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(54) A floor plate

(57) A floor plate (2) is provided for use as part of a modular floor construction particularly but not exclusively for a telecommunications transmission/reception station, an electricity sub-station, or other comparable installation. The floor plate (2) has a sandwich construction with a core (16) made of a cellular synthetic material located between upper and lower faces (17,18) of reinforced concrete. Preferably, the core (16) comprises a foamed polystyrene and is bordered by reinforced concrete side-pieces (19) so that it is completely enclosed in concrete. Advantageously, the plate is provided with a plurality of connecting flanges which enables it to be bolted to another similar plate (2).

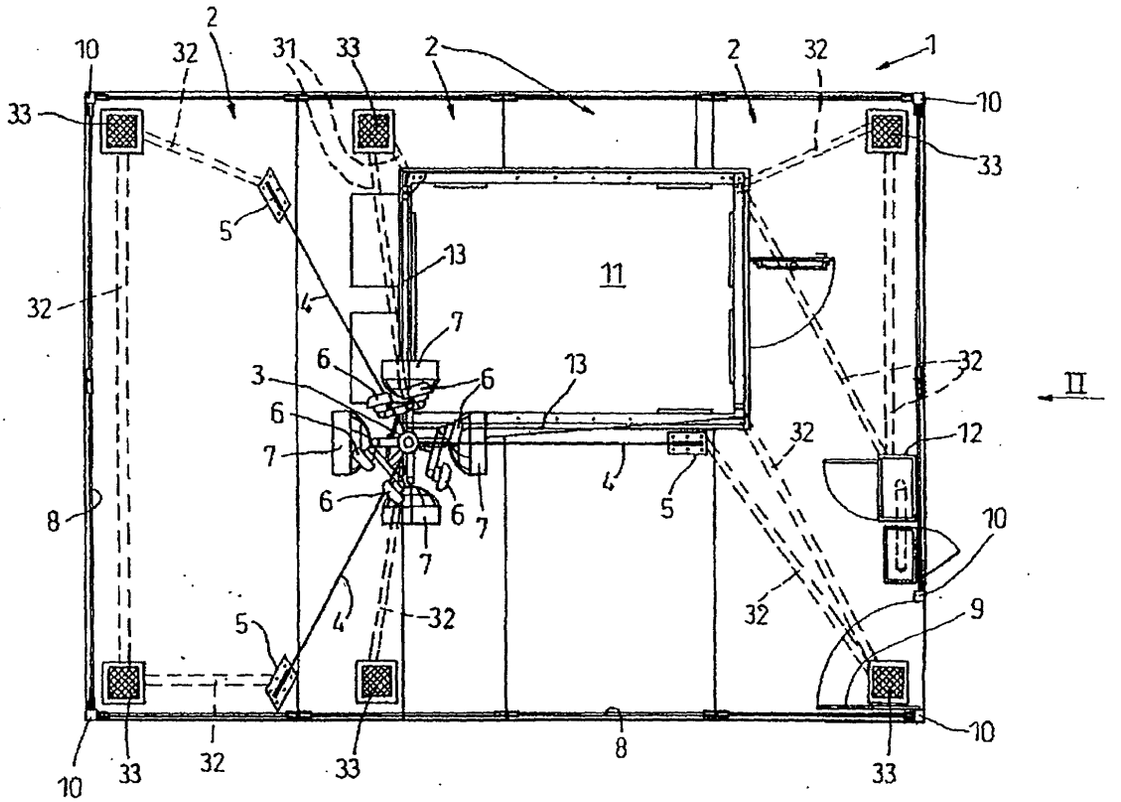

Fig. 1

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Description

[0001] The present invention relates to a floor plate for use as part of a modular floor construction, particularly but not exclusively for a telecommunications transmission/reception station, electricity sub-station, or other comparable installation.

[0002] Telecommunications transmission and/or reception stations, electricity sub-stations, or other comparable installations are typically situated on open terrain. The floor construction to which various components of the installation may be anchored must therefore be suitable for this purpose and weather-proof. Typically, therefore, the construction of a suitable floor is an important consideration when such an installation is being constructed.

[0003] The object of the present invention is to provide a pre-fabricated modular floor plate which can be combined with other similar plate to provide a floor construction which offers improvements over those used hitherto.

[0004] According to a first aspect of the present invention there is provided a floor plate for use as part of a modular floor construction characterised in that comprises a sandwich construction with a core of a cellular synthetic material located between upper and lower faces of reinforced concrete.

[0005] Preferably, the core comprises a foamed polystyrene.

[0006] Preferably also, the upper and lower faces are between 30 mm and 40 mm inclusive in thickness.

[0007] Preferably also, the core is between 220 mm and 240 mm inclusive in thickness.

[0008] Preferably also, the core is bordered by reinforced concrete side-pieces so that it is completely enclosed.

[0009] Preferably also, the plate is strengthened by strips of reinforced concrete which extend crosswise through the core.

[0010] Preferably also, the strips of concrete are integrally connected to the upper and lower faces.

[0011] Preferably also, the strips of concrete are reinforced by steel wires.

[0012] Preferably also, the plate is provided with strengthening beams connected thereto along at least two opposing sides

[0013] Preferably also, the strengthening beams comprise I-beams, which are preferably made of steel.

[0014] Advantageously, the plate is provided with a connecting flange which enables it to be connected to another similar plate.

[0015] Preferably also, the connecting flange is disposed substantially vertically.

[0016] Preferably also, the connecting flange is positioned such that it can be bolted to the connecting flange of another similar plate.

[0017] Preferably also, a plurality of first connecting flanges are provided attached to the ends of the strengthening beams for connecting the two opposing sides of the plate to another similar plate.

[0018] Preferably also, at least one second connecting flange is provided along at least one of the other two opposing sides of the plate for connecting each of these two opposing sides to another similar plate.

[0019] Preferably also, each of the second connecting flanges is secured to the plate in a hollow box formed in the reinforced concrete side-pieces bordering the core.

[0020] Preferably also, each hollow box is formed by plates which have been welded together and set into the concrete.

[0021] Preferably also, the hollow box is provided with a cover plate.

[0022] Preferably also, at positions on the floor plate where a component is to be anchored, the core is recessed and the recess filled with reinforced concrete in which may be set an anchoring means.

[0023] Preferably also, at least one cable duct is located running through the interior of the plate through which electrical cables can be run across the plate when in use.

[0024] Preferably also, a shaft is provided through the plate with which each of the cable ducts in the plate communicates to enable at least one of the electrical cables to be connected to an earthing terminal located within the shaft.

[0025] According to a second aspect of the present invention, there is provided a floor construction for a telecommunications transmission/reception station, an electricity sub-station, or other comparable installation comprising a plurality of interconnected modular floor plates in accordance with the first aspect of the invention.

[0026] Preferably, the floor construction is located on a prepared bed made of sand or gravel.

[0027] The present invention will now be described by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a plan view of a telecommunications transmission/reception station with a modular floor construction made up of floor plates in accordance with the present invention;

Fig. 2 is a side elevation of the station shown in Fig. 1 in the direction of arrow II;

Fig. 3 is a plan view of the modular floor construction shown in Fig. 1;

Fig. 4 is a vertical cross-section along the line IV-IV in Fig. 3;

Fig. 5 is a vertical cross-section along the line V-V in Fig. 3;

Fig. 6 is a view to an enlarged scale of the area

ringed VI in Fig 3;

Fig. 7 is a vertical cross-section along the line VII-VII in Fig. 6;

Fig. 8 is a vertical cross-section along the line VIII-VIII in Fig. 6;

Fig. 9 is a view to an enlarged scale of the area ringed IX in Fig 3; and

Fig. 10 is a vertical cross-section along the line X-X in Fig. 9.

[0028] A modular floor construction 1 for a telecommunications transmission/reception station, electricity sub-station, or other comparable installation comprises two or more floor plates 2 according to the present invention which can be joined together on-site during construction of the installation. The floor plates 2 are therefore prefabricated and can be adapted to accommodate and anchor various components of the installation.

[0029] In a telecommunications transmission/reception station as shown in Figs. 1 and 2 a transmission and reception mast 3 is mounted on the floor 1 and held in place by guys 4 which are attached to the mast 3 and anchored to plates 5 secured to the floor 1 as will be described. The guys 4 are preferably anchored in a star-shaped pattern. Mounted on the mast 3 are a plurality of antennae 6 and/or parabolic dishes 7, as required.

[0030] The site of the station, which is defined by the total area of the floor construction 1, will usually be enclosed by a security fence 8, typically a wire fence, with a gate 9. Preferably, posts 10 to which the fence 8 and the gate 9 are attached are secured to the floor construction. In addition, a cabin 11 housing electronic equipment connected with the mast 3 and an electricity supply cabinet 12 may also be located within the fence 8 and secured to the floor construction 1.

[0031] In addition to the guys 4, the mast 3 may also be supported by a modular steel supports 13 which are secured to the mast 3 and to the roof of the cabin 11 at a mutual angle of 90°, as shown in Fig. 1. A ladder 14 with safety hoops 15 may also be secured to the mast 3 to permit mounting of and access to the antennae 6 and/or parabolic dishes 7.

[0032] It will thus be appreciated that the floor construction 1 must be sufficiently strong to accommodate the above components of the installation safely and to withstand all normal weather conditions.

[0033] The floor construction 1 of the invention comprises a pre-fabricated arrangement comprising the relatively lightweight floor plates 2 which can be laid on a prepared site in a desired configuration. This enables the floor construction 1 to be completed quickly and easily without extensive building work being required, for example as would be the case if the floor construction were to be wholly constructed on-site.

[0034] Referring now particularly to Figs. 3 to 5, each floor plate 2 for use as part of the modular floor construction 1 comprises a sandwich construction with a core 16 of a cellular synthetic material located between upper and lower faces, 17 and 18 respectively, of reinforced concrete. Preferably, the core 16 is made of a foamed polystyrene but other cellular or honeycombed materials could be used. It will be appreciated that the presence of such a core 16 reduces the weight of the plate 2, which is an important consideration when designing any pre-fabricated component that has to be transported to a site and then manoeuvred into the required position.

[0035] The core 16 is bordered by reinforced concrete side-pieces 19 so that it is completely enclosed in concrete. In addition, the plate 2 is strengthened by strips 20 of reinforced concrete which extend crosswise through the core 16 and are integrally connected to the upper and lower faces 17 and 18. The side-pieces 19 and the strips 20 are preferably reinforced by means of steel wires 21.

[0036] As a further reinforcement and to ensure that a horizontal alignment of two or more of the plates 2 when secured together to form the floor construction 1, as described below, two opposing sides of the plate 2 are provided with strengthening beams 22. The beams 22 are set into the concrete along the two opposing edges and preferably comprise steel I-beams.

[0037] Preferably, the upper and lower concrete faces 17 and 18 are made between 30 mm and 40 mm inclusive in thickness and the core has a thickness between 220 mm and 240 mm inclusive. It will be appreciated that the floor area of each plate 2 can be made as appropriate for its intended use but for a telecommunications station as shown in Figs. 1 and 2 it is expected that each plate 2 would be made rectangular with dimensions of the order of 2125 mm x 6000 mm. The floor construction 1, which typically needs to be 8500 mm x 6000 mm therefore comprises four plates 2 which are connected together along their longer sides as will now be described with particular reference to Figs. 6 to 10.

[0038] To enable the plate 2 to be connected to another similar plate 2, it is provided with a plurality of connecting flanges 23 and 24, each or which is disposed substantially vertically and can be bolted to a similar flange 23, 24 of an adjoining plate 2 so that the two flanges lie apposed and in close contact with one another.

[0039] A plurality of first connecting flanges 23 are provided attached to the ends of the strengthening beams 22 for connecting the two opposing sides of the plate 2 to another similar plate 2. The flanges 23 are welded to the exposed ends faces of the beams 22 so that they project outwardly from the plate 2. The projecting portions of the flanges 23 are preferably strengthened by corner-pieces 25 which are welded between each flange 23 and adjacent sides of the beam 22. These projecting portions facilitate the connection of adjacent flanges 23 together by bolts 26, typically seven

bolts 26 being used to connect each pair of flanges 23, as shown in Fig. 10.

[0040] A plurality of second connecting flanges 24 are also provided along at least one of the other two opposing sides of the plate 2 for connecting each of these two opposing sides to another similar plate 2. At least one such flange 24 must be provided intermediate the side of the plate 2 but preferably a plurality are spaced around 2000 mm apart. Hence, a rectangular plate which has a length of 6000 mm will have two such flanges 24 located along at least one of its longer sides, as shown in Fig. 3, to correspond with the positions of the transverse portions of the strips 20 extend crosswise through the core 16.

[0041] Each of the second connecting flanges 24 is secured to the plate 2 and forms part of a hollow box construction 27 set into the reinforced concrete side-pieces 19 bordering the core 16. The core 16 may be recessed to provide enlarged concrete regions which can accommodate the box constructions 27. Each hollow box construction 27 is formed by three vertical plates 28, which have been welded together at right angles and set into the concrete, the flange 24 forming the fourth outward facing side of the box and being similarly welded to other three 28.

[0042] It will be appreciated that when two similar floor plates 2 are located side by side for connection together, the flanges 24 along each side are made to lie apposed and in close contact with one another. The two box constructions 27 therefore also align with one another to from access regions on each side of the apposed flanges 24 to permit bolts 29 to be used to connect the two flanges 24, and therefore the plates 2, firmly together. Typically, four bolts 29 are used, as shown in Fig. 7.

[0043] After connection of the two flanges 24 together, a cover plate 30 can be position over the top of the two aligned box constructions 27 to prevent the ingress of rainwater and to provide a continuous floor surface on the upper surface of the floor construction 1.

[0044] Hence, in use a plurality of floor plates 2 as described above can be transported individually to a prepared site and there assembled to forma floor construction of the required dimensions for the installation in question. Preferably, the site is prepared by the excavation of a level area over which a bed of sand or gravel is laid that can bed down under the weight of each floor plate 2 to provide a solid support therefor. After the location of each plate 2 in position on the bed, its upper face 17 is preferably flush with the surrounding ground surface, as shown in Fig. 2, so that the ground should be excavated to a sufficient depth prior to preparation of the underlying bed. Once each plate 2 has been appropriately positioned on the bed, it can be connected to an adjacent plate 2 as described above by interconnection of the apposed flanges 23 and the apposed flanges 24.

[0045] The floor plates 2 for use in any particular installation may also be customized as required. For example, at predetermined positions on a floor plate 2 where a component is to be anchored, the core 16 can be appropriately recessed and the recess filled with reinforced concrete in which may be set an anchoring means such as plates 5, a receptacle 31 for the mast 3, or brackets or similar (not shown) for the fence posts 10.

[0046] If the floor construction 1 is to be used for supporting an installation powered by electricity, cable ducts 32 can be located running through the interior of the plate 2 through which electrical cables can be run across the plate 2 when in use. If an earthing terminal is to be provided, a shaft 33 can also be provided through the plate 2 with which one or more of the cable ducts 32 in the plate 2 communicates. This enables the electrical cables to be connected to an earthing terminal located within the shaft 33. Such an arrangement is shown in Fig. 1, where three out of the four floor plates 2 are provided with two shafts 33 which communicate one or more of the cable ducts 32 provided in that plate 2.

[0047] The invention therefore provides a strong but relatively lightweight floor plate which can be prefabricated in factory conditions in accordance with the requirements of the installation for which it is to be used. Hence, construction on-site, in less than ideal circumstances is therefore not required. Once manufactured, the floor panel can be laid in position easily and with no little floor construction work being necessary.

Claims

1. A floor plate (2) for use as part of a modular floor construction (1)
characterised in that
it comprises a sandwich construction with a core (16) of a cellular synthetic material located between upper and lower faces (17, 18) of reinforced concrete.

2. A floor plate (2) as claimed in Claim 1,
characterised in that
the core (16) comprises a foamed polystyrene.

3. A floor plate (2) as claimed in Claim 1 or Claim 2,
characterised in that
the upper and lower faces (17, 18) are between 30 mm and 40 mm inclusive in thickness.

4. A floor plate (2) as claimed in any of Claims 1 to 3,
characterised in that
the core (16) is between 220 mm and 240 mm inclusive in thickness.

5. A floor plate (2) as claimed in any of Claims 1 to 3,
characterised in that
the core (16) is bordered by reinforced concrete side-pieces (19) so that it is completely enclosed in concrete.

6. A floor plate (2) as claimed in Claim 5, **characterised in that** the side-pieces (19) are reinforced by steel wires (21).

7. A floor plate (2) as claimed in any of Claims 1 to 5, **characterised in that** it is strengthened by strips of reinforced concrete (20) which extend crosswise through the core (16).

8. A floor plate (2) as claimed in Claim 7, **characterised in that** the strips of concrete (20) are integrally connected to the upper and lower faces (17, 18).

9. A floor plate (2) as claimed in Claim 7 or Claim 8, **characterised in that** the strips of concrete (20) are also reinforced by steel wires (21).

10. A floor plate (2) as claimed in any of Claims 1 to 9, **characterised in that** it is provided with strengthening beams (22) connected thereto along at least two opposing sides.

11. A floor plate (2) as claimed in Claim 10, **characterised in that** the strengthening beams (22) comprise I-beams

12. A floor plate (2) as claimed in Claim 10 or Claim 11, **characterised in that** the strengthening beams are made of steel.

13. A floor plate (2) as claimed in any of Claims 1 to 12, **characterised in that** it is provided with a connecting flange (23, 24) which enables it to be connected to another similar plate (2).

14. A floor plate (2) as claimed in Claim 13, **characterised in that** the connecting flange (23, 24) is disposed substantially vertically.

15. A floor plate (2) as claimed in Claim 13 or Claim 14, **characterised in that** the connecting flange (23, 24) is positioned such that it can be bolted to the connecting flange (23, 24) of another similar plate (2).

16. A floor plate (2) as claimed in any of Claims 13 to 15, **characterised in that** a plurality of first connecting flanges (23) are provided attached to the ends of the strengthening beams (22) for connecting the two opposing sides of the plate (2) to another similar plate (2).

17. A floor plate (2) as claimed in any of Claims 13 to 16, **characterised in that** at least one second connecting flange (24) is provided along at least one of the other two opposing sides of the plate (2) for connecting each of these two opposing sides to another similar plate (2).

18. A floor plate (2) as claimed in Claim 17, **characterised in that** each of the second connecting flanges (24) is secured to the plate formed part of a hollow box construction (27) set into the reinforced concrete side-pieces (19) bordering the core (16).

19. A floor plate (2) as claimed in Claim 17, **characterised in that** each hollow box construction (27) is formed by plates (28) which have been welded together and set into the concrete side-pieces (19).

20. A floor plate (2) as claimed in Claim 18 or Claim 19, **characterised in that** the hollow box construction (27) is provided with a cover plate (30).

21. A floor plate (2) as claimed in any of Claims 1 to 20, **characterised in that** at positions on the floor plate (2) where a component (4, 10) is to be anchored, the core (16) has been is recessed and the recess filled with reinforced concrete in which may be set an anchoring means (5, 31).

22. A floor plate (2) as claimed in any of Claims 1 to 21, **characterised in that** at least one cable duct (32) is located running through the interior of the plate (2) through which electrical cables can be run across the plate (2) when in use.

23. A floor plate (2) as claimed in Claim 22, **characterised in that** a shaft (33) is provided through the plate (2) with which at least one of the cable ducts (32) in the plate (2) communicates to enable electrical cables within the duct (32) to be connected to an earthing terminal located within the shaft (33).

24. A floor construction (1) for a telecommunications transmission/reception station (3-15), an electricity sub-station, or other comparable installation comprising a plurality of interconnected modular floor plates (2) as claimed in any of Claims 1 to 23.

25. A floor construction as claimed in Claim 24, **characterised in that** it is located on a prepared bed made of sand or gravel.

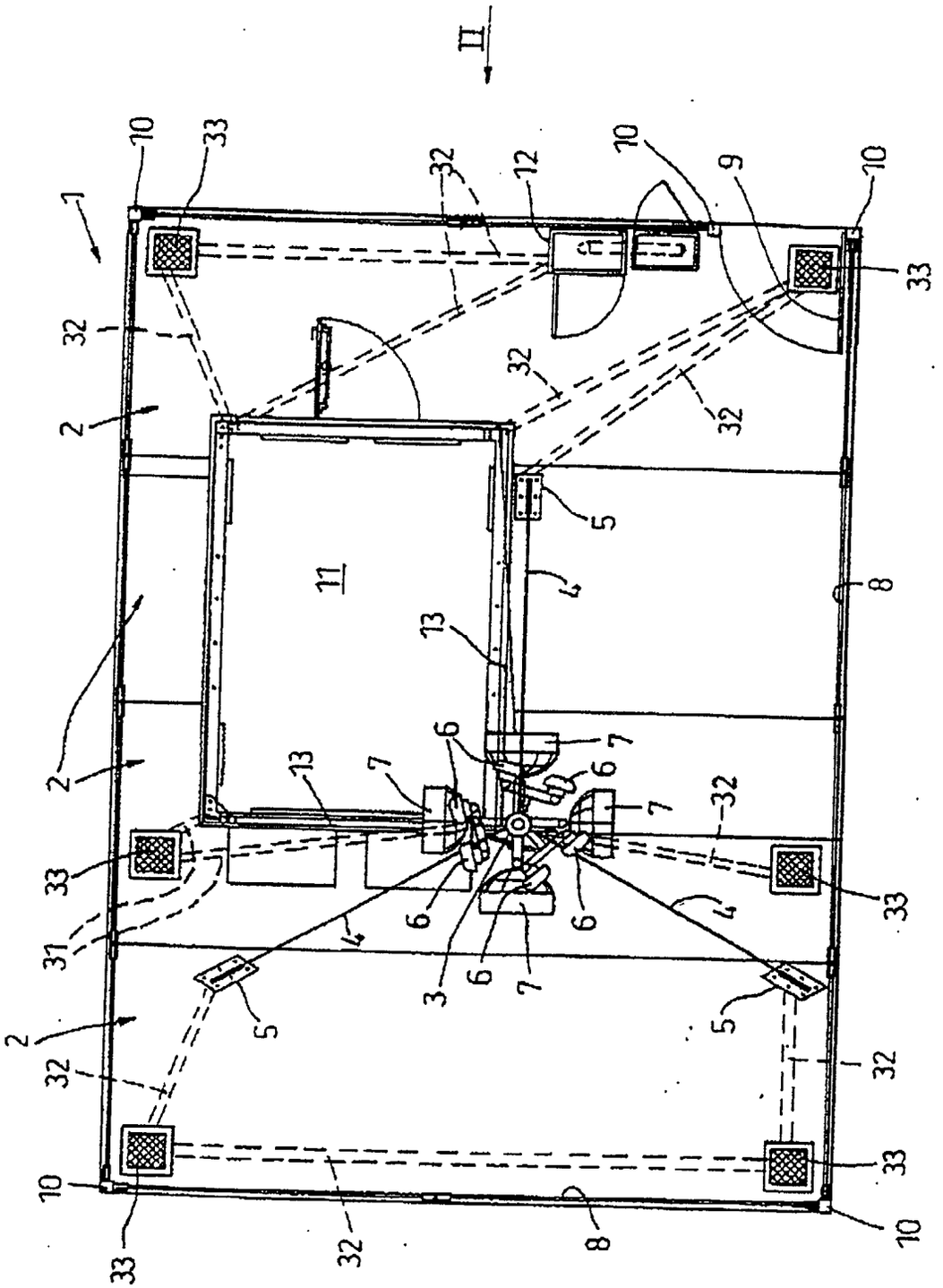

Fig. 1

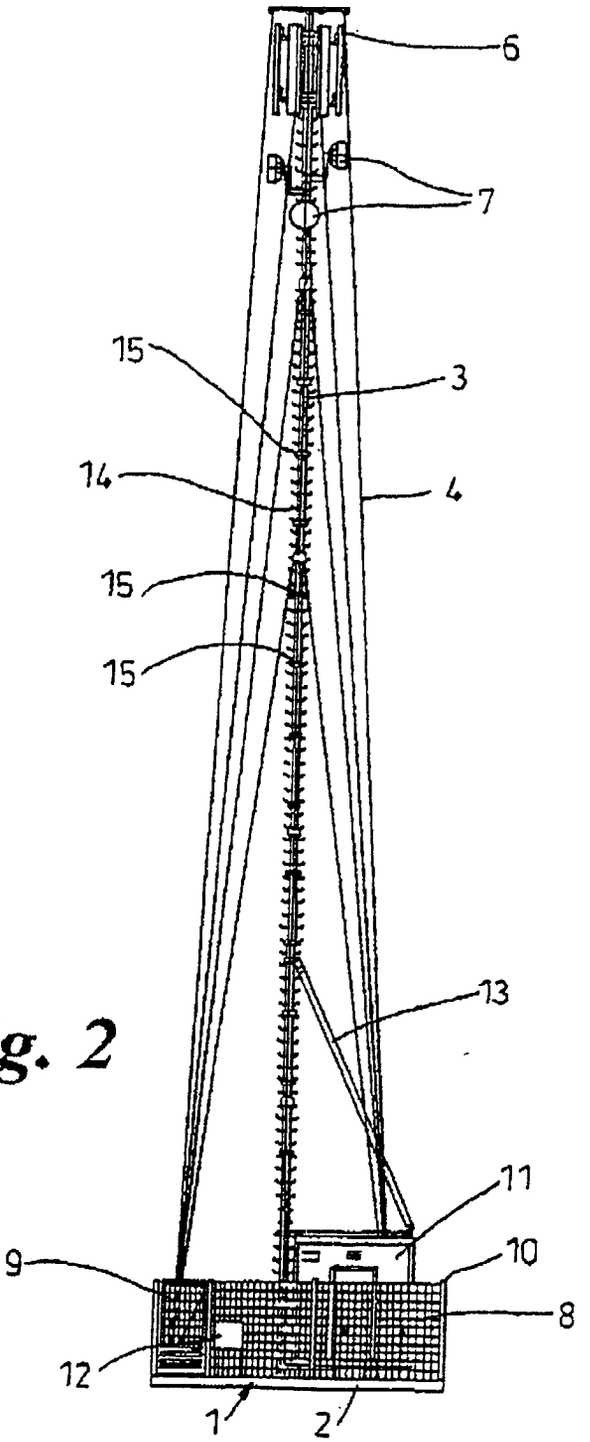

Fig. 2

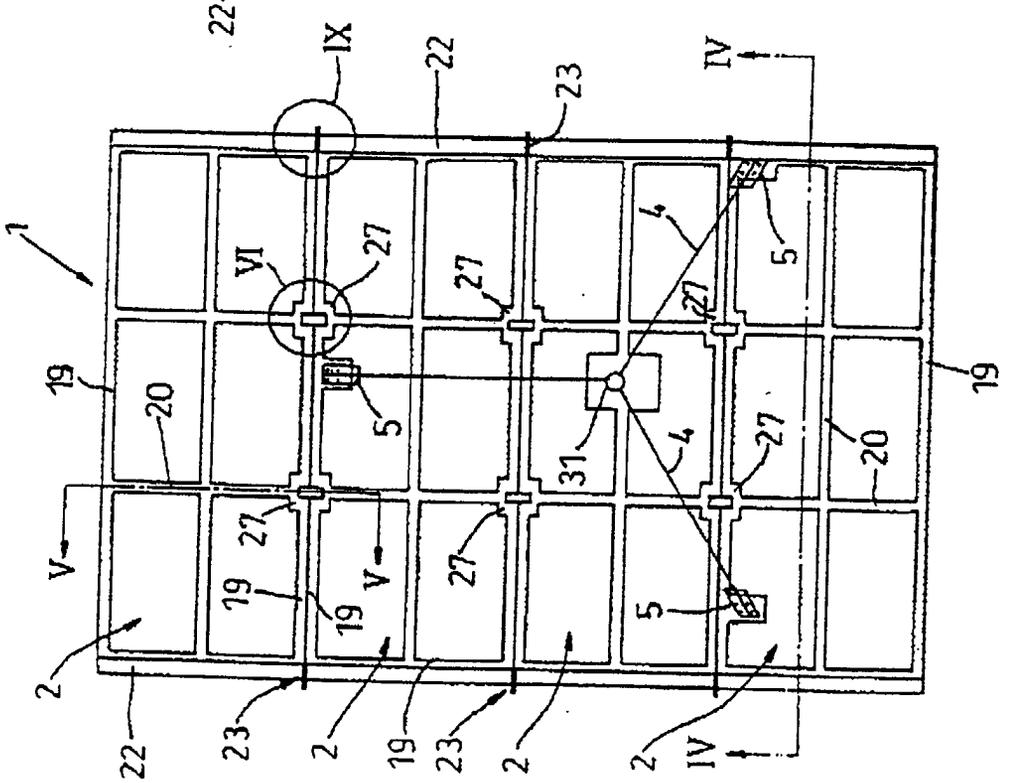

Fig. 3

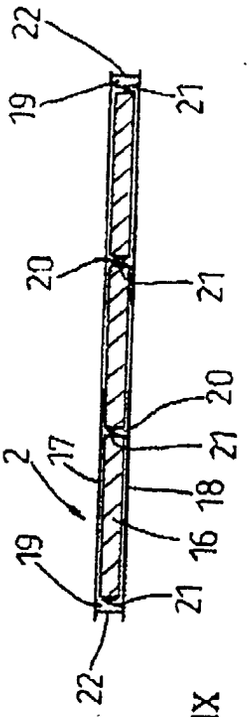

Fig. 4

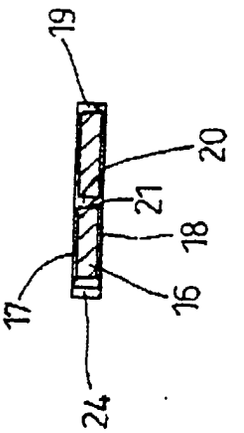

Fig. 5

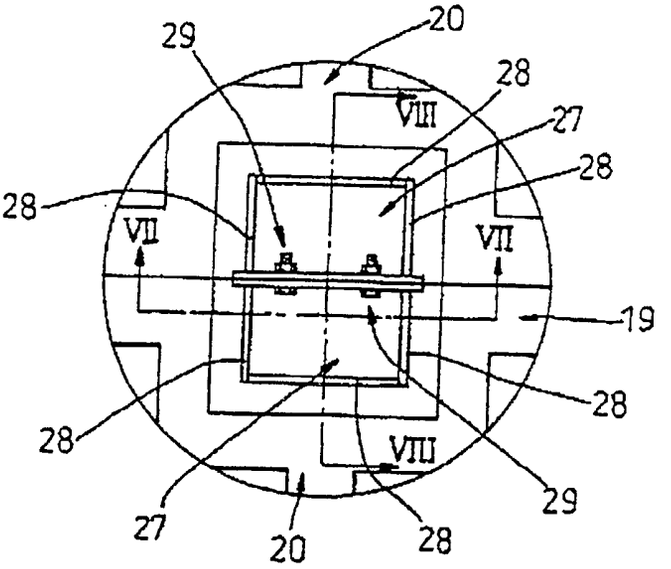

Fig. 6

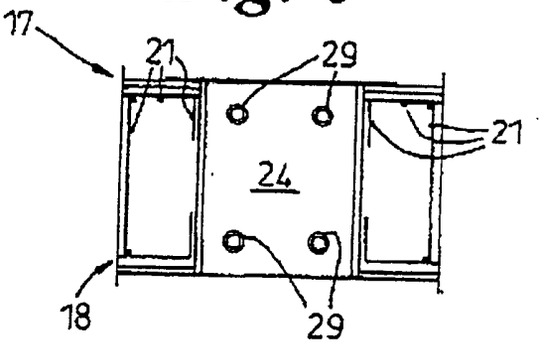

Fig. 7

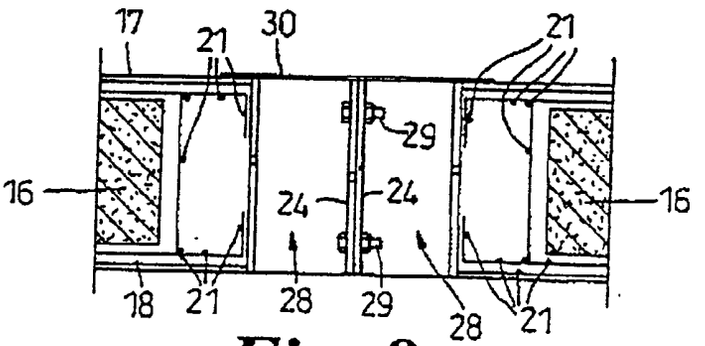

Fig. 8

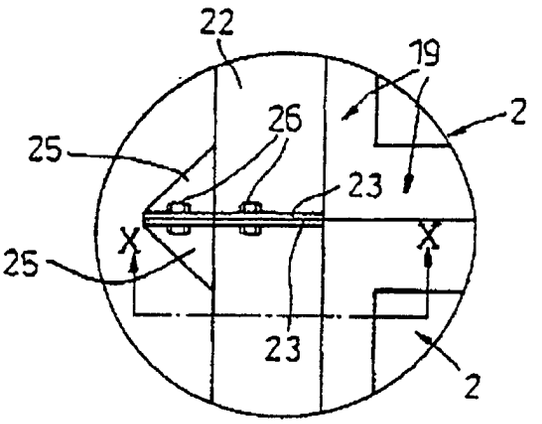

Fig. 9

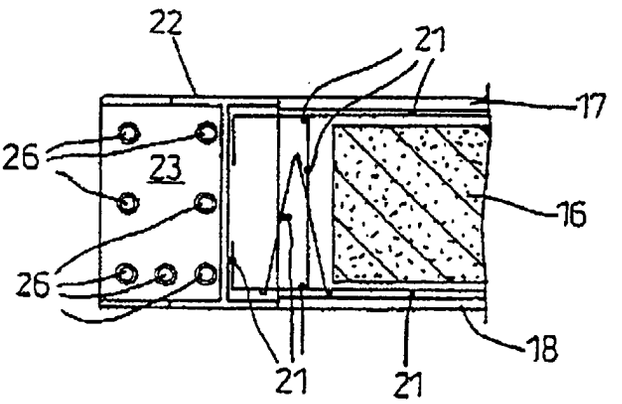

Fig. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 1372

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	6 August 2002	Bouyssy, V

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	6 August 2002	Bouyssy, V

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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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

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 01 1372

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