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(54) **MULTI-PURPOSE PREFABRICATED SLAB**

VORGEFERTIGTE MEHRZWECKPLATTE

PLAQUE PRÉFABRIQUÉE MULTI-USAGE

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Description

[0001] The present invention relates, in general, to a multi-purpose prefabricated slab, called "Eisekofly-Dalle-Beton-Papier". More specifically, it is a prefabricated reinforced concrete (R.C.) or prestressed reinforced concrete (P.C.) slab with special features that allow it to be used in an easy and advantageous manner compared to known precast slabs.

[0002] As is well known, prefabricated two-dimensional structures, known as precast slabs, are usually used to quickly construct slabs.

[0003] Such slabs are disclosed in patent documents, such as: EP 0 857 836 A2, US 6 272 805 B1, CN 1 337 510 A and BE 626 689 A.

[0004] The best known prefabricated slab is the hollow core slab. It is a self-supporting structure, made of concrete with pre-stressed reinforcement made of strands, without shear reinforcement or distribution nets.

[0005] The honeycomb slab usually has a width of 120 cm or less and a height between 12 and 70 cm.

[0006] Holes are cut into the inside of the honeycomb slab to make the structure lighter.

[0007] The honeycomb slab is usually manufactured using an automatic extrusion machine that also creates the lightening holes, the number of which varies depending on the manufacturer and the application requirements.

[0008] The most significant problem with the honeycomb slab is precisely the need to use special machines to make it, which increases its cost and, above all, makes it inflexible in terms of size and shape.

[0009] Another well-known prefabricated slab type is the 'Predalle' slab, which has a width of 250 cm or less and a height of between 15 and 70 cm.

[0010] The 'Predalle' slab is self-supporting and is made of pre-stressed concrete and prestressed reinforcement.

[0011] The 'Predalle' slab has reinforcement made of strands and/or slow reinforcement, nets and stirrups. Lightening is achieved by means of polystyrene shapes.

[0012] The production of the "Predalle" slab takes place in successive steps on a flat bench, working in layers. As a result, it is not possible to cut holes as in the case of the honeycomb slab, but by means of polystyrene shapes that can have various conformations, although the typical one is rectangular in cross-section.

[0013] The biggest problem with the "Predalle" slab is precisely the presence of the polystyrene shapes, which are polluting and not eco-friendly.

[0014] In particular, the 'Predalle' slab cannot be used in all those countries where the use of non-eco-compatible materials is prohibited.

[0015] For example, in France it is forbidden to use slab whose lightening is realised through the use of materials derived from petroleum.

[0016] The purpose of the present invention is to offer a prefabricated slab that is lightened without the aid of

polluting lighteners.

[0017] Another purpose of the invention is to provide a prefabricated slab that is easily fabricated.

[0018] A further purpose of the invention is to provide a prefabricated slab whose mode of construction allows it to be manufactured flexibly, varying in size, shape and characteristics according to the requirements of use.

[0019] These and other purposes are achieved, according to the invention, by a prefabricated slab comprising a concrete structure and reinforcement, according to claim 1.

[0020] In particular, the prefabricated slab comprises within it at least one lightening element made of a material typically chosen from paper or cardboard or both, said element being capable of creating a volume of lower density than the concrete portion within the prefabricated slab.

[0021] In this way, the lightening of the slab according to the invention is achieved without the aid of polystyrene moulds or other petroleum-derived and therefore environmentally unfriendly material.

[0022] Advantageously, the one or more lightening elements can be internally filled, so as to avoid any bending or folding.

[0023] Alternatively, the one or more lightening elements may be internally hollow, so as to further decrease the weight of the slab of the invention.

[0024] Advantageously, one or more lightening elements may have a parallelepiped shape and/or a cylindrical shape depending on the overall volume and dimensions of the prefabricated slab to be lightened.

[0025] This reinforcement usually comprises at least one strand or mesh or both. Furthermore, in order to realise a reinforced structure, the prefabricated slab comprises at least one U-shaped member and may comprise at least one strand and/or at least one mesh.

[0026] The U-shaped element protrudes from the structure, so as to be a useful coupling element for an eventual casting above the prefabricated slab itself.

[0027] The prefabricated slab comprises at least one fastening element useful for lifting the prefabricated slab when it is to be placed in the desired position.

[0028] Further features and details can be better understood from the following description, which is given as a non-limiting example, as well as from the accompanying drawing tables in which

figure 1 is a top view of a prefabricated slab according to the invention;

figure 2 is a side view of the prefabricated slab of figure 1;

figure 3 is a sectional side view of the prefabricated slab according to the sectional plane indicated by A-A in figure 1;

figure 4 is a cross-sectional side view of the prefab-

ricated slab according to the cross-sectional plan indicated with B-B in figure 1

Figure 5 is a top view of a prefabricated slab according to a variant of the invention;

figure 6 is a side view of the prefabricated slab of figure 5;

figure 7 is a sectional side view of the prefabricated slab according to the sectional plane indicated with A-A in figure 5;

Figure 8 is a cross-sectional side view of the prefabricated slab according to the cross-sectional plan indicated with B-B in figure 5.

[0029] With reference to the appended figures, in particular figures 1 to 4, a prefabricated slab according to the invention is referred to as 10 in its entirety.

[0030] The precast slab 10 comprises a concrete structure 12 in the shape of a parallelepiped in which strands are embedded.

[0031] A lower mesh 16 and an upper mesh 18, both made of a metal alloy, are also embedded in the concrete structure 12 so as to make, together with strands, a reinforcement embedded in the concrete structure 12.

[0032] Three parallelepiped lightening elements 20 are included in the concrete structure 12 to lighten the precast slab 10.

[0033] In particular, such parallelepiped elements 20 (of which only one is indicated with reference 20) are made entirely of cardboard; in other words, the volume defined by such parallelepiped elements is entirely occupied by cardboard.

[0034] Alternatively, such parallelepiped elements 20 may be internally hollow, i.e. made with only the perimeter faces of cardboard.

[0035] Furthermore, as illustrated in Figure 4, the prefabricated slab 10 according to the invention also comprises first U-shaped elements 22, which are entirely embedded in the concrete structure 12, and second U-shaped elements 24, which protrude superiorly from the same structure 12.

[0036] Such second U-shaped elements 24 serve to allow for a better coupling with the possible casting arranged above the precast slab 10.

[0037] At the four corners of the structure 12 are arranged fastening elements 26 useful for lifting the prefabricated slab 10 when it is to be arranged in the desired position.

[0038] According to a second variant of the invention illustrated in Figures 5 to 8, a prefabricated slab 110 comprises a parallelepiped-shaped concrete structure 112 in which strands are embedded.

[0039] A lower mesh 116 and an upper mesh 118, both of metal alloy, are also embedded in the concrete structure 112, so as to create, together with the strands, a

reinforcement embedded in the concrete structure 112.

[0040] Included in the concrete structure 112 are six cylindrical lightening elements 120, suitable for lightening the precast slab 110.

5 **[0041]** In particular, such cylindrical elements 120 (of which only one is indicated by reference 120) are made entirely of cardboard; in other words, the volume defined by such parallelepiped elements is entirely occupied by cardboard.

10 **[0042]** Alternatively, such cylindrical elements 120 may be internally hollow, i.e. made with only the perimeter faces of cardboard.

[0043] Furthermore, as illustrated in Figure 8, the prefabricated slab 110 according to the invention also comprises first U-shaped elements 122, entirely embedded in the concrete structure 112, and second U-shaped elements 124, which protrude superiorly from the same structure 112.

[0044] Such second U-shaped elements 124 serve to allow for a better coupling with the possible casting disposed above the precast slab 110.

[0045] Fixing elements 126 are arranged at the four corners of the structure 112, which are useful for lifting the prefabricated slab 110 when it is to be arranged in the desired position.

25 **[0046]** Further variants may also be provided which are to be considered within the scope of the invention.

[0047] For example, the shape of the lightening elements may be other than parallelepiped or cylindrical.

30 **[0048]** In any case, the presence of lightening elements such as parallelepiped elements 20 or cylindrical elements 120 makes it possible to avoid the use of shapes of polystyrene or other petroleum-derived material, while still achieving the desired lightening.

35 **[0049]** Furthermore, the use of such lightening elements allows the prefabricated slab according to the invention to be made without the use of specific machinery. Thus, it is possible to make the prefabricated slab according to the desired shape, size and characteristics, without constraints due to the use of machinery.

40 **[0050]** Additionally, the lightening element realised can comprise a containing structure made of paper and/or cardboard inside which is arranged a honeycomb or lattice structure, also typically made of paper and/or cardboard or another nonpolluting material, with the purpose of lightening the slab, but at the same time giving solidity to the lightening element itself.

[0051] Alternatively, the honeycomb or lattice structure can be filled with lightening material with a lower density than concrete.

Claims

- 55 1. Prefabricated slab (10; 110) comprising a structure (12; 112) made of concrete and a reinforcement (16, 18, 22, 24; 116, 118, 122, 124), wherein it includes

within it at least one lightening element (20; 120) made of paper and/or cardboard suitable for creating a volume of lower density than the structure (12; 112) made of concrete, within the prefabricated slab;

wherein the at least one lightening element (20; 120) is internally filled; and/or wherein the at least one lightening element (20; 120) is internally hollow; **characterized by the fact that**

the reinforcement includes at least one U-shaped member (22, 24; 122, 124); the at least one U-shaped member (24, 124) protrudes from the structure (12; 112); the prefabricated slab includes at least one fastener (26, 126) useful for lifting the prefabricated floor (10; 110) when it is to be arranged in the desired position.

2. Prefabricated slab (10) according to the preceding claim, wherein a paper and/or cardboard containing structure is comprised, inside which a honeycomb or mesh structure, also made of paper and/or cardboard or other material, is arranged.
3. Prefabricated slab (110) according to claim 1, wherein a paper and/or cardboard containing structure, filled with a lightening material with a lower density than concrete, is comprised.
4. Prefabricated slab (110) according to one of the preceding claims, wherein the at least one lightening element (20) has a parallelepiped shape.
5. Prefabricated slab (110) according to any one of claims 1 to 4, wherein the at least one lightening element (20) has a cylindrical shape.
6. Prefabricated floor slab (10; 110) according to any one of the preceding claims, wherein the reinforcement comprises at least one strand or at least a wire mesh (16, 18; 116, 118) or both.

Patentansprüche

1. Vorgefertigte Platte (10; 110), die eine Struktur (12; 112) aus Beton und eine Bewehrung (16, 18, 22, 24; 116, 118, 122, 124), wobei sie in sich mindestens ein aus Papier und/oder Pappe hergestelltes Leichtbauelement (20; 120) enthält, das geeignet ist, innerhalb der vorgefertigten Platte ein Volumen mit geringerer Dichte als die Struktur (12; 112) aus Beton zu erzeugen;

wobei das mindestens eine Leichtbauelement (20; 120) innen gefüllt ist; und/oder wobei das mindestens eine Leichtbauelement (20; 120) innen hohl ist; **gekennzeichnet durch die Tatsache, dass**

die Bewehrung mindestens ein U-förmiges Element (22, 24, 122, 124) umfasst; das mindestens eine U-förmige Element (24, 124) aus der Struktur (12; 112); die vorgefertigte Platte umfasst mindestens ein Befestigungselement (26, 126), das zum Anheben der vorgefertigten Platte (10; 110) nützlich ist, wenn diese in der gewünschten Position angeordnet werden soll.

2. Vorgefertigte Platte (10) gemäß dem vorhergehenden Anspruch, wobei sie eine Struktur umfasst, die Papier und/oder Pappe enthält, in deren Inneren eine Waben- oder Gitterstruktur, die ebenfalls aus Papier und/oder Pappe oder einem anderen Material besteht, angeordnet ist.
3. Vorgefertigte Platte (110) gemäß Anspruch 1, wobei sie eine Struktur umfasst, die Papier und/oder Pappe enthält und mit einem Leichtbaumaterial mit einer geringeren Dichte als Beton gefüllt ist.
4. Vorgefertigte Platte (110) gemäß einem der vorhergehenden Ansprüche, wobei das mindestens eine Leichtbauelement (20) eine Parallelepipedform aufweist.
5. Vorgefertigte Platte (110) gemäß einem der Ansprüche 1 bis 4, wobei das mindestens eine Leichtbauelement (20) eine zylindrische Form aufweist.
6. Vorgefertigte Bodenplatte (10; 110) gemäß einem der vorstehenden Ansprüche, wobei die Bewehrung mindestens einen Strang oder mindestens ein Drahtgeflecht (16, 18; 116, 118) oder beides umfasst.

Revendications

1. Dalle préfabriquée (10; 110) comprenant une structure (12; 112) en béton et une armature (16, 18, 22, 24; 116, 118, 122, 124), dans laquelle elle inclut au moins un élément d'allègement (20; 120) en papier et/ou en carton apte à créer un volume de densité inférieure à celle de la structure (12; 112) en béton, à l'intérieur de la dalle préfabriquée;

dans lequel l'au moins un élément d'allègement (20; 120) est rempli à l'intérieur; et/ou dans lequel au moins un élément d'allègement (20; 120) est creux à l'intérieur; **caractérisé par le fait que**

l'armature comprend au moins un élément en forme de U (22, 24, 122, 124); l'élément en forme de U (24, 124) fait saillie par rapport à la structure (12; 112); la dalle préfabriquée comprend au moins un élément de fixation (26, 126) utile pour soulever le plancher préfab-

briqué (10; 110) lorsqu'il doit être disposé dans la position souhaitée.

2. Dalle préfabriquée (10) selon la revendication précédente, dans laquelle est comprise une structure contenant du papier et/ou du carton, à l'intérieur de laquelle est disposée une structure en nid d'abeille ou en treillis, également en papier et/ou en carton ou en un autre matériau. 5
- 10
3. Dalle préfabriquée (110) selon la revendication 1, dans laquelle une structure contenant du papier et/ou du carton, remplie d'un matériau d'allègement d'une densité inférieure à celle du béton, est comprise. 15
4. Dalle préfabriquée (110) selon l'une des revendications précédentes, dans laquelle le au moins un élément d'allègement (20) a une forme parallélépipédique. 20
5. Dalle préfabriquée (110) selon l'une des revendications 1 à 4, dans laquelle le au moins un élément éclairant (20) a une forme cylindrique. 25
6. Dalle préfabriquée (10; 110) selon l'une quelconque des revendications précédentes, dans laquelle l'armature comprend au moins un toron ou au moins un treillis métallique (16, 18; 116, 118) ou les deux. 30

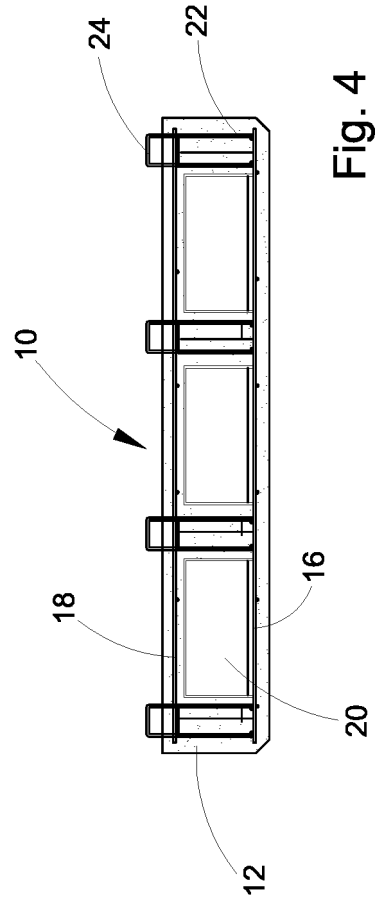
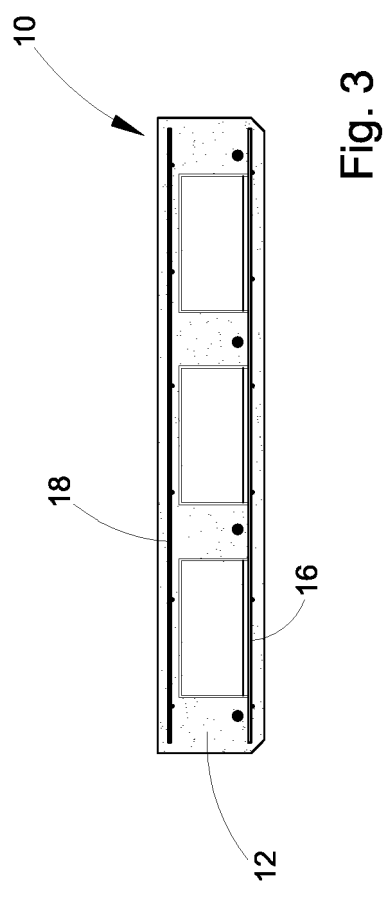
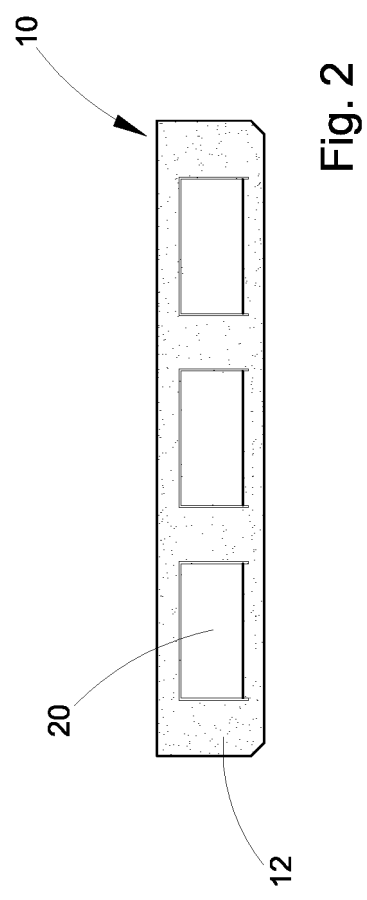
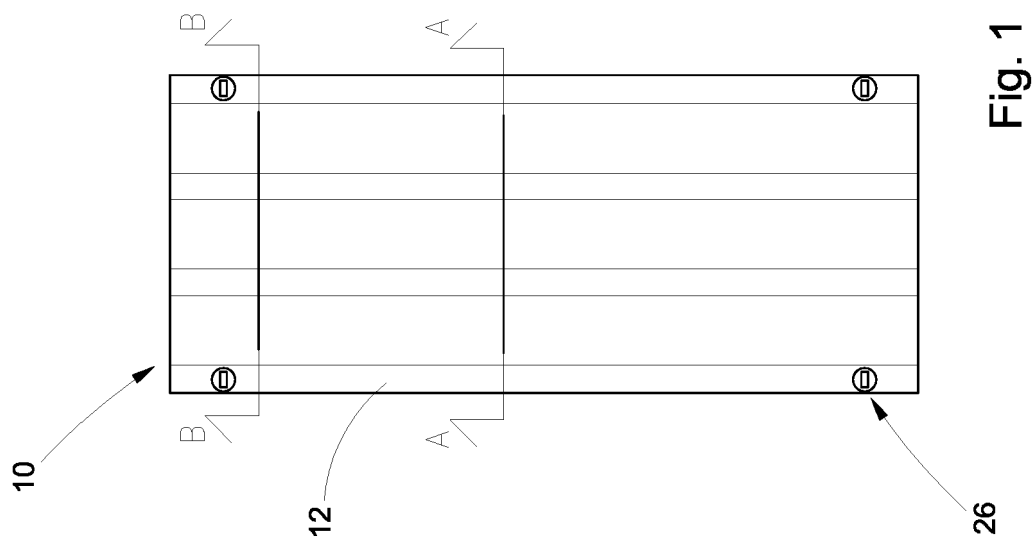
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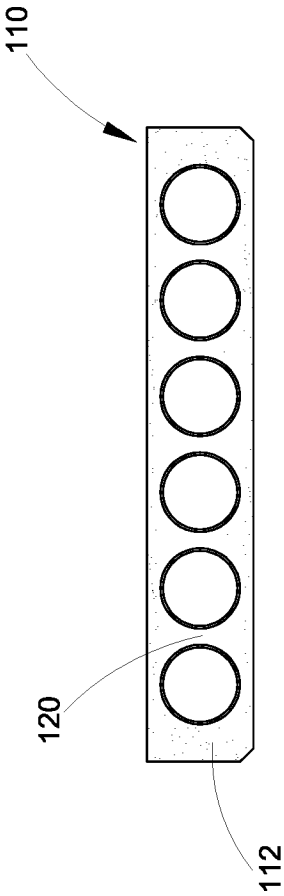


Fig. 6

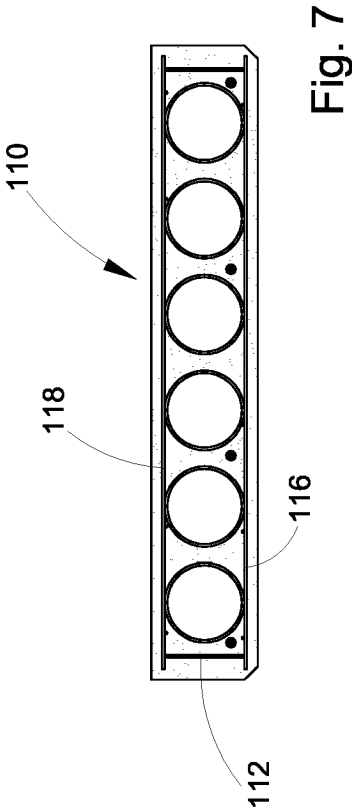


Fig. 7

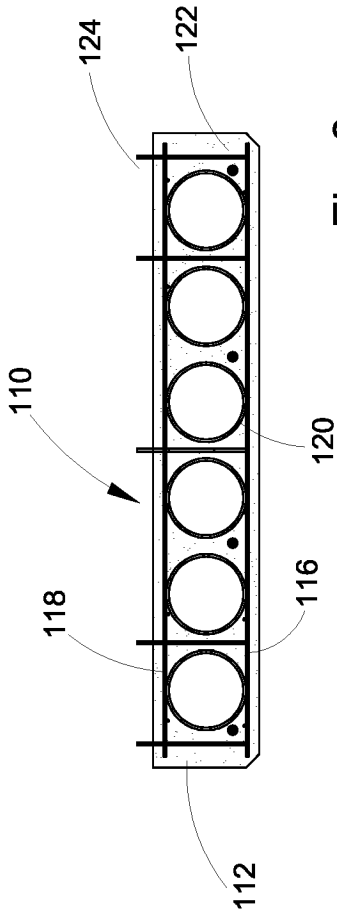


Fig. 8

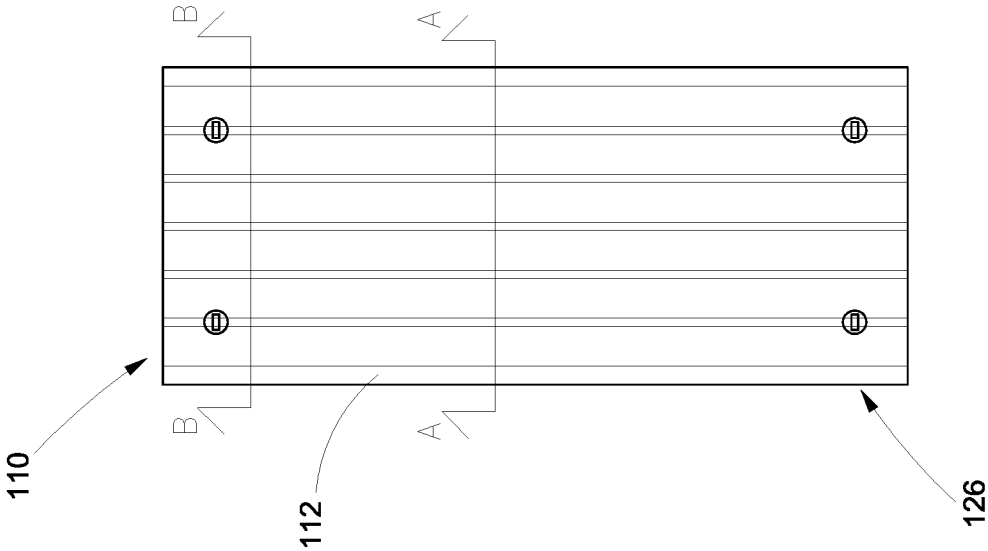


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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