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(54) A FOUNDATION UNIT

(57) Disclosed is a foundation unit for supporting a structure, the foundation unit provided in a plurality of parts, arranged to be coupled together before use,

wherein the foundation unit is arranged to be at least partially buried in, and to receive, material.

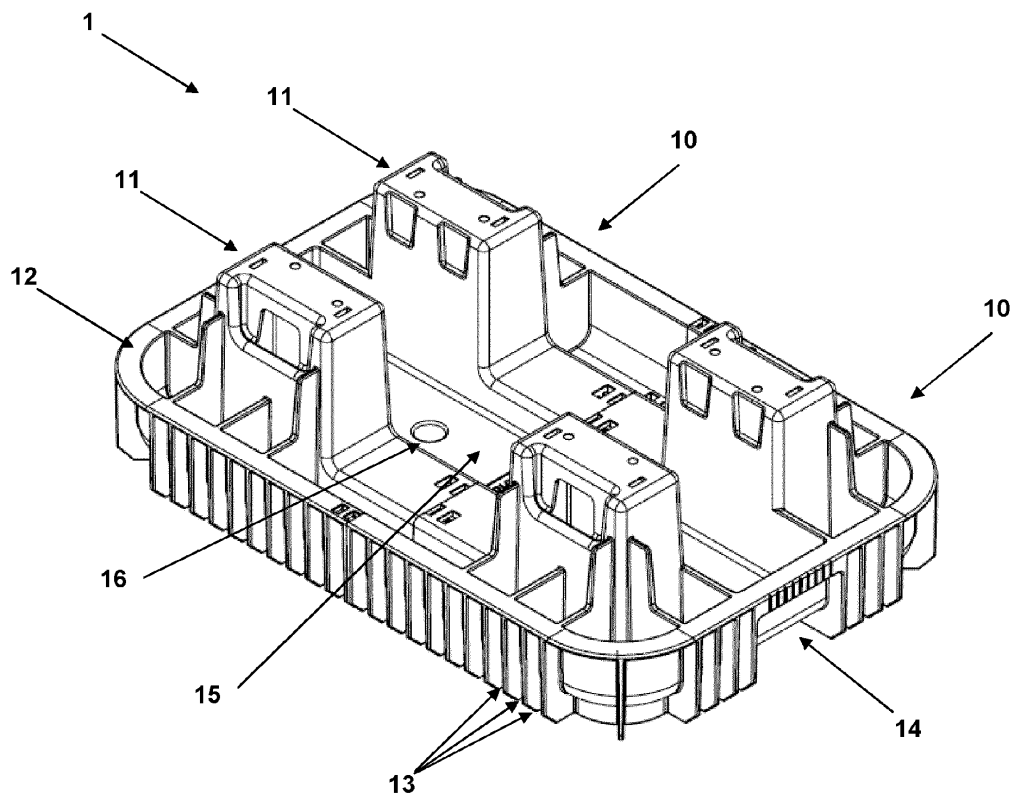


Fig. 1

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Description

Field

[0001] The present invention relates generally to a foundation unit, and in particular to a foundation unit for supporting a unit. More specifically, the present invention relates to foundation units for use in or near railway lines, where access may be difficult.

Background

[0002] Tracksides cabinets installed at the side of a railway are used to house a range of sensitive equipment performing a wide range of operations including track/platform control, train monitoring, power distribution, safety and signalling. According to the prior art, installing such cabinets typically involves digging a hole in the ground, filling the hole with concrete to form a foundation on which the cabinet can be mounted, and drilling holes in the foundation to install the cabinet.

[0003] However, such an installation process is expensive due to the amount of manpower and materials required. Transporting the material to the side of the railway can often be difficult due to remoteness of the locations at which tracksides cabinets are to be installed. Sometimes, access via rail transport is the only viable option. The operation is therefore typically performed at night, when railway traffic is minimal.

[0004] It is an aim of example embodiments to at least partially overcome or avoid one or more disadvantages of the prior art, described above or elsewhere, or to provide an at least partially improved or even an alternative system to those already in existence.

Summary

[0005] According to the present invention there is provided an apparatus and method as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

[0006] According to an aspect of the invention, there is provided a foundation unit for supporting a structure, the foundation unit provided in a plurality of parts, arranged to be coupled together before use, wherein the foundation unit is arranged to be at least partially buried in, and to receive, material. Thus, a stable and easy to install foundation unit can be provided.

[0007] The foundation unit may comprise a base arranged to receive the material. Thus, by filling the base with material, stability of the foundation unit can be improved.

[0008] The base may comprise a plurality of drainage holes arranged to, in use, drain fluid from the foundation unit. Thus, excess fluid can be drained from the foundation unit, preventing damage to the foundation.

[0009] The foundation unit may comprise a plurality of

support pillars extending substantially vertically from the base, wherein the plurality of support pillars are arranged to, in use, extend above the material in which the foundation unit is buried. Thus, a stable foundation upon which the structure can sit can be provided.

[0010] The plurality of support units may each comprise a screw hole, such that each of the plurality of support pillars is arranged to receive a fastener for attaching the structure to the foundation unit. Thus, the structure can be securely mounted to the foundation unit.

[0011] The plurality of support pillars may each further comprise a threaded metal plate. Thus, the bolt for attaching the structure can securely sit inside the support pillar, as the risk of damaging the foundation unit while mounting the structure is minimised, and the risk of the connection between the support pillars and the foundation unit deteriorating over time is reduced.

[0012] The foundation unit may further comprise a plurality of generally upright walls arranged at a circumference of the base. Thus, the material filling the base is retained securely within the base.

[0013] The plurality of walls may be each provided with a plurality of reinforcing ribs. Thus, the strength of the foundation unit can be improved while minimising the amount of material used for manufacturing the foundation unit when compared to, for example, manufacturing the foundation unit with thick, solid walls. The reinforcing ribs can enhance the rigidity of the foundation unit and ensure that the foundation unit engages better with the ground in which it is buried.

[0014] The plurality of walls may be further provided with means for carrying the unit. Thus, the foundation unit can be handled, or picked up, by a single person.

[0015] The foundation unit may be formed from a plastics material in a blow-moulding process, or an injection moulding process. By use of a plastics material, the weight of the foundation unit is kept at a level where it can be carried by a single person, greatly easing work with the foundation units on-site.

[0016] Each of the plurality of parts of the foundation unit may be substantially identical. Thus, only one mould can be required for manufacturing the foundation unit, improving the ease of manufacture.

[0017] Each of the plurality of parts of the foundation unit may comprise at least one coupling projection and at least one complementary coupling receiver such that the plurality of parts of the foundation unit can be coupled to form the foundation unit. Thus, the foundation unit can be easily assembled, and the parts of the foundation unit can be easily secured to one another. Further, this enables a smaller mould to be used in the manufacturing process, which is cost-effective and also assists in transportation of the completed product.

[0018] The plurality of parts of the foundation unit may be releasably couplable. Thus, the foundation unit can be easily disassembled if necessary, with minimal tools used.

[0019] The foundation unit may comprise at least one

extension unit couplable between the plurality of parts of the foundation unit. Thus, the size of the foundation unit can be easily increased such as to provide optimal support for structures of different sizes.

[0020] According to another exemplary embodiment, provided is a method of assembling the foundation unit as described herein. Thus, a stable and easy-to-install foundation unit can be provided.

[0021] Although a few example embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

Introduction to the drawings

[0022] For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example only, to the accompanying diagrammatic drawings in which:

Figure 1 shows a perspective view of a foundation unit according to an example embodiment;

Figure 2 shows a top plan view of a foundation unit according to an example embodiment;

Figure 3 shows an underside view of a foundation unit according to an example embodiment;

Figure 4 shows a side view of a foundation unit according to an example embodiment;

Figure 5 shows a perspective view of a part of a foundation unit according to an example embodiment;

Figure 6 shows a perspective view of an extension unit of a foundation unit according to an example embodiment;

Figure 7 shows a top plan view of a part of a foundation unit according to an example embodiment;

Figure 8 depicts steps in a method according to an example embodiment.

Description of example embodiments

[0023] Referring now to Figure 1, a foundation unit is denoted as a whole by the reference numeral 1.

[0024] The foundation unit 1 is provided in a plurality of parts 10. The parts 10 are the basic units which form the foundation unit 1, and are substantially identical. The foundation unit 1 comprises a base 15 defined by a plurality of generally upright walls arranged at a circumfer-

ence of the base 15 such that the foundation unit 1 is arranged to be at least partially buried in, and to receive, material. That is, to install the foundation unit 1 at a site, a small hole is dug in the ground to accommodate the foundation unit 1. The foundation unit 1 is placed in said hole and then material is inserted into the foundation unit. The base 15 and the plurality of walls arranged at the circumference thereof define the structure which receives the material. Upon placing the foundation unit 1 in the hole, the walls arranged at a circumference of the base 15 are not visible.

[0025] In use, the base 15 is arranged flush to the surface. The material received by the base 15 can be, but is not limited to, soil, gravel or hardcore. The material serves to provide stability to the foundation unit. The upper surface 12 defines the height of material received by the foundation unit 1. Advantageously, the use of concrete is not required, and thus the foundation unit 1 is easy to install even in remote locations such as alongside a rail track, since no or little specialised or bulky equipment is required.

[0026] The base 15 comprises a plurality of draining holes 16 arranged to, in use, drain fluid from the foundation unit. Thus, any water which does enter the foundation unit 1 can drain away through the base 15 of the foundation unit 1, and the damage to the foundation caused by excess fluid can be reduced and the stability of the foundation unit 1 can be improved.

[0027] The foundation unit 1 comprises a plurality of support pillars 11 extending vertically from the base 15. The support pillars 11 are arranged to, in use, extend above the material in which the foundation unit 1 is buried. Figure 4, which shows a side view of the foundation unit 1, illustrates that the support pillars 11 extend higher from the base 15 than the walls surrounding the base 15.

[0028] The support pillars 11 are arranged to support a structure mounted onto the foundation unit 1. That is, in use, the support pillars 11 directly contact the structure mounted onto the foundation unit 1. The structure mounted onto the foundation unit 1 can be, for example, a trackside cabinet or a rail location case for housing telecom and signalling equipment and switchgear. Typically, installing a trackside cabinet involves digging a hole in the ground, filling the hole with concrete to form a foundation on which the cabinet can be mounted, and drilling holes in the foundation to install the cabinet. As concrete is not required in order to support stability to the foundation unit 1, the foundation unit 1 is especially suitable for installing trackside cabinets.

[0029] The foundation unit 1 comprises a plurality of reinforcing ribs 13 located at an external side of the plurality of generally upright walls arranged at the circumference of the base 15. The reinforcing ribs 13 improve the strength of the foundation unit 1 while minimising the amount of material used for manufacturing the foundation unit 1 when compared to, for example, manufacturing the foundation unit 1 having thick, solid walls. As well as providing additional rigidity, the ribs 13 assist in anchor-

ing the foundation unit 1 in the ground, when it is installed in a scenario where it is at least partially buried in either earth, gravel or hardcore. Thus, the strength of the foundation unit can be improved while minimising the amount of material used for manufacturing the foundation unit when compared to, for example, manufacturing the foundation unit with thick, solid walls. The reinforcing ribs can enhance the rigidity of the foundation unit and ensure that the foundation unit engages better with the ground in which it is buried.

[0030] The foundation unit 1 comprises gripping means 14 for carrying the unit. Ideally, the foundation unit 1 may be carried by a single person, greatly easing work with the units on-site. The gripping means 14 are formed by providing a recess in the plurality of generally upright walls located at the circumference of the base 15 of the foundation unit 1. Thus, the foundation unit 1 does not require an appended handle for carrying the unit.

[0031] The foundation unit 1 is formed from a plastics material using a blow-moulding process, or an injection moulding process. As the parts 10 which form the foundation unit 1 are substantially identical, only one mould is required for production of the foundation unit. Furthermore, the parts 10 can be easily stacked on top of one another, reducing the amount of space required to store a plurality of unassembled foundation units 1.

[0032] Referring to Figure 2, the support pillars 11 comprise a plurality of screw holes 20, such that the support pillars 11 are arranged to receive a bolt for attaching the structure to the foundation unit 1, thereby securing the structure in place. Such bolts can be, for example, M16 bolts; however, the skilled person will appreciate that any suitable fastener can be used for securing the structure. Thus, the support pillars 11 further comprise a threaded metal plate for securely attaching the structure to the support pillars 11, as plastics materials are more prone to cracking than metal. This ensures that the foundation unit 1 is not damaged while the structure is mounted onto the support pillars 11.

[0033] As shown in Figure 5, at an edge of part 10 of the foundation unit 1 located are at least one coupling projection 21 and at least one complementary coupling receiver 22 such that the plurality of parts 10 can be coupled to form the foundation unit 1. Coupling projection 21 may be considered as a male part and coupling receiver 22 can be considered as a female part. As such, the parts 10 may only be joined in one orientation, male to female.

[0034] The male 21 and female 22 parts interconnect snugly; however, decoupling is possible. In order to decouple the parts 10, a tool (such as a screwdriver) can be inserted into a recess located above the coupling receiver 22, releasing the male part from the female part.

[0035] In order to accommodate various sizes of the structures intended to be supported by the foundation unit 1, extension units can be used. Figure 6 depicts such an extension unit. The extension unit 30 may be considered to be a bridging piece, connected between the plurality of parts 10. Similar to the parts 10, the extension

unit 30 comprises at least one corresponding coupling projection 21 and at least one complementary coupling receiver 22 such that the extension unit 30 can be connected between the plurality of parts 10, thereby increasing the size of the foundation unit 1. The extension unit 30 comprises at least one support pillar 11 to aid in supporting the structure mounted onto the foundation unit 1.

[0036] Figure 8 describes a method of assembling the foundation unit, such as that described above. The method comprises assembling the foundation unit, such as that described above, S100.

[0037] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0038] All of the features described in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combination where at least some of such features and/or steps are mutually exclusive.

[0039] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0040] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A foundation unit for supporting a structure, the foundation unit provided in a plurality of parts, arranged to be coupled together before use, wherein the foundation unit is arranged to be at least partially buried in, and to receive, material.
2. The foundation unit according to claim 1, wherein the foundation unit comprises a base arranged to receive the material.
3. The foundation unit according to claim 2, wherein the base comprises a plurality of drainage holes arranged to, in use, drain fluid from the foundation unit.
4. The foundation unit according to claim 2 or 3, comprising a plurality of support pillars extending substantially vertically from the base, wherein the plu-

ality of support pillars are arranged to, in use, extend above the material in which the foundation unit is buried.

5. The foundation unit according to claim 4, wherein the plurality of support pillars each comprise a screw hole, such that each of the plurality of support pillars is arranged to receive a fastener for attaching the structure to the foundation unit. 5
6. The foundation unit according to claim 5, wherein the plurality of support pillars each further comprise a threaded metal plate. 10
7. The foundation unit according to any one of claims 2 to 6, wherein the foundation unit further comprises a plurality of generally upright walls arranged at a circumference of the base. 15
8. The foundation unit according to claim 7, wherein the plurality of walls are each provided with a plurality of reinforcing ribs. 20
9. The foundation unit according to claim 7 or 8, wherein the plurality of walls are further provided with gripping means for carrying the unit. 25
10. The foundation unit according to any preceding claim, wherein the foundation unit is formed from a plastics material in a blow-moulding process, or an injection moulding process. 30
11. The foundation unit according to any preceding claim, wherein each of the plurality of parts of the foundation unit is substantially identical. 35
12. The foundation unit according to any preceding claim, wherein each of the plurality of parts of the foundation unit comprises at least one coupling projection and at least one complementary coupling receiver such that the plurality of parts of the foundation unit can be coupled to form the foundation unit. 40
13. The foundation unit according to claim 12, wherein the plurality of parts of the foundation unit is releasably couplable. 45
14. The foundation unit according to any preceding claim, further comprising at least one extension unit couplable between the plurality of parts of the foundation unit. 50
15. A method of assembling the foundation unit according to any of the preceding claims. 55

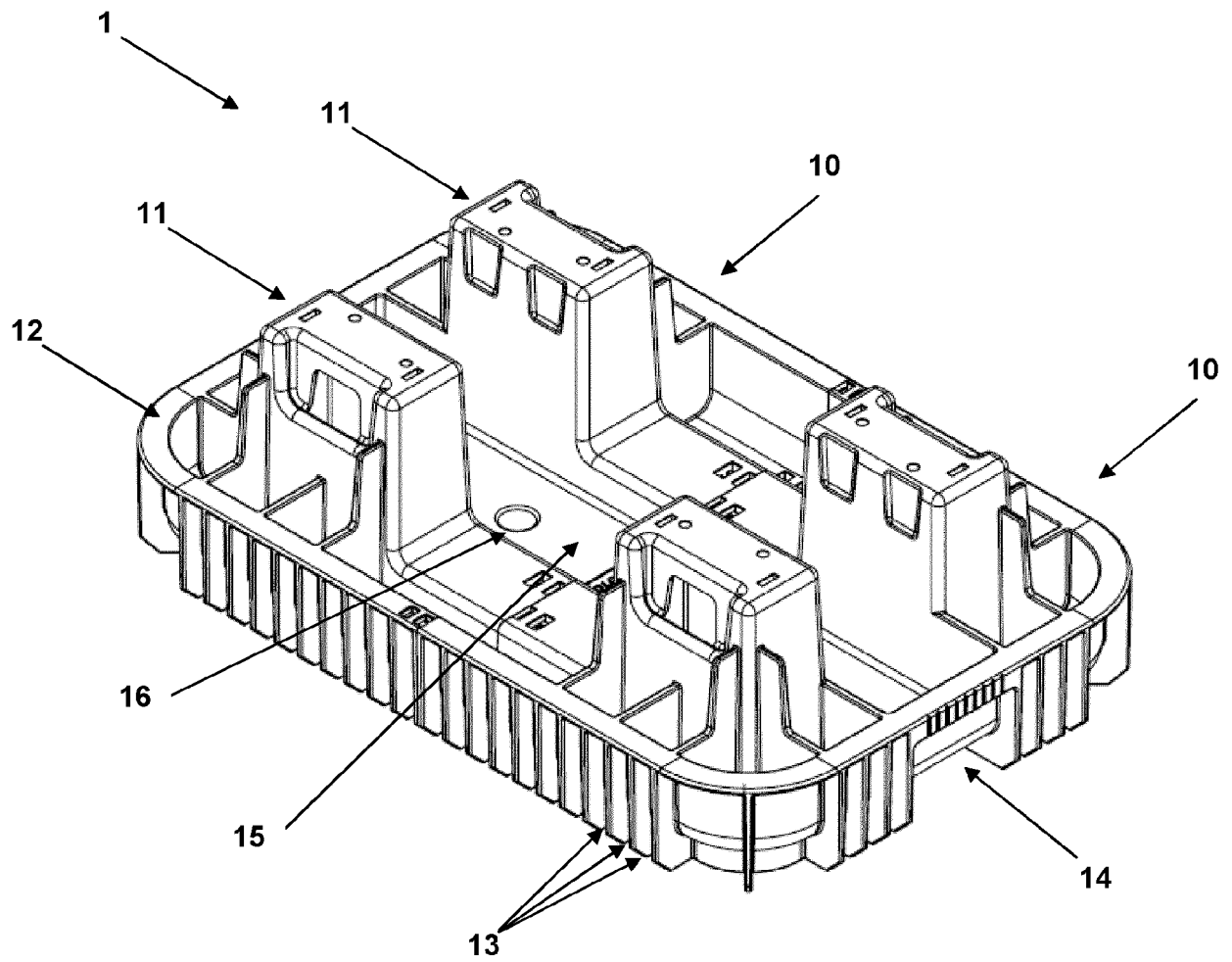


Fig. 1

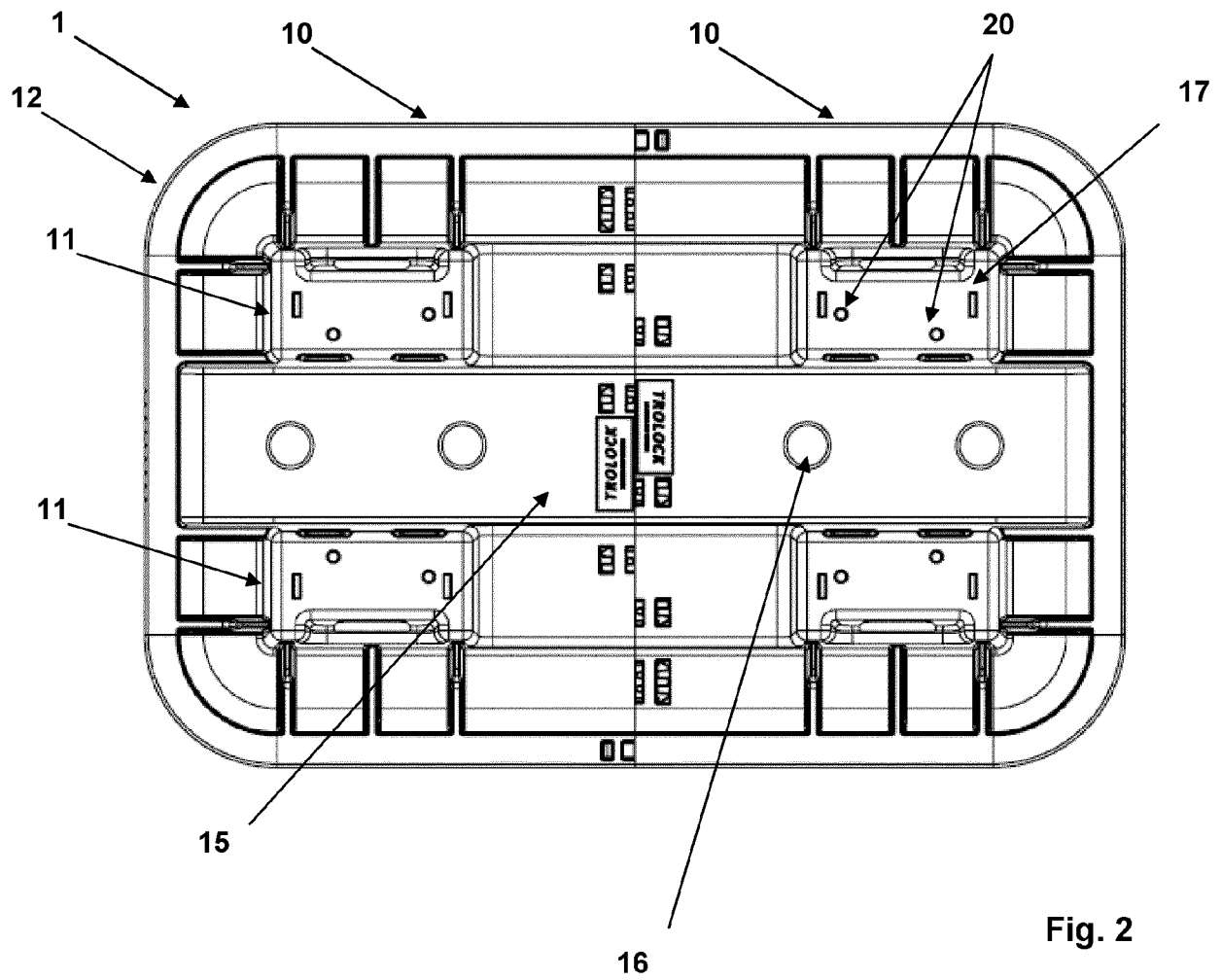


Fig. 2

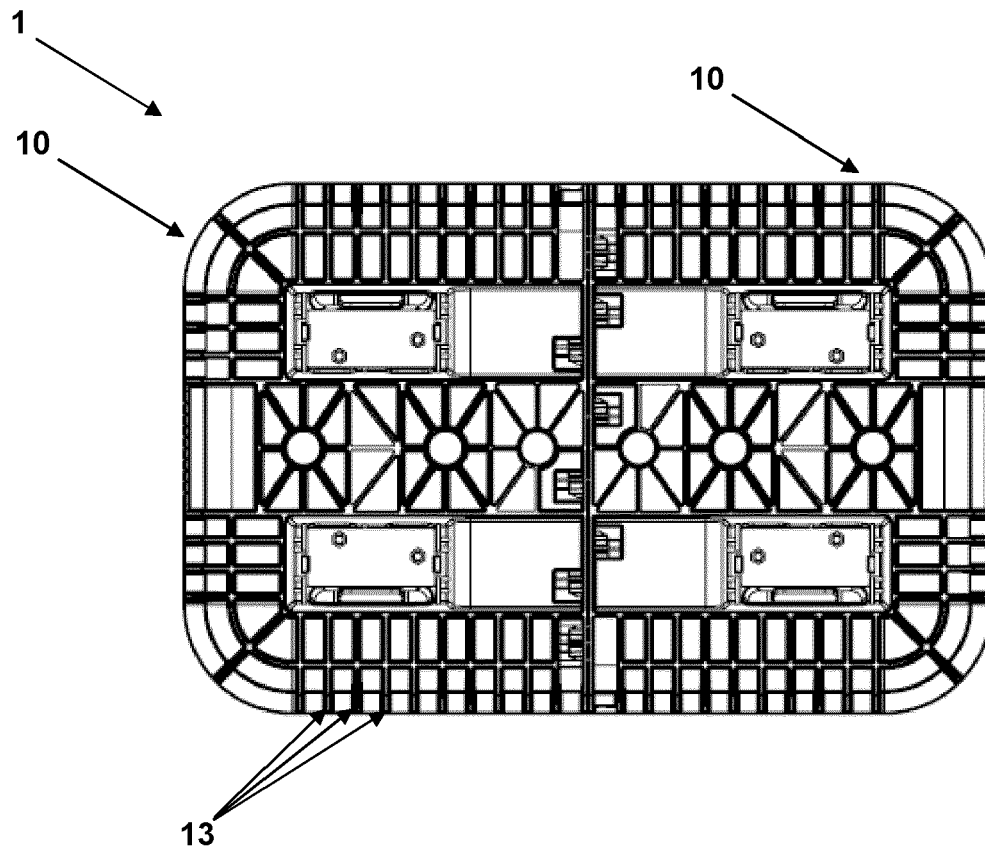


Fig. 3

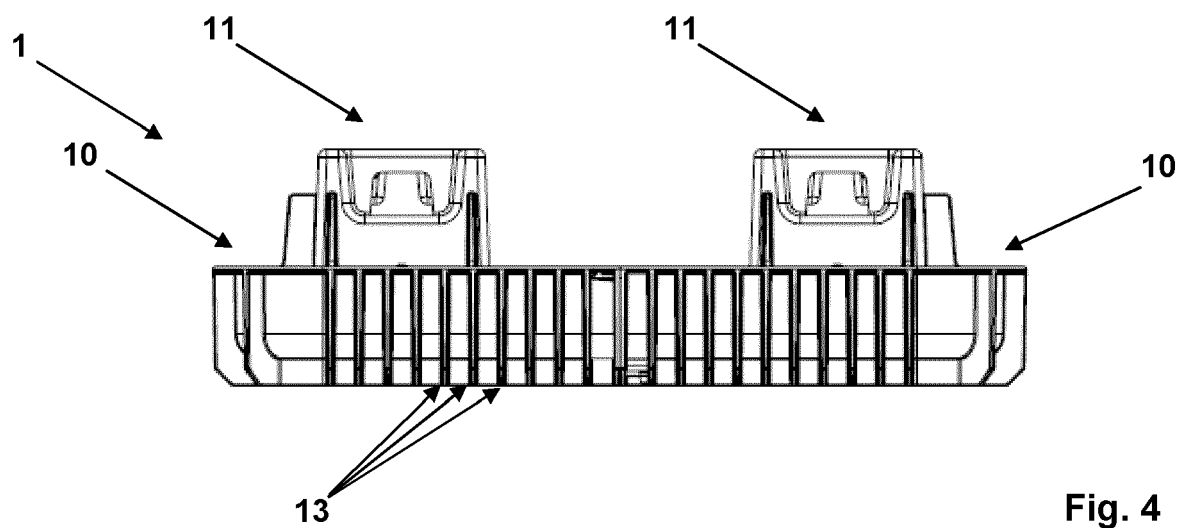


Fig. 4

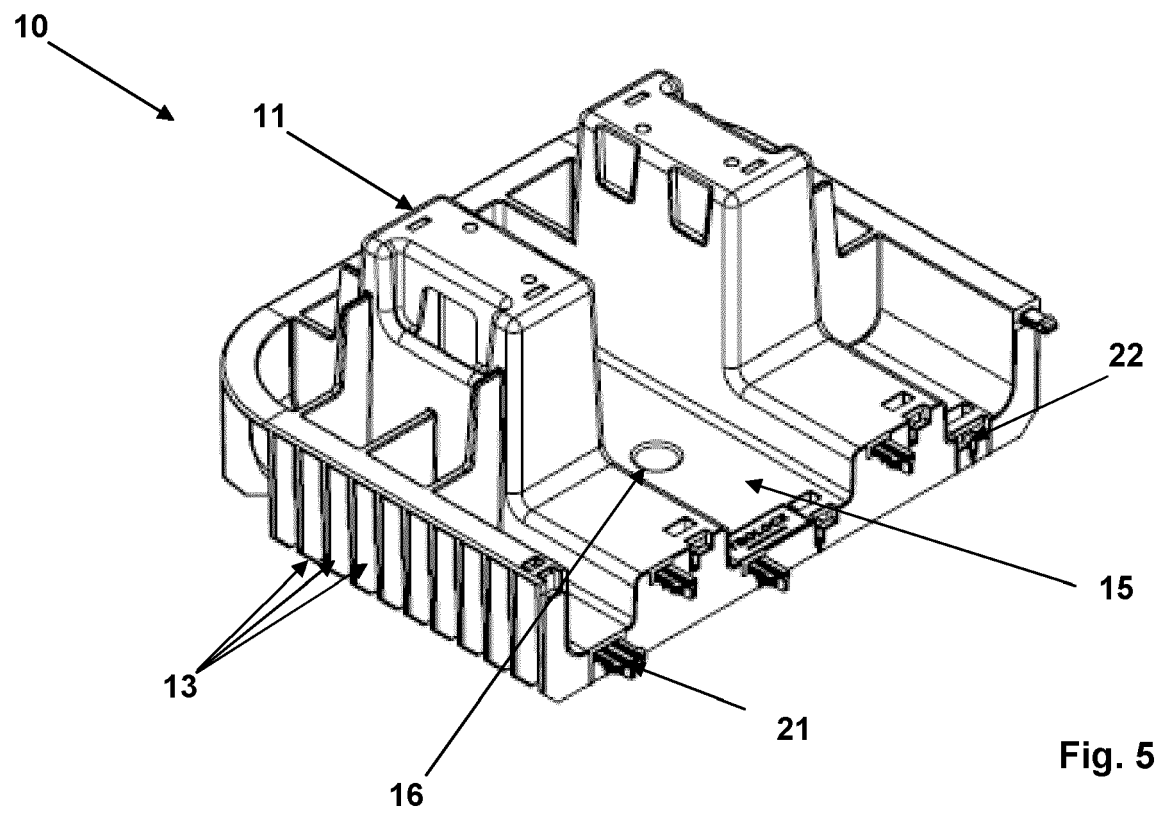


Fig. 5

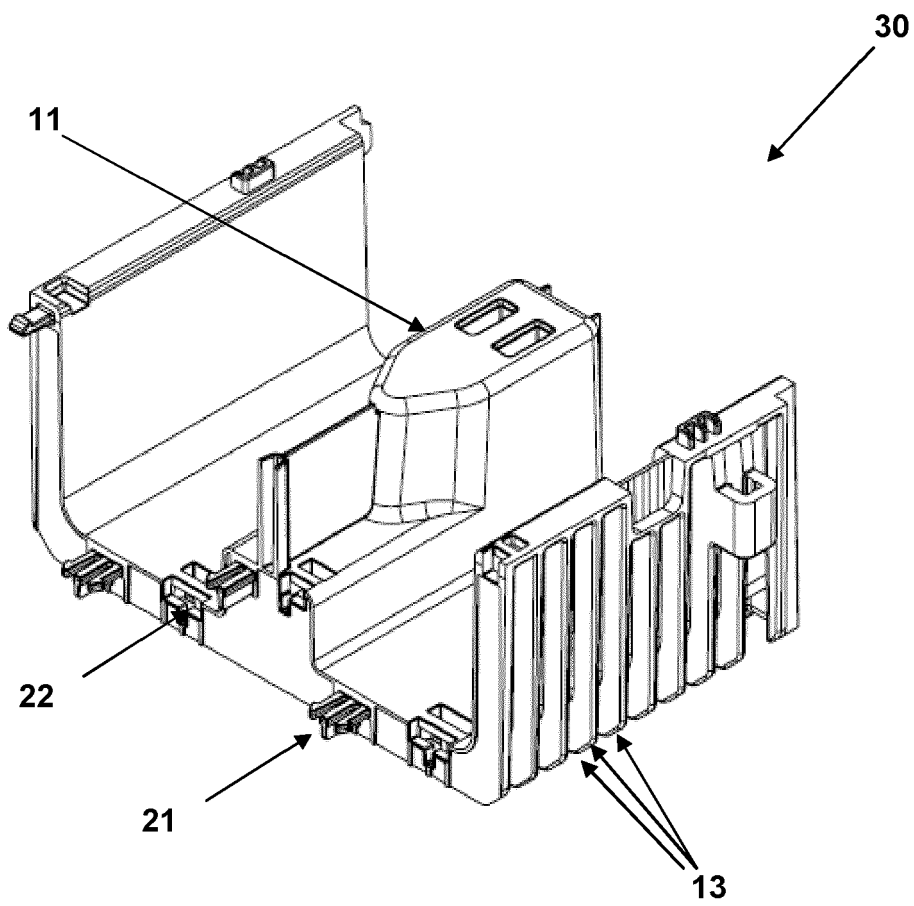


Fig. 6

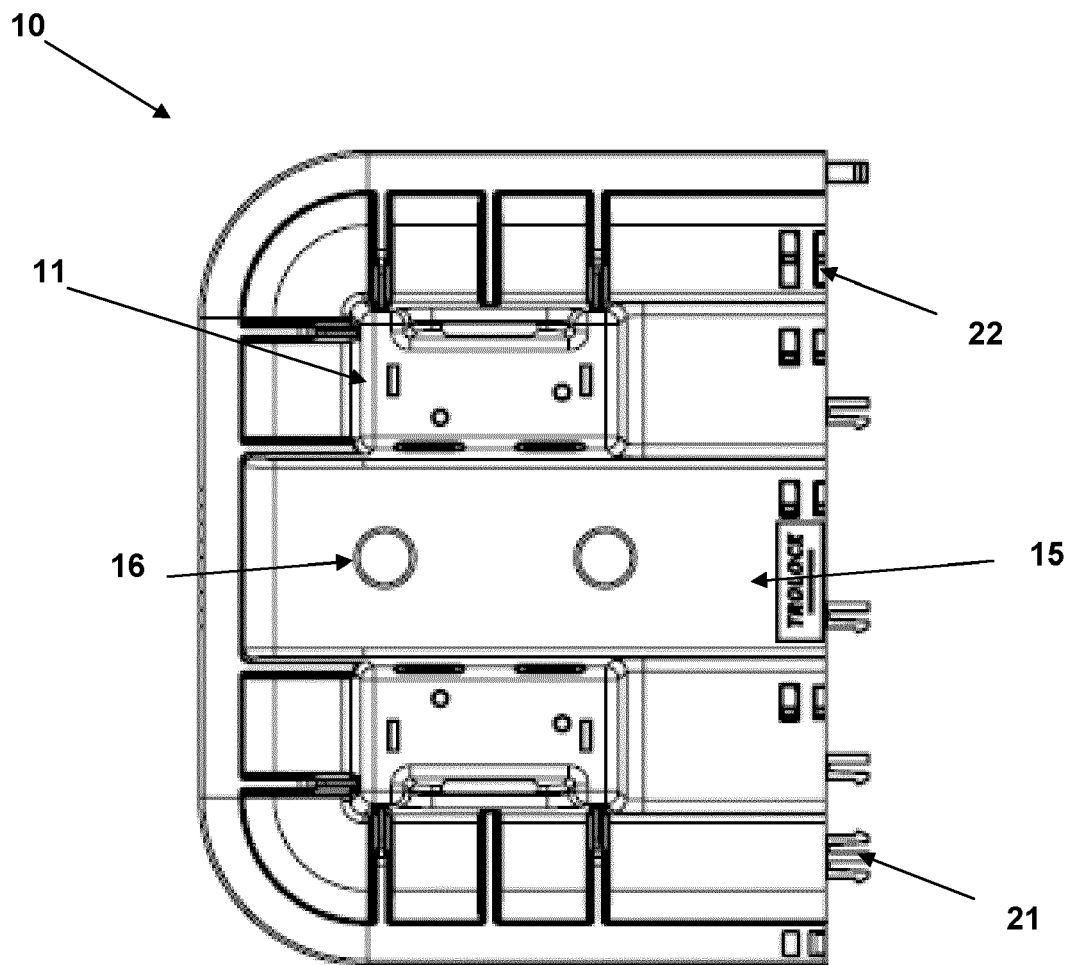


Fig. 7



Fig. 8



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
			E02D E04H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 December 2021	Examiner Martinez Cebollada
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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
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