the opposite sides of the longitudinal hole and whose connecting line runs preferably at right angles to the elongated hole. Using these boreholes, screws can be screwed into these types of slotted tracks which are provided on the right or left hand sides of the guiding device designed as a guide pin.

Fundamentally, with both alternative versions of the invention and otherwise, the guiding device can be provided in different places in the housing. According to a further preferred development of the invention however, the guiding device is arranged centrally in the housing bottom. This provides the greatest flexibility in the arrangement and orientation of the connecting element.

In particular, a large number of symmetrical installation geometries are considered. In this context it is preferable if a plurality of straight-running slotted guide systems are provided which are arranged in a star-shaped fashion in the housing bottom. It is quite specifically preferred if these slotted guide systems extend in a star-shaped pattern out from the central guiding device. The central guiding device therefore forms the middle from which straight-running slotted guide systems run towards the housing walls of the housing.

In this arrangement, the number of slotted guide systems can vary. In principle, for example, four slotted guide systems are possible, each of which forms an angle of 90° to its respective neighbouring slotted guide system and both form a cross, therefore. Quite especially preferred, however, a total of eight slotted guide systems are provided from each of which two sides of the central guiding device are arranged opposite each other along a common line wherein the angle between neighbouring adjacent slotted guide systems is 45° . Slotted guide systems are possible in this manner each of which runs vertical to a housing wall or is located in a corner of the housing if the basic shape of the housing bottom is square.

Up to now, an engagement element of the fastening section of the connecting element has always been mentioned. Basically, a single engagement element can be sufficient to enable a guide, or fixing of the connecting element, to be enabled in the housing. According to a further preferred development of the invention, the attachment section has two engagement elements each of which grip on two different sides of the elongated hole into a slotted guide system. It is quite especially preferred, in particular, that the two engagement elements are provided on two different sides of the guiding device and each grips into a slotted guide system outside the elongated hole

In principle, the connecting elements of the connecting element can be arranged at different places in the housing and in particular directly on the base also to electrically connect the circuits. According to a further preferred development of the invention, the connecting elements of the connecting element are arranged to electrically connect the circuits at a distance from the housing bottom. In particular, it is possible in this manner to run circuits under the connecting terminals,

thus making it possible to have a visible and space-saving electrical installation inside the junction box.

Finally, in order to form a fire protection housing, the housing is made, on the one hand, of plastic, and, on the other hand, the connecting element and the connecting elements are made exclusively from metal or from ceramic materials. It is possible, thereby, that, even in the event of fire, the electrical installations, at least for a predetermined time, remain functional, even if the housing with its plastic material disappears because of the fire. This is quite especially preferred in combination with the above described design of the first alternative further development of the invention, according to which a metallic securing device to secure the electrical junction box to a wall is provided and the guiding device is formed by a screw which is secured to the metallic securing device.

Below, the invention is described with the use of a preferred development example with references to the drawing. The drawings show, in:

Fig. 1 A plan view of an electrical junction box according to a first preferred development example of the invention,

Fig. 2 A rear view of the electrical junction box according to the first preferred development example of the invention,

Fig. 3 A perspective view of the electrical junction box according to the first preferred development example of the invention,

Fig. 4 A sectional view of the electrical junction box according to the first preferred development example of the invention,

Fig. 5 An enlarged sectional view of a detail of the electrical junction box according to the first preferred development example of the invention,

Fig. 6 A perspective view of the electrical junction box according to the first preferred development example of the invention with a connecting element otherwise orientated,

Fig. 7 A plan view of an electrical junction box according to a second preferred development example of the invention and

Fig. 8 A perspective view of the electrical junction box according to the second preferred development example of the invention.

Fig. 1 shows a plan view of an electrical junction box according to a first preferred development example of the invention. The electrical junction box has a housing 1 with a housing bottom 2 and

housing walls 3. The housing 1 can be closed with a cover, which is no longer shown, so that the housing 1 can comply with a predetermined protection class such as IP 65.

A connecting element 4 is arranged in the housing 1 to connect electrical circuits together supplied by the housing 1 and/or is arranged with other electrical or electronic devices. The connecting element 4 has connecting elements 5 in the form of screw terminals to electrically connect the circuits. Furthermore, the connecting element 4 is provided with an attachment section 6 in which an elongated hole 10 is made. Eight slotted guide systems 7, in each case in the form of a groove, are provided in the housing bottom 2. These slotted guide systems 7 start centrally from the middle of the housing bottom 2 wherein neighbouring slotted guide systems 7 each make an angle of 45° to each other.

The attachment section 6 of the connecting element 4 has an engagement element 8 in the form of a gripping nose which grips into the slotted guide system 7. A second engagement element 8 of the same type is arranged underneath the connecting elements 5 and, as a result, cannot be seen in the in the plan view shown. A guiding device 9 in the form of a screw is arranged extending centrally into the interior of the housing 1 on the housing bottom 2. The screw is fed through the elongated hole 10 of the attachment section 6 of the connecting element 4. Since the attachment section 6 runs parallel to the housing bottom 2, the connecting element 4 can be fixed with its attachment section 6 to the housing bottom 2 by tightening the screw. The engagement element 8 in the form of a respective gripping nose serves only to guide the connecting element 4 and not to fix it in the slotted guide systems 7.

The guiding device 9 designed as a screw is connected to a metallic attachment device 11 provided on the outer side of the housing bottom 2 on the rear side of the housing 1. The attachment device 11 has attachment openings 12 so that the housing 1 can be attached to a wall by means of screws. For this, on each of two mutually opposing sides the attachment device 11 has a section which extends over the housing bottom 2 so that the section of the attachment device 11 extending over the housing bottom 2 is accessible when securing it to the wall of the housing 1. As can be seen from Fig. 2 which shows a rear view of the present box, one of these sections is positioned, however, underneath a cable gland 16 so that it is not accessible from the front, as a result, and cannot be seen in Fig. 1 either.

With the present electrical junction box it is essential that the guiding device 9 designed as a screw is guided in a sealed fashion through the housing bottom 2 to the outer side of the housing 1. For

this, the screw is surrounded by a sealing element 13 which can be seen, in particular, in Figs. 3, 4 and 5. This sealing element 13 has an opening to activate the screw wherein this opening can be closed by means of a sealing cover 14 to form the seal. The sealing cover 14 is connected to the sealing element 13 by means of an integral hinge 18 so that it cannot be lost.

The exact construction can be discerned from the detailed view in Fig. 5. It shows there how the guiding device 9 designed as a screw is screwed into a counterpart 15 which, for its part, is guided from outside through the attachment device 11. Due to an overhang 19 of the counterpart 15, the latter forces the attachment device 11 from outside to the housing bottom 2 by tightening the screw. However, the screw is not positioned directly on the inner side of the housing bottom 2. Instead, the screw is surrounded by the sealing element 13 which, for its part, is positioned on the housing bottom 2. A flat washer 17 is provided between the head of the screw and the sealing element 13. In order to ensure that a predetermined protection class, such as IP 65, is awarded after the installation of the connecting element 4, that is, after tightening the screw, the opening of the sealing element 13 is closed by means of the sealing cover 14 which is clamped on to the upper side of the sealing element 13, thus sealing it.

In the present case, housing 1 consists of a plastic material whereas the connecting element 4 and the connecting elements 5 consist exclusively of metallic or, as the case may be, ceramic materials. Thus, according to the development example described here, a fire protection housing with a defined fire protection class is provided since, even as a result of the housing 1 disappearing due to a fire, its functionality, retained by the connecting element 4 and the connecting elements 5 made from non-combustible materials, can be guaranteed, which, for their part, are attached to a wall by means of the metallic and therefore non-combustible attachment device 11. In everyday use, the housing 1 therefore provides protection from water, dust and contact. In the event of a fire, however, the functional behaviour does not depend on the housing 1 since the functions "electrical connection" and "fastened to a wall" operate independently of the housing 1.

A perspective view of the electrical junction box according to the first preferred development example of the invention can be seen in Fig. 6, wherein the connecting element 4 with its connecting elements 5 is now orientated, displaced by 45°, while the engagement element 8 had been inserted in a respectively adjacent slotted guide system 7.

Figs. 7 and 8 show a plan view and, respectively, a perspective view of an electrical junction box according to a second preferred development example of the invention. This second preferred

development example of the invention constitutes an alternative to the first preferred development example insofar as the guiding device 9 is not configured as a screw but as a guide pin so that the guiding device 9 acts simply as a guide but does not fix the said device in the slotted guide system 7. The engagement elements 8 are formed by screws screwed into the slotted guide systems 7, by means of which the connecting element 4 with its attachment section 6 can be fixed to the housing bottom 2. Three pairs of boreholes 20 are provided in the attachment section 6 of the connecting element 4, wherein said holes are arranged on opposite sides of the elongated hole 10 and whose connecting line runs at right angles to the elongated hole 10.

Reference list

Housing	1
Housing bottom	2
Housing walls	3
Connecting element	4
Joining devices	5
Attachment section	6
Slotted guide system	7
Engagement element	8
Guiding device	9
Elongated hole	10
Attachment device	11
Attachment opening	12
Sealing element	13
Sealing cover	14
Counterpart	15
Cable gland	16
Flat washer	17
Integral hinge	18
Overhang	19
Boreholes	20

Elektrisk samledåse

Patentkrav:

- 5 1. Elektrisk samledåse, der omfatter et kabinet (1), der indbefatter en kabinetbund (2) og kabinetvægge og kan lukkes med et dæksel, og et forbindelseselement (4), der er tilvejebragt i kabinettet (1) til forbindelse af elektriske ledninger, der udgår fra kabinettet (1), til hinanden og/eller til andre elektriske eller elektroniske anordninger, idet forbindelseselementet (4) omfatter terminale anordninger (5) til elektrisk
10 forbindelse af ledningerne og en fastgørelsessektion (6),
mindst ét rillede styresystem (7) i form af en rille er tilvejebragt i kabinetbunden (2),
og
fastgørelsessektionen (6) omfatter et indgrebselement (8), der går i indgreb med det rillede styresystem (7),
15 **kendetegnet ved, at**
en styreanordning (9), der stikker frem i det indre af kabinettet (1), er indrettet ved kabinetbunden (2), og
fastgørelsessektionen (6) løber parallelt med kabinetbunden (2) og indbefatter en aflangt hul (10), i hvilket styreanordningen (9) strækker sig.
20
2. Elektrisk samledåse ifølge krav 1, **kendetegnet ved, at** styreanordningen (9) er dannet af en skrue, ved hjælp af hvilken forbindelseselementet (4) kan fastgøres med sin fastgørelsessektion (6) til kabinetbunden (2).
- 25 3. Elektrisk samledåse ifølge krav 2, **kendetegnet ved, at** indgrebselementet (8) er konfigureret som en indgrebsløjke, således at der kun tillades styring, men ikke fastgøring i det rillede styresystem (7).
4. Elektrisk samledåse ifølge krav 2 eller 3, **kendetegnet ved, at** skruen er forbundet
30 med en metalfastgørelsesanordning (11), der er tilvejebragt på ydersiden af kabinetbunden (2) og med hvilken kabinettet (1) kan fastgøres til en væg.
5. Elektrisk samledåse ifølge et hvilket som helst af kravene 2 til 4, **kendetegnet ved, at** fastgørelsesanordningen (11) på mindst én side strækker sig med en sektion ud over
35 kabinetbunden (2), således at der er adgang til sektionen af fastgørelsesanordningen (11), der strækker sig ud over kabinetbunden (2), ved fastgørelse af kabinettet (1) til væggen.
6. Elektrisk samledåse ifølge et hvilket som helst af kravene 2 til 5, **kendetegnet ved, at** skruen styres på forseglet vis gennem kabinetbunden (2) til ydersiden af kabinettet (1).
40
7. Elektrisk samledåse ifølge krav 6, **kendetegnet ved, at** skruen med henblik på forsegling af kabinettet (1) er omgivet af et forseglingselement (13), der indbefatter en åbning til aktivering af skruen, hvilken åbning kan lukkes på forseglande vis ved hjælp af et forseglingsdæksel (14).
45

8. Elektrisk samledåse ifølge krav 1, **kendetegnet ved, at** styreanordningen (9) er konfigureret som en styrestift, således at der kun tillades styring, men ikke fastgøring i det rillede styresystem (7).
- 5 9. Elektrisk samledåse ifølge krav 8, **kendetegnet ved, at** indgrebselementet (8) er dannet af en skrue, der kan skrues ind i det rillede styresystem (7), og ved hjælp af hvilken forbindelseselementet (4) kan fastgøres med sin fastgørelsessektion (6) til kabinetbunden (2).
- 10 10. Elektrisk samledåse ifølge krav 8 eller 9, **kendetegnet ved, at** der er tilvejebragt mindst ét par borer i forbindelseselementets (4) fastgørelsessektion (6), der er indrettet på modsatte sider af det aflange hul (10), og hvis forbindelseslinje fortrinsvis strækker sig i en ret vinkel i forhold til det aflange hul (10).
- 15 11. Elektrisk samledåse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved, at** styreanordningen (9) er indrettet centralt i kabinetbunden (2).
12. Elektrisk samledåse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved, at** der er tilvejebragt en flerhed af rillede styresystemer (7), der strækker sig lineært og er indrettet i en stjerneform i kabinetbunden (2).
- 20 13. Elektrisk samledåse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved, at** de rillede styresystemer (7) strækker sig i en stjerneform fra en central styreanordning (9).
- 25 14. Elektrisk samledåse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved, at** fastgørelsessektionen (6) omfatter to indgrebselementer (8), der går i indgreb med et tilhørende rillet styresystem (7) på to forskellige sider af det aflange hul (10).
- 30 15. Elektrisk samledåse ifølge et hvilket som helst af de foregående krav, **kendetegnet ved, at** kabinettet (1) på den ene side er fremstillet af et plastmateriale, og forbindelseselementet (4) og de terminale anordninger (5) på den anden side er fremstillet udelukkende af metal- eller keramikmaterialer.

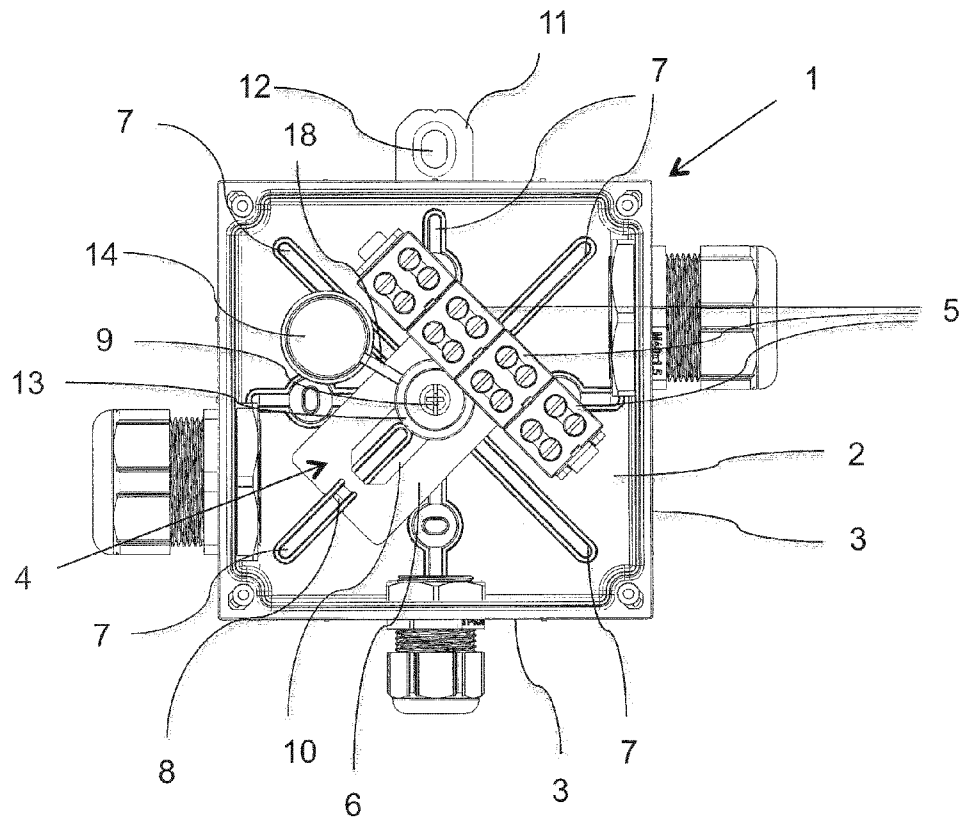


Fig. 1

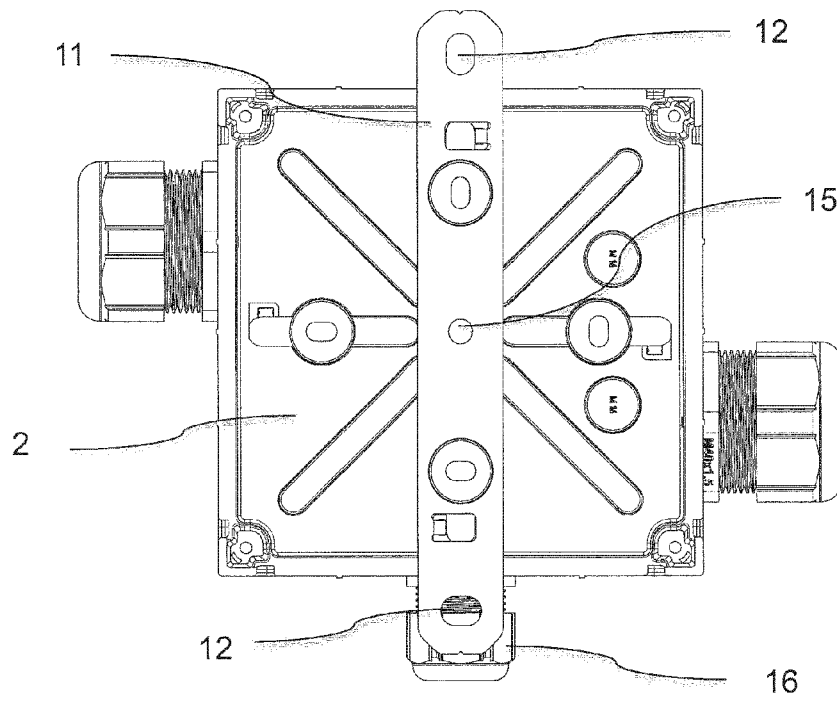


Fig. 2

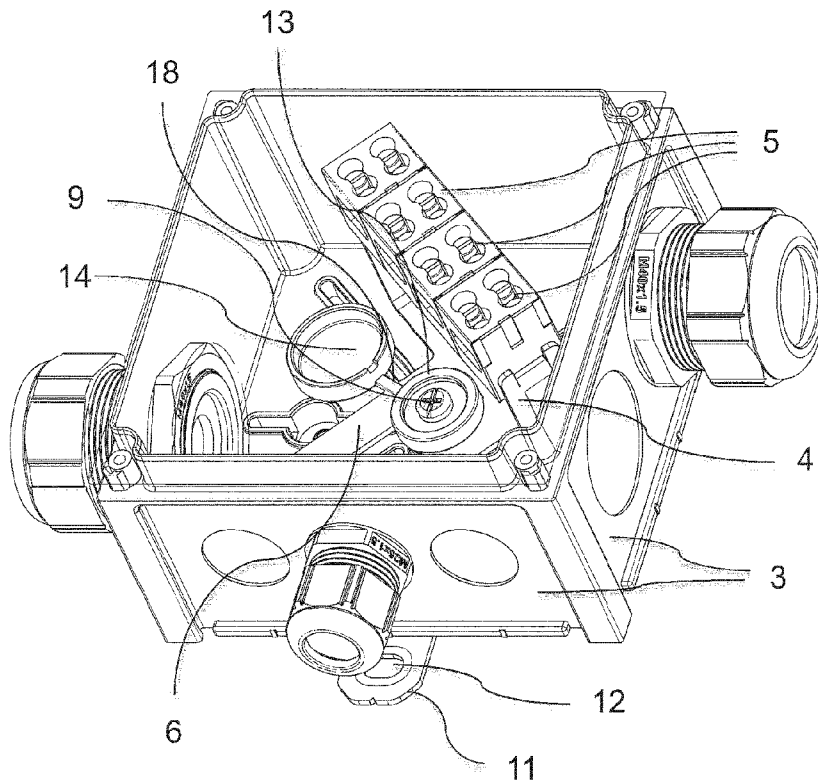


Fig. 3

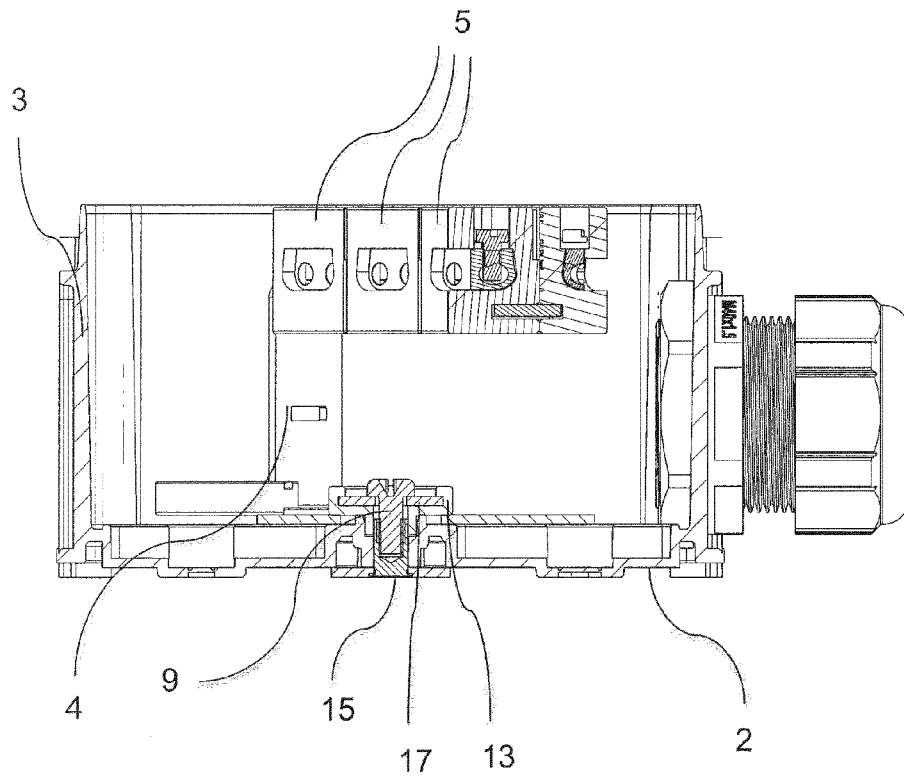


Fig. 4

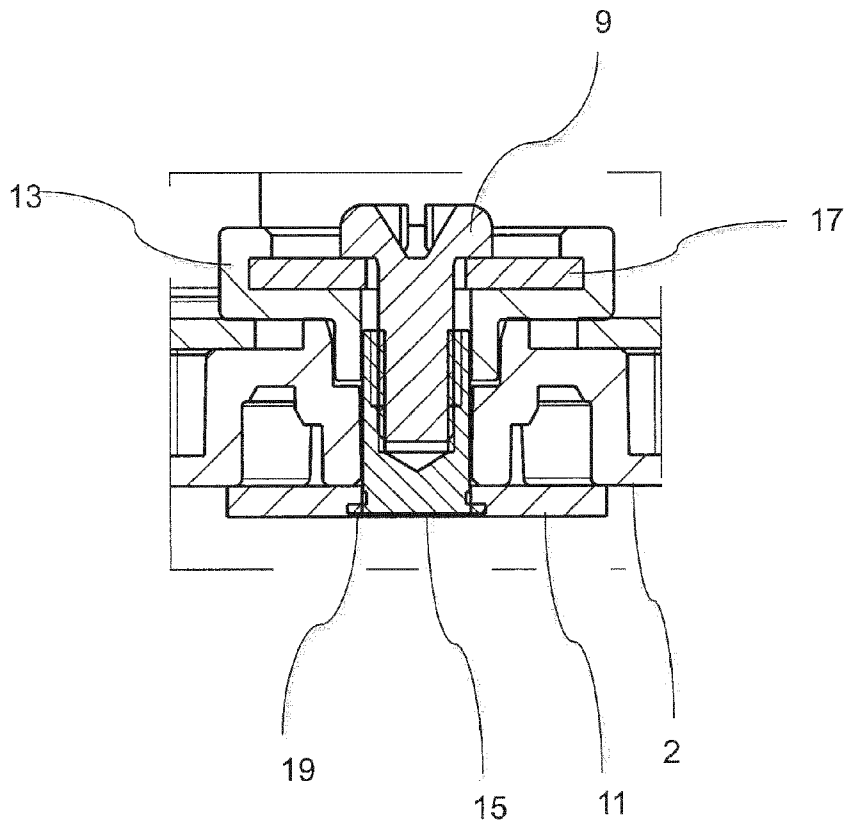


Fig. 5

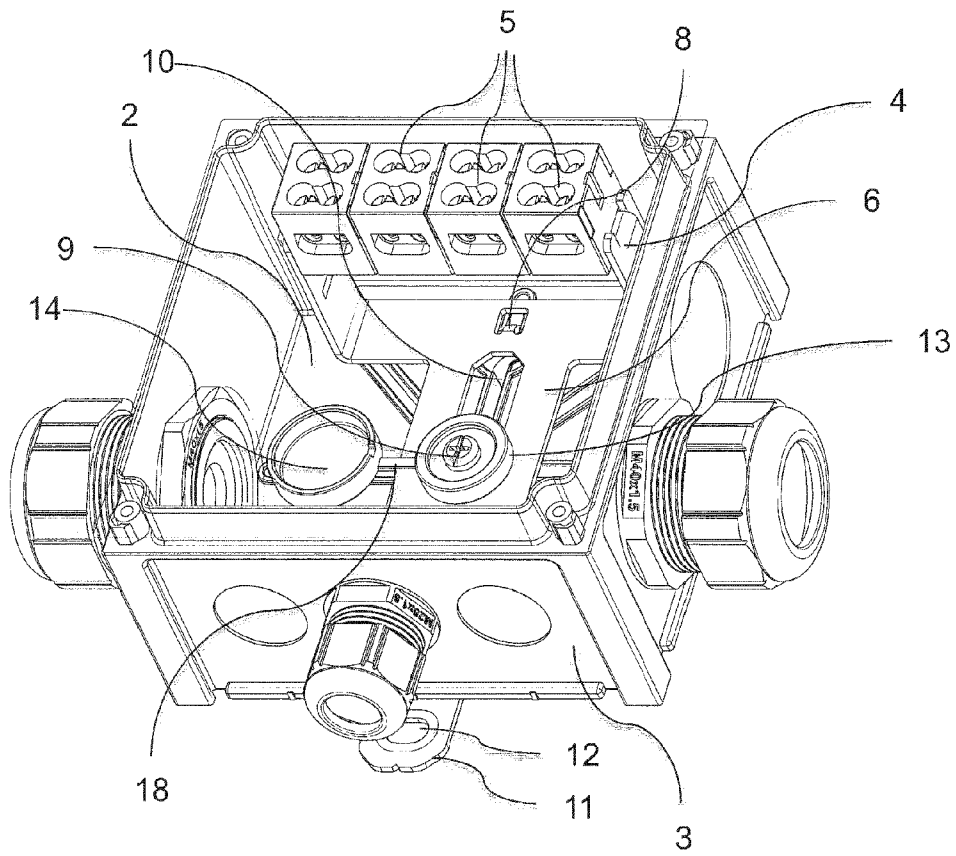


Fig. 6

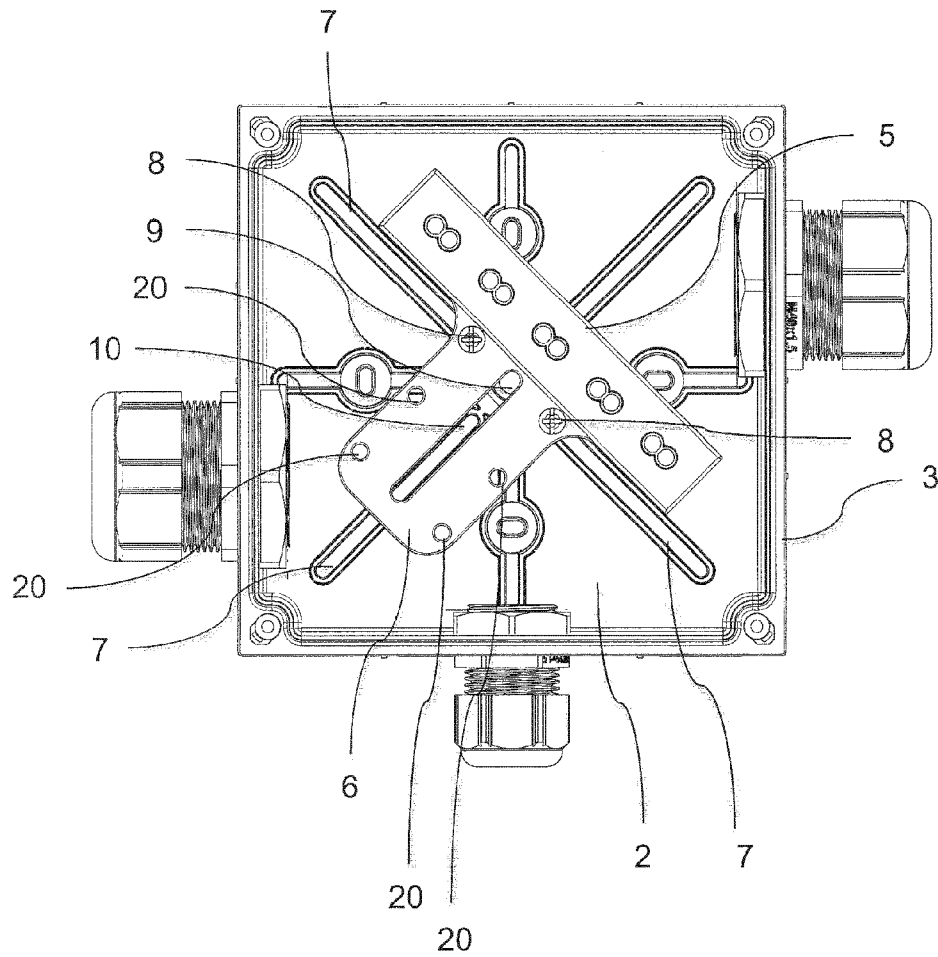


Fig. 7

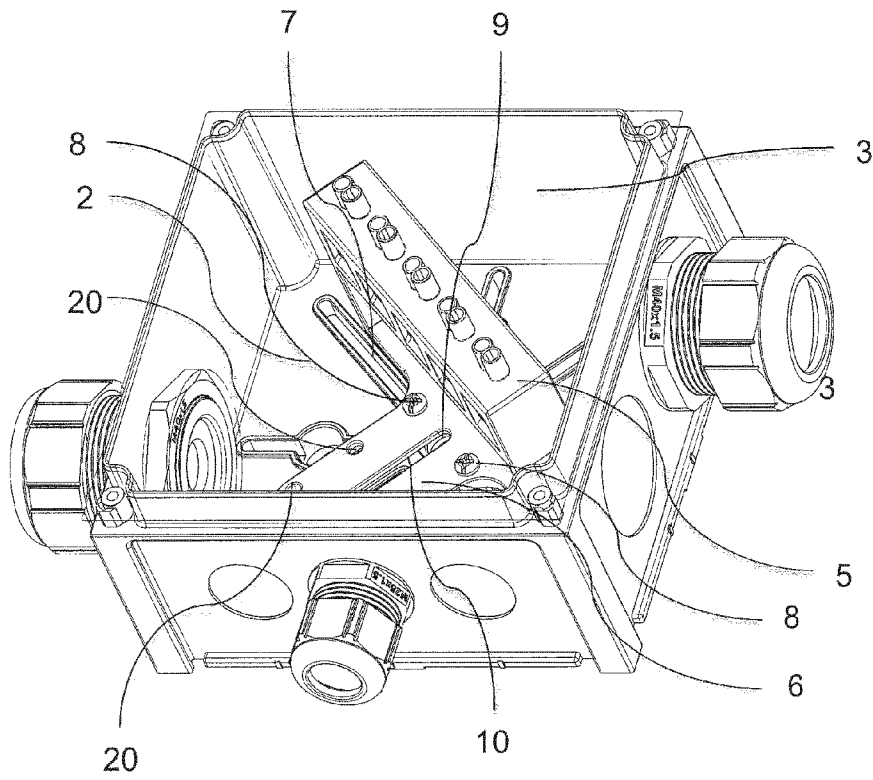


Fig. 8