



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 614 823 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.01.2006 Bulletin 2006/02

(51) Int Cl.:
E04B 5/21 (2006.01)

(21) Application number: **05425198.8**

(22) Date of filing: **06.04.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

(30) Priority: **09.07.2004 IT RM20040340**

(71) Applicant: **Sicilferro Torrenovese S.r.L.**
98070 Torrenova (ME) (IT)

(72) Inventors:
• **Cancelliere, Nicolo**
Sicilferro Torrenovese S.r.l.
98070 Torrenova (ME) (IT)
• **Scurria, Rosario**
98070 Torrenova (ME) (IT)

(74) Representative: **Iannone, Carlo Luigi et al**
Ing. Barzanò & Zanardo Roma S.p.A.
Via Piemonte, 26
00187 Roma (IT)

(54) **Reinforcement form, in particular for making cross-ribbed reinforcement floors, and related floor**

(57) The present invention concerns a reinforcement form, in particular for making crisscross reinforcement floors, comprising a base slab (1) reinforced by one or more shaped perforated metallic guide beams (5), onto which one or more polyhedral blocks (2) are integrally

coupled, the form being characterised in that said one or more polyhedral blocks (2) are spaced from each other so as to let an array of passages (3, 4) free.

The present invention further concerns a crisscross reinforcement floor built through such reinforcement form.

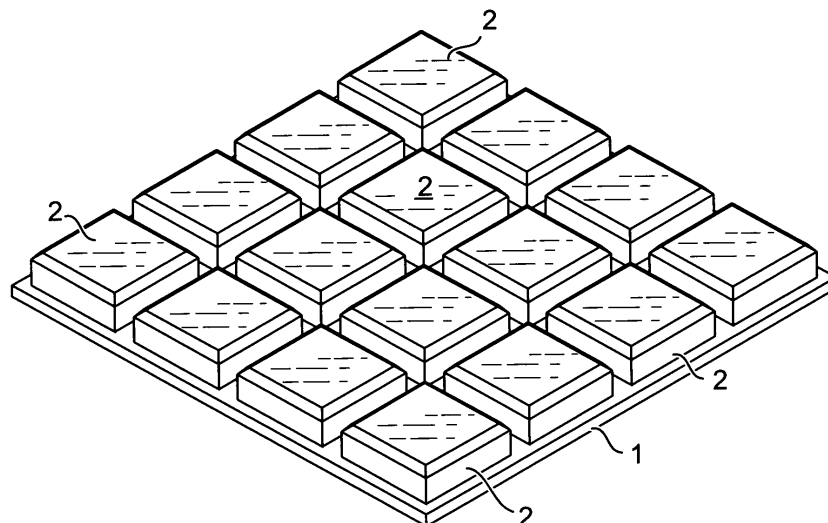


Fig. 1

EP 1 614 823 A2

Description

[0001] The present invention concerns a reinforcement form, in particular for making crisscross reinforcement floors, as well as for making walls or other manufactured articles for erecting buildings, that allows large spans to be covered with very reduced thicknesses and with not much considerable deflections (i.e. displacements orthogonal to the form plane with respect to the undeformed static configuration, due to the loads acting thereon), and that is simple to apply, efficient, light, reliable and inexpensive.

[0002] The present invention concerns a crisscross reinforcement floor built through such form.

[0003] It is known that for erecting buildings it is necessary to make floors apt to sustain even significant loads.

[0004] To this end, wood and masonry floors according to traditional techniques are replaced, most of all in case of large-size buildings wherein loads acting on the floors may be very heavy, with floors provided with concrete, such as floors made of concrete and tile or concrete and wood, and floors made of reinforced concrete.

[0005] However, such floors also present some drawbacks.

[0006] First of all, they are extremely heavy, being consequently difficult to apply and requiring sustaining structures of adequate size, being hence bulky and expensive and which reduce spans which may be covered without pillars.

[0007] Moreover, reinforced concrete floors presently available on the market are provided with reinforcing rods arranged in parallel to a sole direction. This makes structures constituting the floor, such as reinforcement forms, particularly complex, in the sense that their thickness has to be high and the reinforcing rods have to be considerable, being in any case not capable to exceed a rather limited maximum threshold for the spans which may be covered without pillars.

[0008] In this context, it is included the solution proposed according to the present invention, allowing all the aforementioned drawbacks to be solved.

[0009] It is therefore an object of the present invention to provide a structure, in particular, for making floors, as well as for making walls or other manufactured articles for erecting buildings, that allows large spans to be covered with very reduced thicknesses and with not much significant deflections (i.e. displacements orthogonal to the form plane with respect to the undeformed static configuration, due to the loads acting thereon), and that is efficient, light, and reliable.

[0010] It is a further object of the present invention to provide such a structure that is simple and inexpensive to make and to install.

[0011] It is therefore specific subject matter of the present invention a reinforcement form, in particular for making crisscross reinforcement floors, comprising a base slab reinforced by one or more shaped perforated

metallic guide beams, onto which one or more polyhedral blocks are integrally coupled, the form being characterised in that said one or more polyhedral blocks are spaced from each other so as to let an array of passages free.

[0012] Always according to the invention, said array may have a configuration of orthogonal passages.

[0013] Still according to the invention, said one or more polyhedral blocks may be substantially identical to each other.

[0014] Furthermore according to the invention, at least one of said one or more polyhedral blocks may substantially have a regular polygon as base.

[0015] Always according to the invention, at least one of said one or more polyhedral blocks may substantially have a rectangle as base.

[0016] Still according to the invention, at least one of said one or more polyhedral blocks may substantially have a square as base.

[0017] Furthermore according to the invention, said one or more shaped perforated metallic guide beams may be identical to each other.

[0018] Always according to the invention, at least one of said one or more shaped perforated metallic guide beams may have profile at least partially "C"-shaped.

[0019] Still according to the invention, at least one of said one or more shaped perforated metallic guide beams may have profile at least partially "Z"-shaped.

[0020] Furthermore according to the invention, at least one of said one or more shaped perforated metallic guide beams may be partially projecting from the base slab (1).

[0021] Always according to the invention, at least one of said one or more shaped perforated metallic guide beams may comprise at least one upper wing projecting from the base slab, so that at least one of said one or more polyhedral blocks is apt to be hitched to said at least one upper wing.

[0022] Still according to the invention, at least one of said one or more shaped perforated metallic guide beams may comprise at least one upper wing having profile at least partially "Ω"-shaped.

[0023] Furthermore according to the invention, at least one of said one or more shaped perforated metallic guide beams may be shaped according to a profile comprising at least one duct.

[0024] Always according to the invention, the base slab may be made of extruded polystyrene and/or wood and/or metal.

[0025] Still according to the invention, each one of said one or more polyhedral blocks may be made of extruded polystyrene and/or wood and/or metal.

[0026] Furthermore according to the invention, the base slab and said one or more polyhedral blocks may be made of the same material.

[0027] Always according to the invention, at least one of said one or more shaped perforated metallic guide beams may be zinc plated.

[0028] It is further specific subject matter of the present

invention a reinforced floor comprising a reinforced concrete cap, including one or more reinforcing rods, characterised in that it is a crisscross reinforcement floor and it comprises a reinforcement form as previously described, in the array of passages of which said one or more reinforcing rods are placed, the reinforced concrete cap at least partially incorporating said one or more polyhedral blocks and being integrally coupled to the base slab.

[0029] Always according to the invention, the portion of said at least one shaped perforated metallic guide beam possibly projecting from the base slab may be apt to operate as reinforcing rod cover for correctly positioning at least one portion of said one or more reinforcing rods.

[0030] Still according to the invention, at least one of said one or more reinforcing rods may be housed in said at least one possible duct of the profile of said at least one shaped perforated metallic guide beam.

[0031] Furthermore according to the invention, the portion of said at least one shaped perforated metallic guide beam possibly projecting from the base slab may comprise at least one hole apt to operate as guide for correctly positioning at least one portion of said one or more reinforcing rods.

[0032] The present invention will now be described, by way of illustration and not by way of limitation, according to its preferred embodiment, by particularly referring to the Figures of the enclosed drawings, in which:

Figure 1 shows a perspective view of a part of a preferred embodiment of the reinforcement form according to the invention;

Figure 2 shows a top plan view of the part of the reinforcement form of Figure 1;

Figure 3 shows a perspective view, including hidden elements, of the reinforcement form of Figure 1;

Figure 4 shows a perspective view, including hidden elements, of a detail of Figure 3;

Figure 5a shows a shaped perforated metallic guide beam of the reinforcement form of Figure 3;

Figure 5b shows the profile of the shaped perforated metallic guide beam of Figure 5a;

Figure 6 shows a perspective view, including hidden elements, of a preferred embodiment of the reinforced floor according to the invention;

Figure 7 shows a top plan view of the reinforced floor of Figure 6; and

Figure 8 shows section A-A of the reinforced floor of Figure 7.

[0033] In the Figures, alike elements are indicated by the same reference numbers.

[0034] With reference to Figures 1 and 2, it may be observed that the reinforcement form according to the invention comprises a base slab 1 onto which a plurality of blocks 2, having preferably square base, is integrally coupled, which are spaced from each other so as to let

an array of passages 3 and 4 free, orthogonal to each other, wherein the reinforcement section of a reinforced concrete floor, built with the reinforcement form, as it will be better illustrated in the following, is housed.

[0035] Preferably, the base slab 1 and the blocks 2 may be made of extruded polystyrene and/or wood and/or metal. Still more preferably, the base slab 1 and the blocks 2 are made of the same material.

[0036] With reference to Figure 3 and, in greater detail, to Figure 4, it may be observed that the base slab 1 is reinforced by a plurality of shaped perforated metallic, preferably zinc plated, guide beams 5. As shown in greater detail in Figure 5a (wherein the holes of the guide beam 5 are not shown), such metallic guide beams 5 are preferably "C"-shaped with preferably "Ω"-shaped upper wing 6, as shown by the profile of Figure 5b. As shown in Figure 4, the upper wing 6 projects from the base slab 1 so that a block 1 may be hitched to it.

[0037] As said, the shaped guide beams 5 are preferably perforated, so as to lighten the weight of the form and to better anchor them to the base slab 1.

[0038] As said, the reinforcement form according to the invention may be used for making crisscross reinforcement floors.

[0039] In particular, the upper wing 6 of the shaped perforated guide beams 5 that projects from the base slab 1 in correspondence with passages 3 and 4 may be used as reinforcing rod cover for correctly positioning the reinforcing rods along two directions orthogonal to each other, parallel to the passages 3 and 4 of the mentioned array.

[0040] In particular, with reference to Figures 6-8 (wherein the shaped perforated guide beams 5 are not shown), it may be observed that:

- along each passage, 3 or 4, four reinforcing rods are preferably positioned, respectively 7 or 8 (of which two reinforcing lower rods 8 are laid on the shaped perforated guide beams 5, used as reinforcing rod covers); and
- three reinforcing rods 9 parallel to the passages 3 and three reinforcing rods 10 parallel to the passages 4 are preferably positioned over each square block 2, reinforcing rods 9 and 10 preferably having diameter lower than that of reinforcing rods 7 and 8.

[0041] As better shown in Figure 8 (showing section A-A of Figure 7), the reinforced floor is completed by a concrete cap 11, that is reinforced by reinforcing rods 7, 8, 9, and 10, which incorporates blocks 2 and is integrally coupled to the base slab 1.

[0042] It is evident to those skilled in the art that the number and diameter of the reinforcing rods placed within the reinforced floor of Figures 6-8 may change, depending on the span to cover and on the load to sustain.

[0043] Other embodiments of the reinforcement form according to the invention may comprise perforated guide beams shaped according a profile different from

that shown in Figure 5b, e.g. a "Z"-profile, possibly combined with a "C"-profile. In particular, some embodiments may comprise perforated guide beams having a profile comprising at least one duct within which a respective reinforcing rod may be housed (parallel to the passages 4, according to the configuration of Figures 2 and 3).

[0044] Furthermore, other embodiments may also comprise perforated guide beams emerging from the base slab 1 by such an height to leave a higher profile portion uncovered along the passages 3 orthogonal to the same guide beams. In this case, some holes of the guide beams may be used as guides for the reinforcing rods 7 placed along the same passages 3.

[0045] Shapes and size of the various component elements of the reinforcement form and of the related reinforced floor (such as the slab 1, the blocks 2, the array passages 3 and 4, the metallic guide beams 5, and the reinforcing rods 7, 8, 9, and 10) are variable depending on the needs of load and overload of the structures to make.

[0046] The advantages offered by the reinforcement form and by the reinforced floor according to the invention are considerable.

[0047] First of all, the metallic guide beams 5 with which the form is reinforced ensures that it is self-supporting.

[0048] Moreover, the reinforcement form and the related reinforced floor, conceived as a reticle of reinforced concrete structures, allow large spans to be covered with very reduced thicknesses and with not much considerable deflections.

[0049] Furthermore, the reinforcement form allows building related reinforced floors reducing or eliminating assembling problems during the phase of installation, such as size and complexity of steel structures, propping, and shaping reinforced concrete structures.

[0050] The present invention has been described, by way of illustration and not by way of limitation, according to its preferred embodiment, but it should be understood that those skilled in the art can make variations and/or changes, without so departing from the related scope of protection, as defined by the enclosed claims.

Claims

1. Reinforcement form, in particular for making criss-cross reinforcement floors, comprising a base slab (1) reinforced by one or more shaped perforated metallic guide beams (5), onto which one or more polyhedral blocks (2) are integrally coupled, the form being **characterised in that** said one or more polyhedral blocks (2) are spaced from each other so as to let an array of passages (3, 4) free.
2. Form according to claim 1, **characterised in that** said array has a configuration of orthogonal passages (3, 4).

3. Form according to claim 1 or 2, **characterised in that** said one or more polyhedral blocks (2) are substantially identical to each other.
4. Form according to any one of the preceding claims, **characterised in that** at least one of said one or more polyhedral blocks (2) substantially has a regular polygon as base.
5. Form according to any one of claims 1-4, **characterised in that** at least one of said one or more polyhedral blocks (2) substantially has a rectangle as base.
6. Form according to claim 4, **characterised in that** at least one of said one or more polyhedral blocks (2) substantially has a square as base.
7. Form according to any one of the preceding claims, **characterised in that** said one or more shaped perforated metallic guide beams (5) are identical to each other.
8. Form according to any one of the preceding claims, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) has profile at least partially "C"-shaped.
9. Form according to any one of the preceding claims, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) has profile at least partially "Z"-shaped.
10. Form according to any one of the preceding claims, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) is partially projecting from the base slab (1).
11. Form according to claim 10, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) comprises at least one upper wing (6) projecting from the base slab (1), so that at least one of said one or more polyhedral blocks (2) is apt to be hitched to said at least one upper wing (6).
12. Form according to claim 11, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) comprises at least one upper wing (6) having profile at least partially "Ω"-shaped.
13. Form according to any one of claims 10 to 12, **characterised in that** at least one of said one or more shaped perforated metallic guide beams (5) is shaped according to a profile comprising at least one duct.

14. Form according to any one of the preceding claims,
characterised in that the base slab (1) is made of
extruded polystyrene and/or wood and/or metal.
15. Form according to any one of the preceding claims, 5
characterised in that each one of said one or more
polyhedral blocks (2) is made of extruded polysty-
rene and/or wood and/or metal.
16. Form according to any one of the preceding claims, 10
characterised in that the base slab (1) and said
one or more polyhedral blocks (2) are made of the
same material.
17. Form according to any one of the preceding claims, 15
characterised in that at least one of said one or
more shaped perforated metallic guide beams (5) is
zinc plated.
18. Reinforced floor, comprising a reinforced concrete 20
cap (11), including one or more reinforcing rods (7,
8, 9, 10), **characterised in that** it is a crisscross
reinforcement floor and it comprises a reinforcement
form according to any one of the preceding claims
1-17, in the array of passages (3, 4) of which said 25
one or more reinforcing rods (7, 8, 9, 10) are placed,
the reinforced concrete cap (11) at least partially in-
corporating said one or more polyhedral blocks (2)
and being integrally coupled to the base slab (1).
30
19. Reinforced floor according to claim 18, **character-**
ised in that said reinforcement form is that accord-
ing to any one of claims 9-12, and **in that** the portion
of said at least one shaped perforated metallic guide
beam (5) projecting from the base slab (1) is apt to 35
operate as reinforcing rod cover for correctly posi-
tioning at least one portion of said one or more rein-
forcing rods (7, 8, 9, 10).
20. Reinforced floor according to claim 19, **character-**
ised in that said reinforcement form is that accord-
ing to claim 12, and **in that** at least one of said one
or more reinforcing rods (7, 8, 9, 10) is housed in
said at least one duct of the profile of said at least
one shaped perforated metallic guide beam (5). 40
45
21. Reinforced floor according to claim 19 or 20, **char-**
acterised in that the portion of said at least one
shaped perforated metallic guide beam (5) project-
ing from the base slab (1) comprises at least one 50
hole apt to operate as guide for correctly positioning
at least one portion of said one or more reinforcing
rods (7, 8, 9, 10).

55

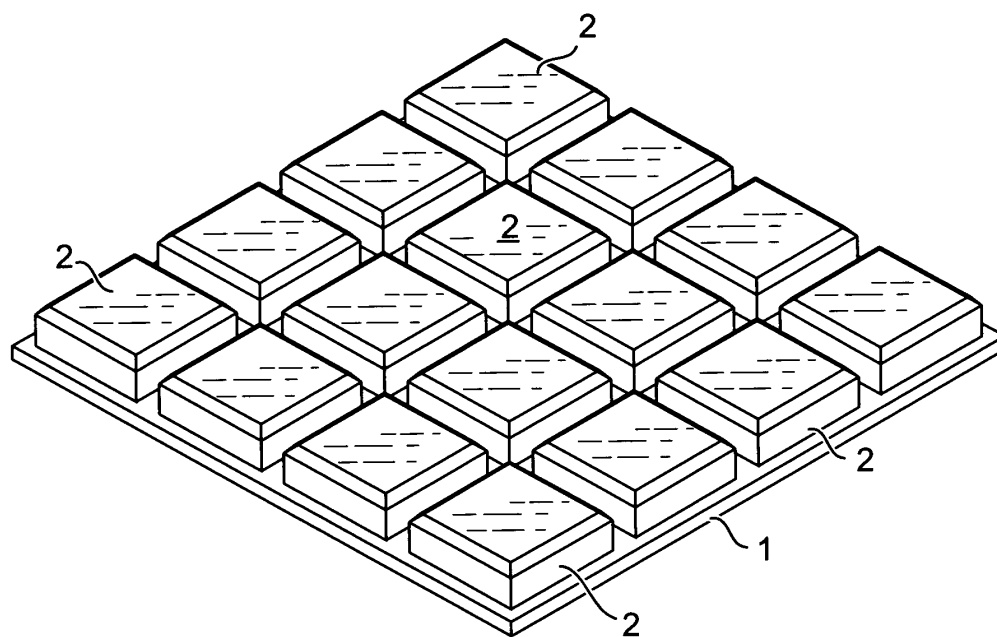


Fig. 1

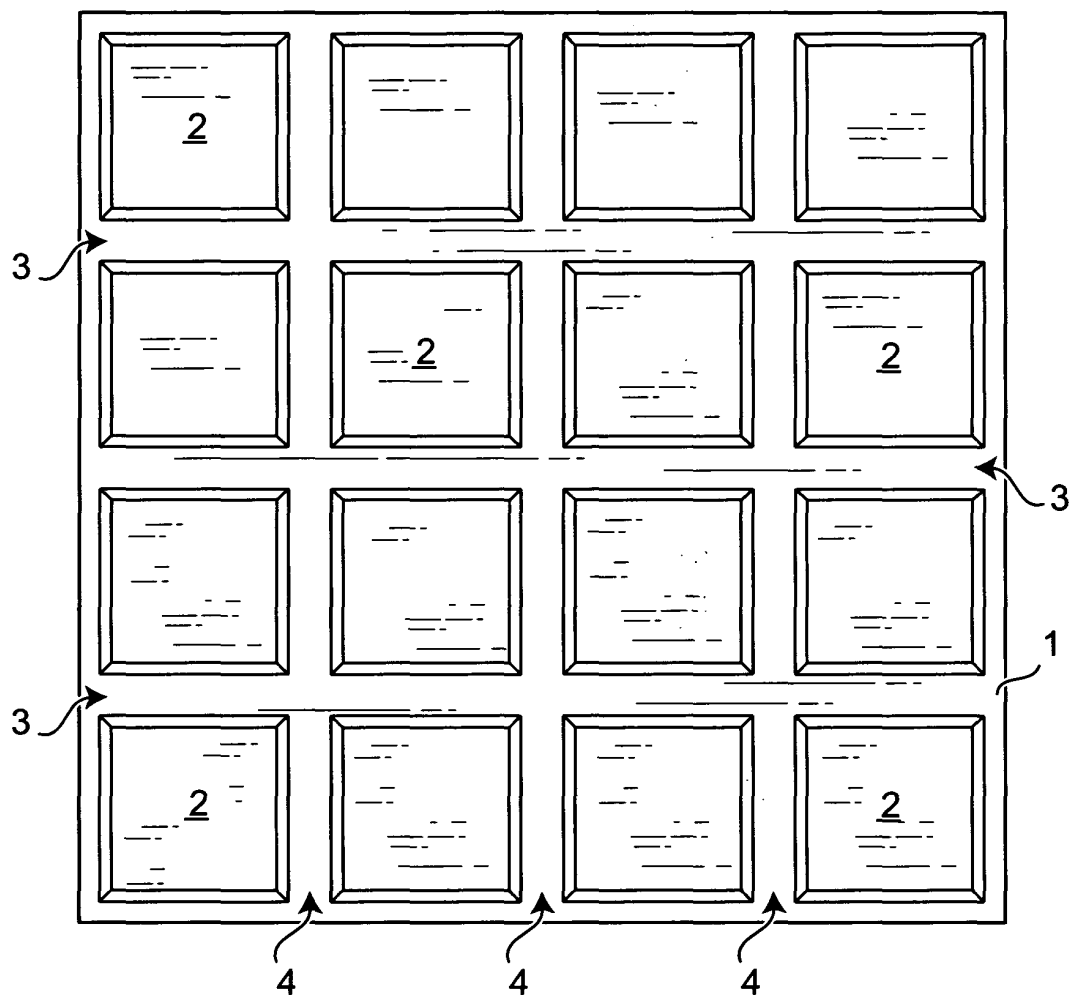


Fig. 2

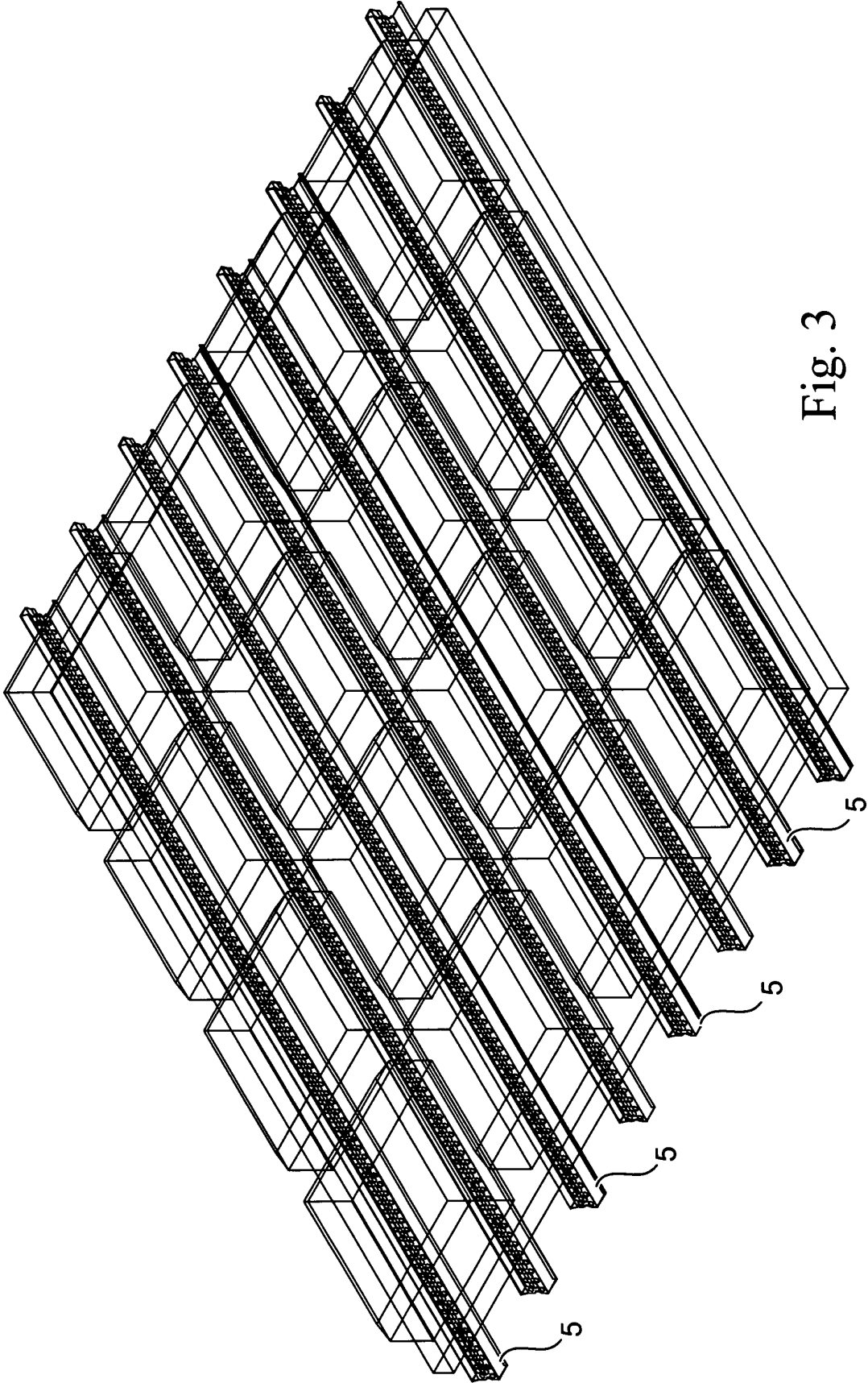


Fig. 3

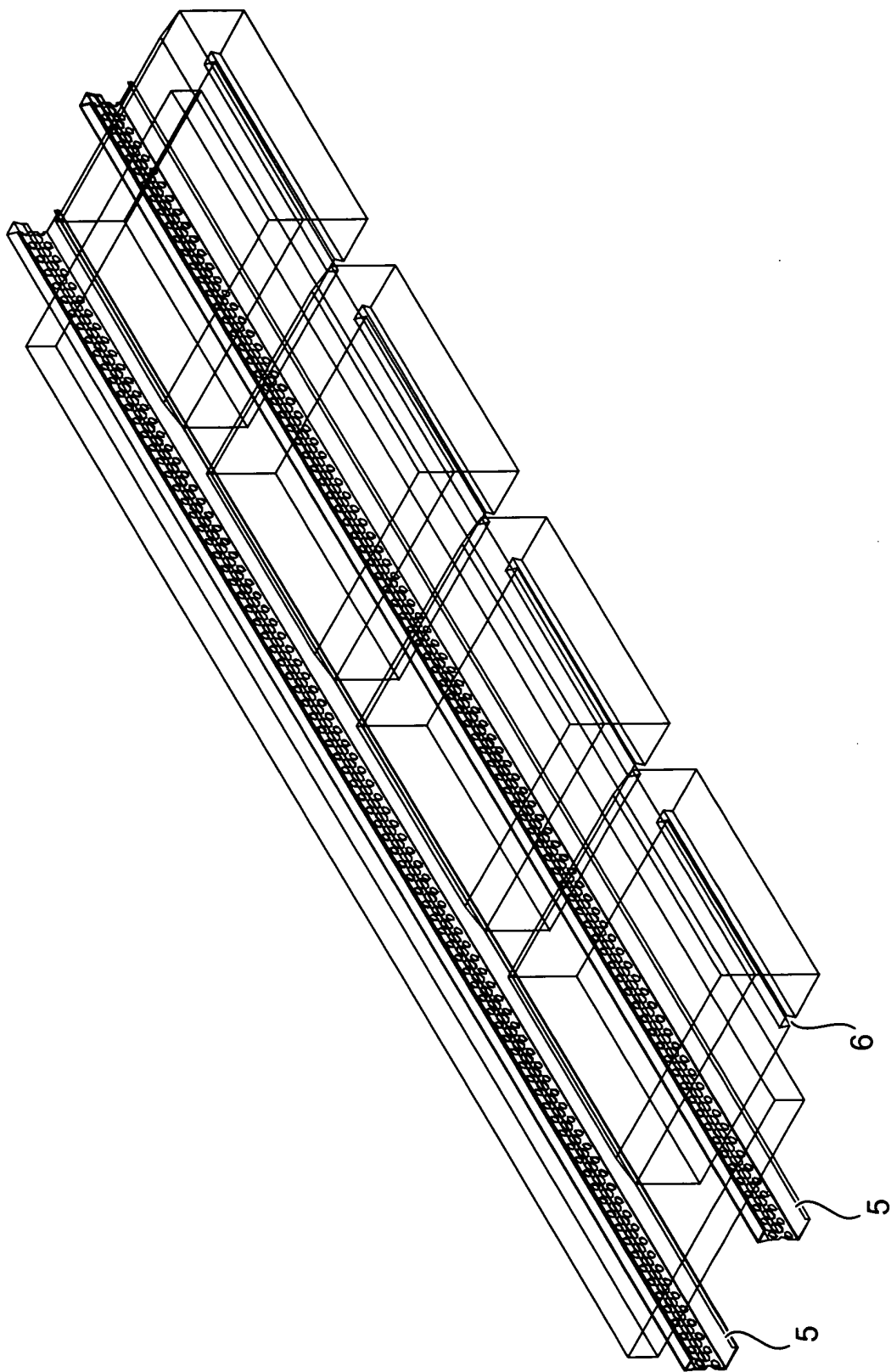


Fig. 4

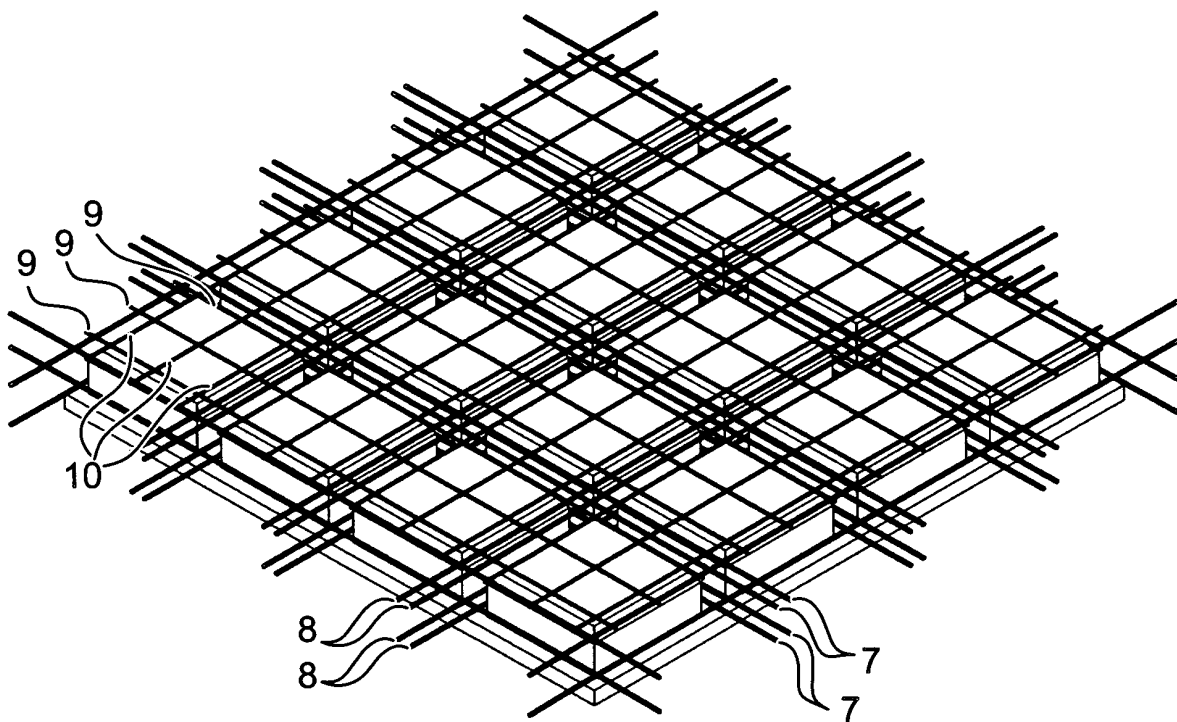


Fig. 6

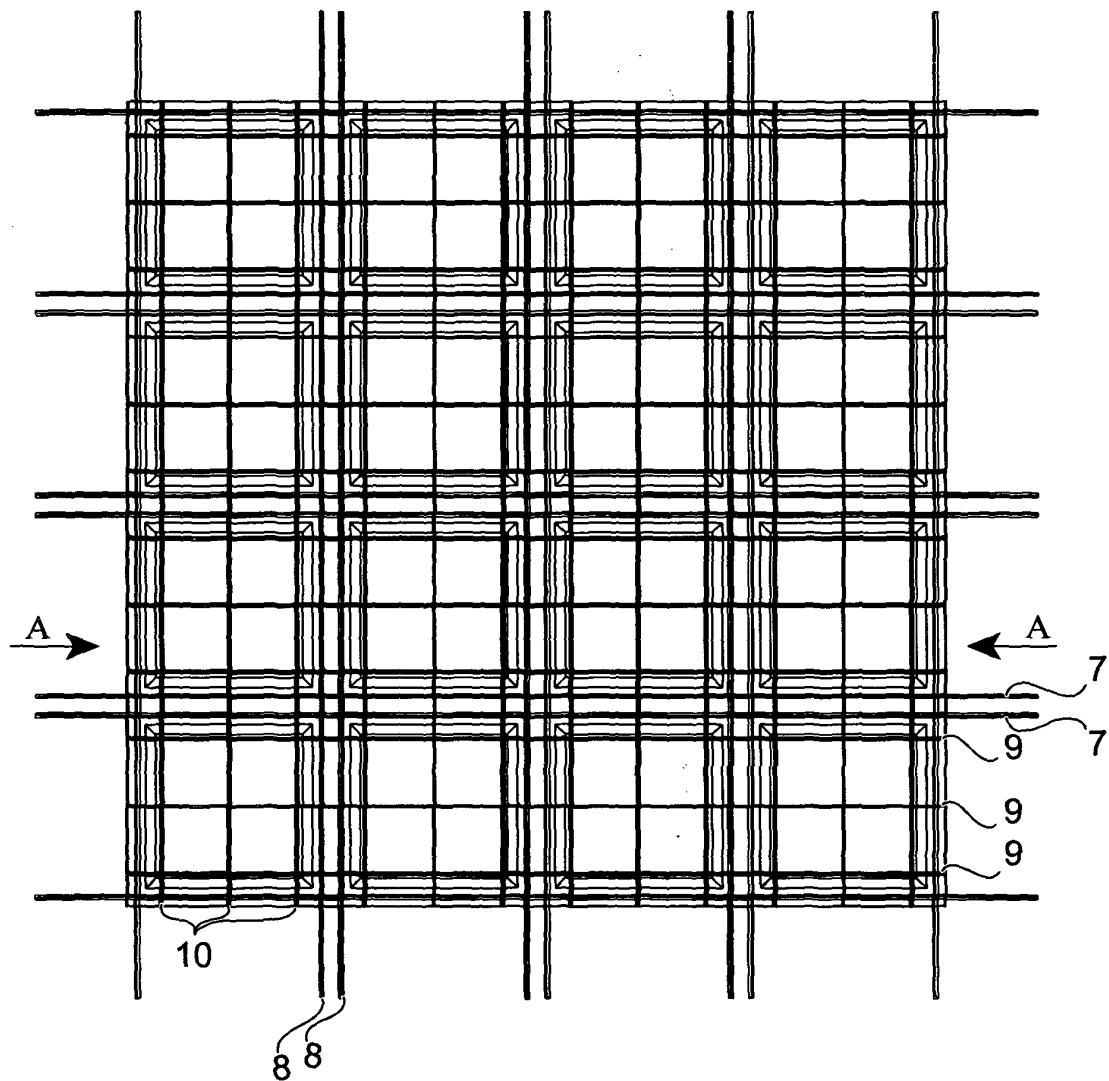


Fig. 7

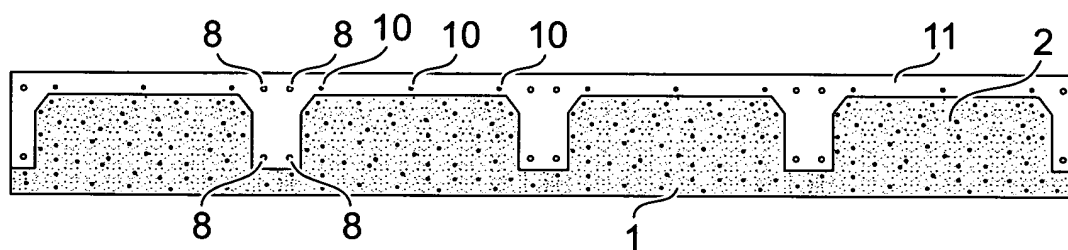
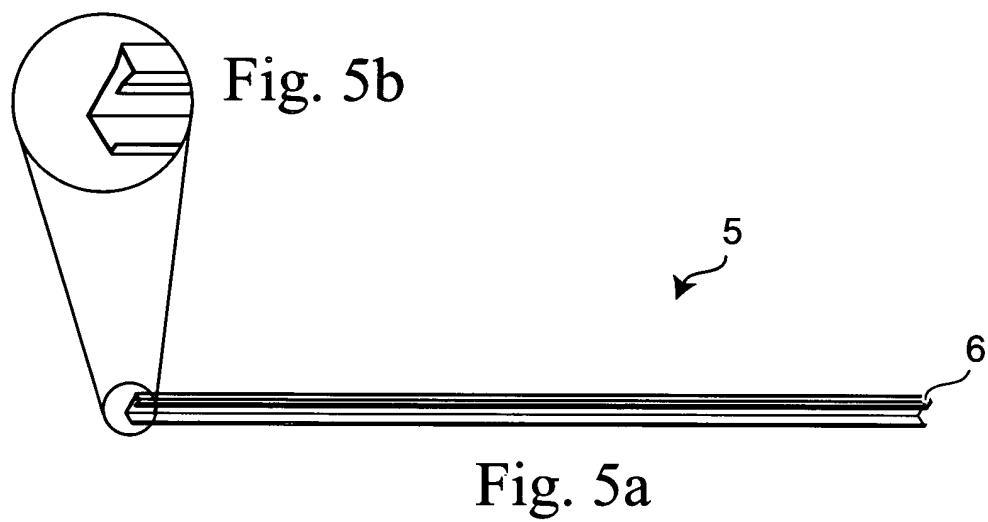


Fig. 8
Section A-A