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(71) Applicant: **PIGAZZI RETI S.r.l.**
23900 LECCO (IT)

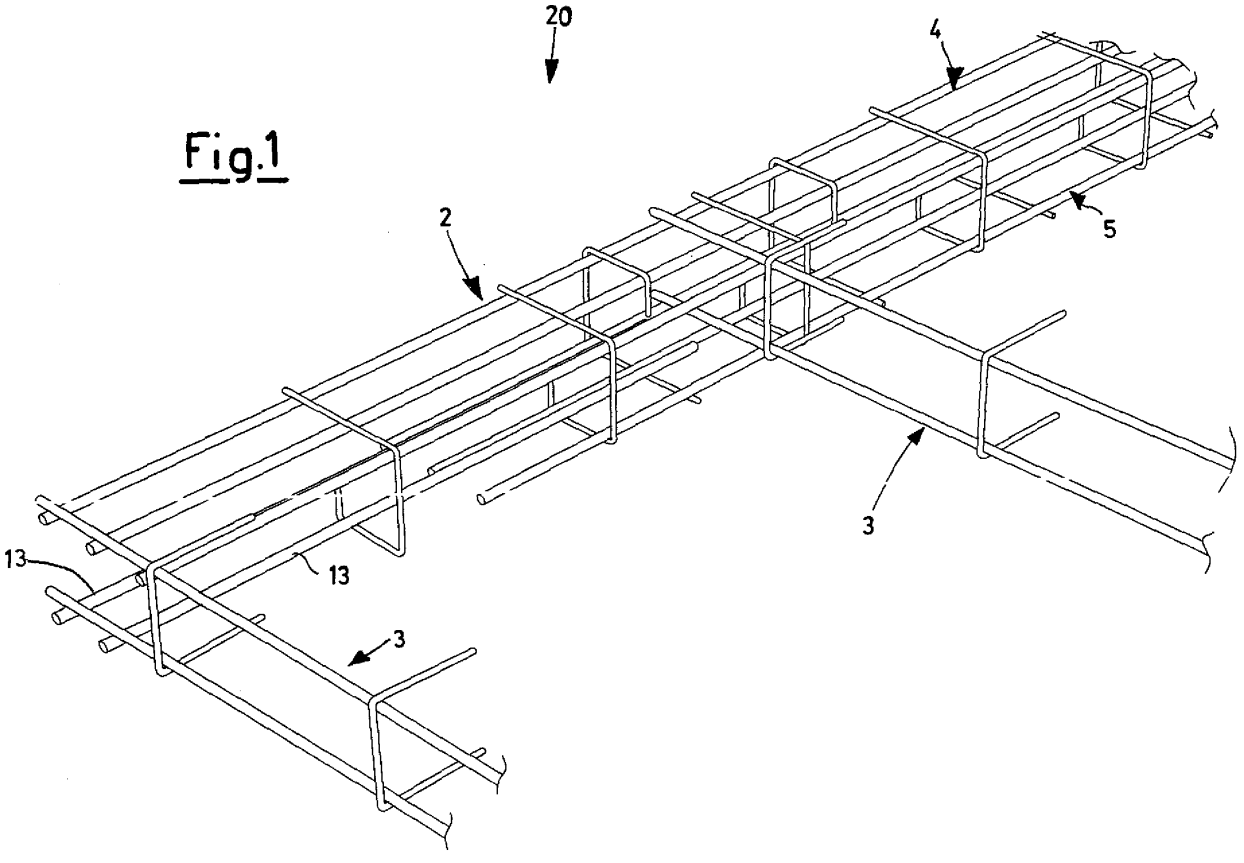
(72) Inventor: **PIGAZZI, Gianluigi Norberto**
23868, VALMADRERA (Lecco) (IT)

(74) Representative: **Martegani, Franco et al**
Franco Martegani S.r.l.
Via Carlo Alberto, 41
20052 Monza (Milano) (IT)

(54) System of electrowelded elements for the reinforcement of building products

(57) A system of electrowelded elements (100) for the reinforcement of manufactured building products in general and in particular of prefabricated panels (30) comprises a plurality of stringers (2) and cross members (3) joined together to form said reinforcement (20). According to the invention said stringers (2) comprise at least one upper half-cage (4) and at least one lower half-cage (5) coupled together so as to mutually slide to vary the length of said stringers (2) according to the prefabricated panel to be made.

Fig.1



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Description

[0001] The present invention refers to a system of electrowelded elements for the reinforcement of manufactured building products and in particular for the reinforcement of prefabricated panels.

[0002] Prefabricated buffering panels are usually made from solid concrete or else concrete in lightened form through insertion of polystyrene blocks. Both in the one case and the other the reinforcement takes place through formation of ribs in the longitudinal direction (along the edges and possibly in the middle) and in the transversal direction (at the ends and inside the panel itself according to design needs).

[0003] Such ribs are therefore made from reinforced concrete. The reinforcement consists of iron cages (round bar for reinforced concrete) that can be made to measure, a method that is fairly expensive and not very well-suited to the production times, or else through the use of premanufactured cages.

[0004] These cages consist of elements produced at a fixed length of 6 or 12 m that must be cut to size according to the size of the panel to be made.

[0005] This constructive process involves high implementation times, due to the cutting-to-size operation of the premanufactured support elements, and high material consumption as a consequence of the swarf made.

[0006] In order to reduce the material consumption it has thus been thought of to recover the off-cut swarf through jointing with superposition of crop ends. In this way, although a reduction in material consumption is obtained, an increase in production costs is generated caused by the additional connection operations of the metal elements through crop ending.

[0007] Therefore, there is a developing requirement to make elements for the reinforcement of manufactured building products in general and in particular for the reinforcement of prefabricated panels that allow the production costs and times to be reduced.

[0008] Therefore, a purpose of the present invention is that of providing electrowelded elements for the reinforcement of manufactured building products in general and in particular of prefabricated panels that do not require or, in any case, reduce to the minimum, the operations of cutting-to-size and of connection through crop ending.

[0009] Another purpose of the present invention is that of providing reinforcement elements that can be adapted to whatever size panel.

[0010] Another purpose of the present invention is that of providing reinforcement elements of manufactured building products that reduce the storage and transportation bulk and consequently the costs linked to such operations.

[0011] Another purpose of the present invention is that of providing a reinforcement element that is simple and easy to use.

[0012] In view of the aforementioned purposes, according to the present invention, it has been thought of to make a system of electrowelded elements for the reinforcement of manufactured building products in general and in particular of prefabricated panels of the type comprising elements for longitudinal reinforcement or stringers and elements for transversal reinforcement or cross members joined together to form the reinforcement, having the characteristics outlined in the attached claims.

[0013] The structural and functional characteristics of the present invention and its advantages compared to the prior art shall become even clearer from an examination of the following description, referring to the attached drawings, which show a system of electrowelded elements for the reinforcement of manufactured building products in general and in particular of prefabricated panels made according to the innovative principles of the invention itself.

[0014] In the drawings:

- Figure 1 is a schematic perspective view of a reinforcement portion made up of the system of electrowelded elements according to the present invention;
- Figure 2 is a schematic perspective view of a lower half-cage of a stringer according to the present invention;
- Figure 3 is a schematic perspective view of an upper half-cage of a stringer according to the present invention;
- Figure 4a is a perspective view of a stringer comprising an upper half-cage and a lower half-cage coupled together;
- Figure 4b is a section view of the stringer of figure 4a;
- Figure 5a is a perspective view of a first embodiment of a cross member according to the present invention;
- Figure 5b is a perspective view of a second embodiment of a cross member according to the present invention; and
- Figure 6 is a perspective view, partially in section, of a prefabricated panel having reinforcement consisting of the system of electrowelded elements according to the present invention.

[0015] With reference to the figures, and in particular to figure 1, a system of electrowelded elements suitable for forming a reinforcement 20 of manufactured building products in general and in particular of prefabricated panels is partially shown.

[0016] The reinforcement 20, in a known way, has stringers 2 and cross members 3 joined together to form the structural mesh.

[0017] Advantageously according to the present invention, each stringer 2, in other words the longitudinal unit of the reinforcement 20, comprises at least one upper half-cage 4 and at least one lower half-cage 5 coupled together.

[0018] According to a preferred aspect of the present

invention the upper half-cage 4 and the lower half-cage 5 are coupled together so as to mutually slide, in the axial direction, to vary the length of the stringer 2 itself according to the size of the prefabricated panel to be made.

[0019] In detail, the upper half-cage 4, shown in greater detail in figure 3, is coupled with the lower half-cage 5, shown in greater detail in figure 2, telescopically.

[0020] Said in another way, the upper half-cage 4 is coupled with the lower half-cage 5 so as to form a cage, which constitutes the stringer, with a rectangular section.

[0021] The two half-cages are thus joined to form a rectangular section, visible in figure 4a, but with one of the two half-cages translated with respect to the other one in the longitudinal direction of the half-cages themselves.

[0022] The translation of the two half-cages in the longitudinal direction is thus a function of the length of the stringer that one wishes to obtain - the longer the stringer, the greater the relative translation, in the longitudinal direction, of one half-cage with respect to the other will be.

[0023] For the sake of precision, it should be disclosed that, following the coupling of the upper half-cage 4 with the lower half-cage 5, the stringer has a complete rectangular section only in the central portion, whereas it has an incomplete rectangular section close to the ends.

[0024] For this reason, to complete the rectangular section of the stringer at the ends, longitudinal connection elements 13 are positioned.

[0025] The longitudinal connection elements 13 of the stringers 2 shall also be connected to the cross members 3 to form the meshes of the reinforcement 20.

[0026] In figure 2, as stated above, a lower half-cage 5 is shown formed from at least two longitudinal iron pieces 9, three in the preferred embodiment shown in the figures, and a plurality of transversal connection elements 10 spaced along the longitudinal iron pieces 9.

[0027] Each transversal connection element 10 is formed from a metal bar bent substantially into a P-shape.

[0028] In detail, the leg 23 of the "P" constitutes the support base upon which the longitudinal iron pieces 9 are pre-welded, suitably spaced, whereas the outer portion of the "curve" 24 of the "P" constitutes the support base for the two longitudinal iron pieces 7 of the upper half-cage 4.

[0029] Figure 3 shows an upper half-cage 4 formed from at least two longitudinal iron pieces 7, three in the preferred embodiment shown in the figures, and a plurality of transversal connection elements 8 spaced along the longitudinal iron pieces 7.

[0030] Also in this case, each transversal connection element 8, like each transversal connection element 10, is formed from a metal bar bent substantially into a P-shape.

[0031] In detail, the leg 23 of the "P" constitutes the support base upon which the longitudinal iron pieces 7 that constitute the upper half-cage 4 are pre-welded, suitably spaced, whereas the outer portion of the "curve" 24 of the "P" constitutes the support base suitably foreseen for the positioning of the two longitudinal iron pieces 9 of the lower half-cage 5.

[0032] Figure 5a shows a first embodiment of a cross member 3, in other words a transversal unit of the reinforcement 20.

[0033] In detail, the cross members 3, produced with a standard length and cut to size in the use step, comprise at least two transversal iron pieces 11 and at least two connection elements 12 arranged spaced apart along the two transversal iron pieces 11.

[0034] The connection elements 12 comprise at least one iron piece bent into a C-shape able to be welded to the transversal iron pieces 11.

[0035] Figure 5b shows another embodiment of the cross members 3 totally similar to the one illustrated in figure 5a apart from the fact that the connection elements 12 are formed from at least one pin-shaped iron piece able to be welded to the transversal iron pieces 11.

[0036] As stated previously, the system of electrowelded elements according to the present invention forms a reinforcement for a prefabricated panel 30.

[0037] For such a purpose, figure 6 shows an embodiment of a prefabricated panel 30 comprising a reinforcement 20 formed from the system of electrowelded elements according to the present invention.

[0038] The panel 30 thus has a reinforcement 20 made up of cross members 3 and stringers 2, joined together to form the meshes or cage of the reinforcement, the lightening-filling panels (polystyrene or other) 17, positioned between the meshes of the reinforcement 20, and finally an inert material 18, such as concrete, with binder function.

[0039] From what has been described above with reference to the figures, it is clear how a system of electrowelded elements for the reinforcement of a prefabricated panel according to the invention is particularly useful and advantageous. The purpose mentioned in the preamble of the description are thus achieved.

[0040] The technical basis of the invention specifically concerns the system for the reinforcement of horizontal panels, i.e. those panels that are mounted on specific supports inserted in the pillars and arranged, indeed, horizontally with respect to the structure.

[0041] For these panels the development of the reinforcement requirement reaches maximums at lifting hooks and the middle section, whereas in the zones near to the supports the need for reinforcement is substantially reduced, to such a degree that it is possible to halve the area of the steel (resistant section).

[0042] Consequently, in that point it suffices to use a half-cage with a suitable integration through addition of a crop end.

[0043] The half-cages shall be produced in a series of fixed lengths and with a range of diameters that shall allow the panels to be covered whatever their size.

[0044] Although in the present description application to prefabricated panels has been illustrated in greater detail, it should in any case be understood that the

present invention can have different applications. The system of electrowelded elements for the reinforcement of manufactured building products according to the present invention can, indeed, be applied, independently of the telescopic effect, in a vast range of cases of reinforced seaming, both in civil engineering and in other reinforcement cement works.

[0045] Of course, the shapes of the invention can be different to those shown just as a non-limiting example in the drawings, just as the materials can also be different.

[0046] The scope of protection of the invention is therefore defined by the attached claims.

Claims

1. System of electrowelded elements (100) for the reinforcement of manufactured building products and in particular of prefabricated panels (30) of the type comprising a plurality of stringers (2) and cross members (3) joined together to form said reinforcement (20), **characterised in that** said stringers (2) comprise at least one upper half-cage (4) and at least one lower half-cage (5) coupled together.

2. System (100) according to claim 1, **characterised in that** said at least one upper half-cage (4) and said at least one lower half-cage (5) are coupled so as to mutually slide to vary the length of said stringers (2) according to the prefabricated panel to be made.

3. System (100) according to claim 2, **characterised in that** said half-cages (4, 5) can be coupled in an axially telescopic manner.

4. System (100) according to claim 1, **characterised in that** said upper half-cage (4) comprises at least two upper longitudinal iron pieces (7) and at least two transversal connection elements (8) arranged spaced apart along the two upper longitudinal iron pieces (7).

5. System (100) according to any one of the previous claims, **characterised in that** said lower half-cage (5) comprises at least two lower longitudinal iron pieces (9) and at least two connection elements (10) arranged spaced apart along said at least two lower longitudinal iron pieces (9).

6. System according to any one of the previous claims, **characterised in that** said connection elements (8, 10) comprise a bent iron piece able to be welded to the longitudinal iron pieces (7, 9).

7. System according to any one of the previous claims, **characterised in that** said cross members (3) comprise at least two transversal iron pieces (11) and at least two connection elements (12) arranged spaced apart along the two transversal iron pieces (11).

8. System according to claim 7, **characterised in that** said connection elements (12) comprise at least one iron piece bent into a C-shape able to be welded to said transversal iron pieces (11).

9. System according to claim 7, **characterised in that** said connection elements (12) comprise at least one pin-shaped iron piece able to be welded to said transversal iron pieces (11).

10. System according to any one of the previous claims, **characterised in that** said stringers (2) comprise longitudinal connection elements (13) with said cross members (3).

11. Prefabricated panel (30) comprising at least one reinforcement (20) made up of a system of electrowelded elements according to any one of the previous claims from 1 to 10, comprising filling panels (17), arranged between the meshes of said reinforcement (20) and of the binder material (18).

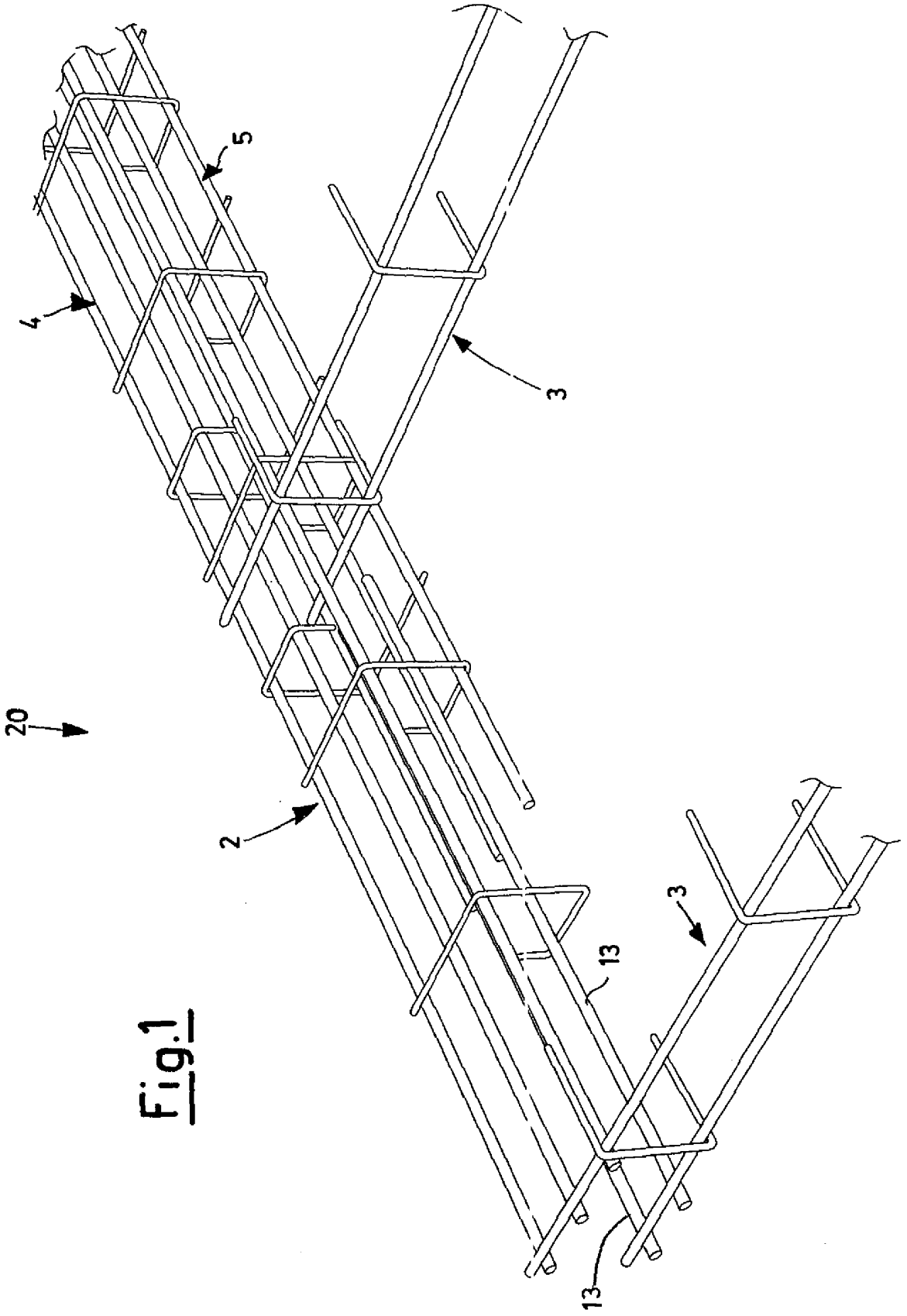


Fig.1

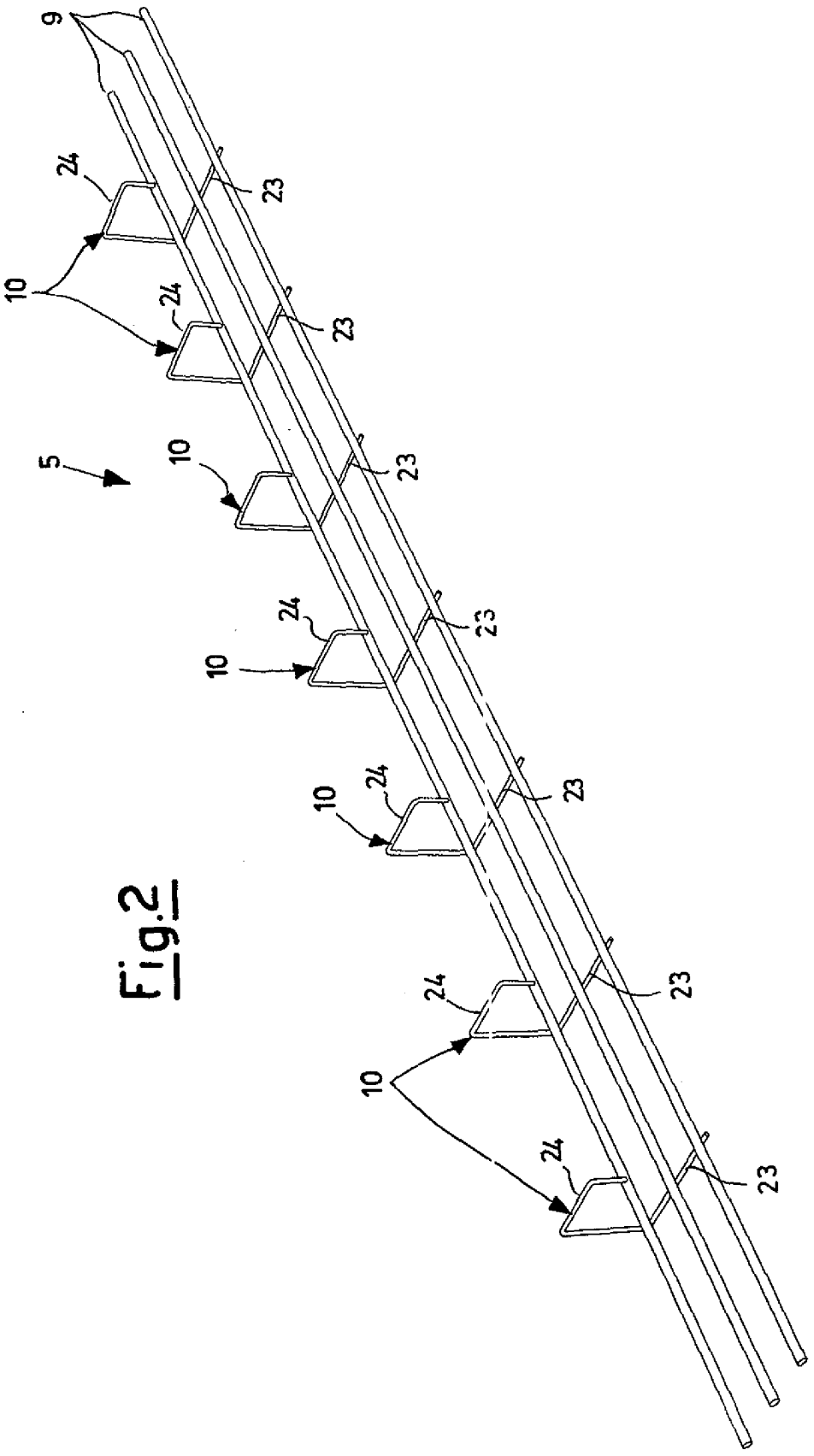


Fig.2

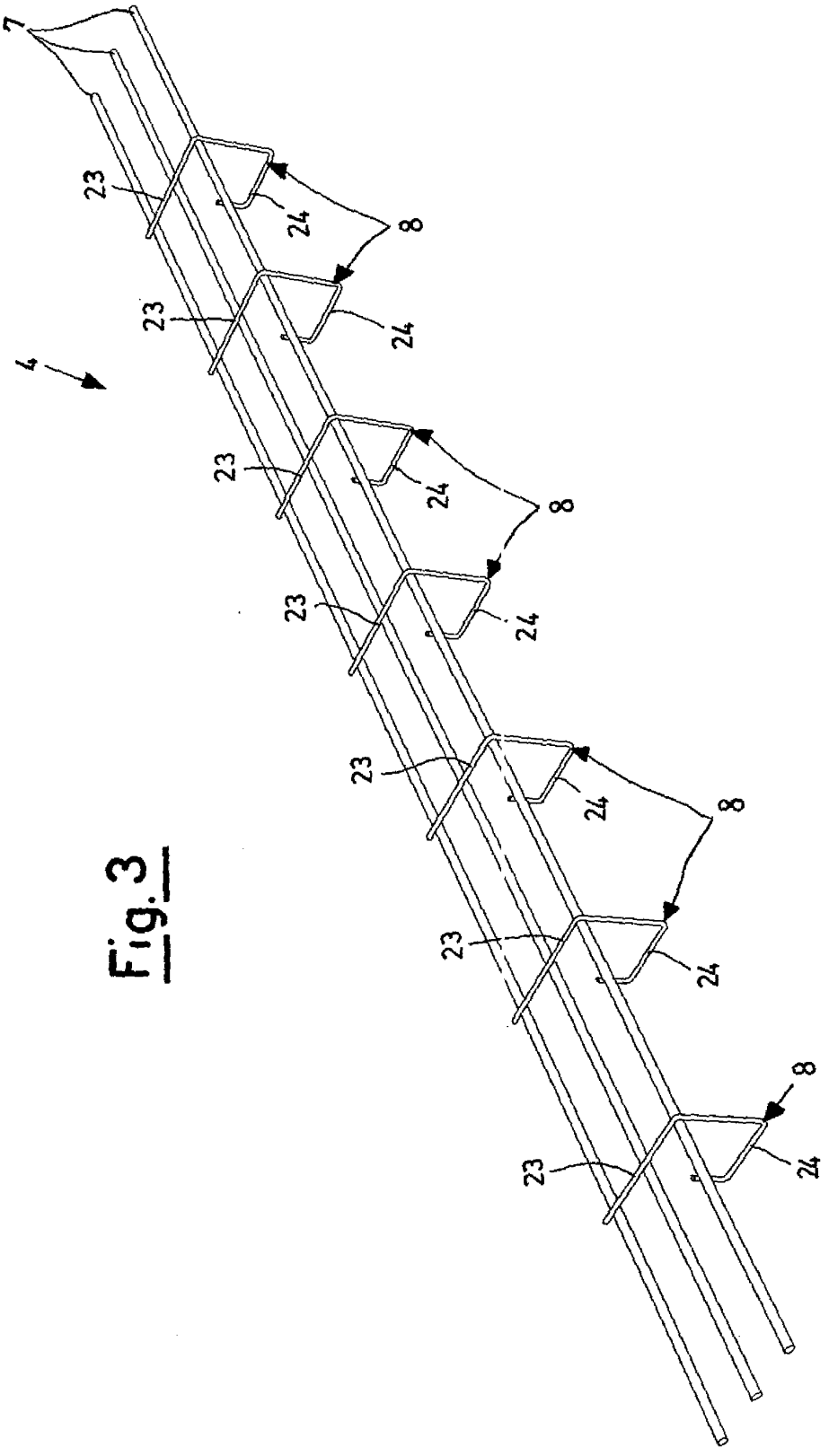


Fig.3

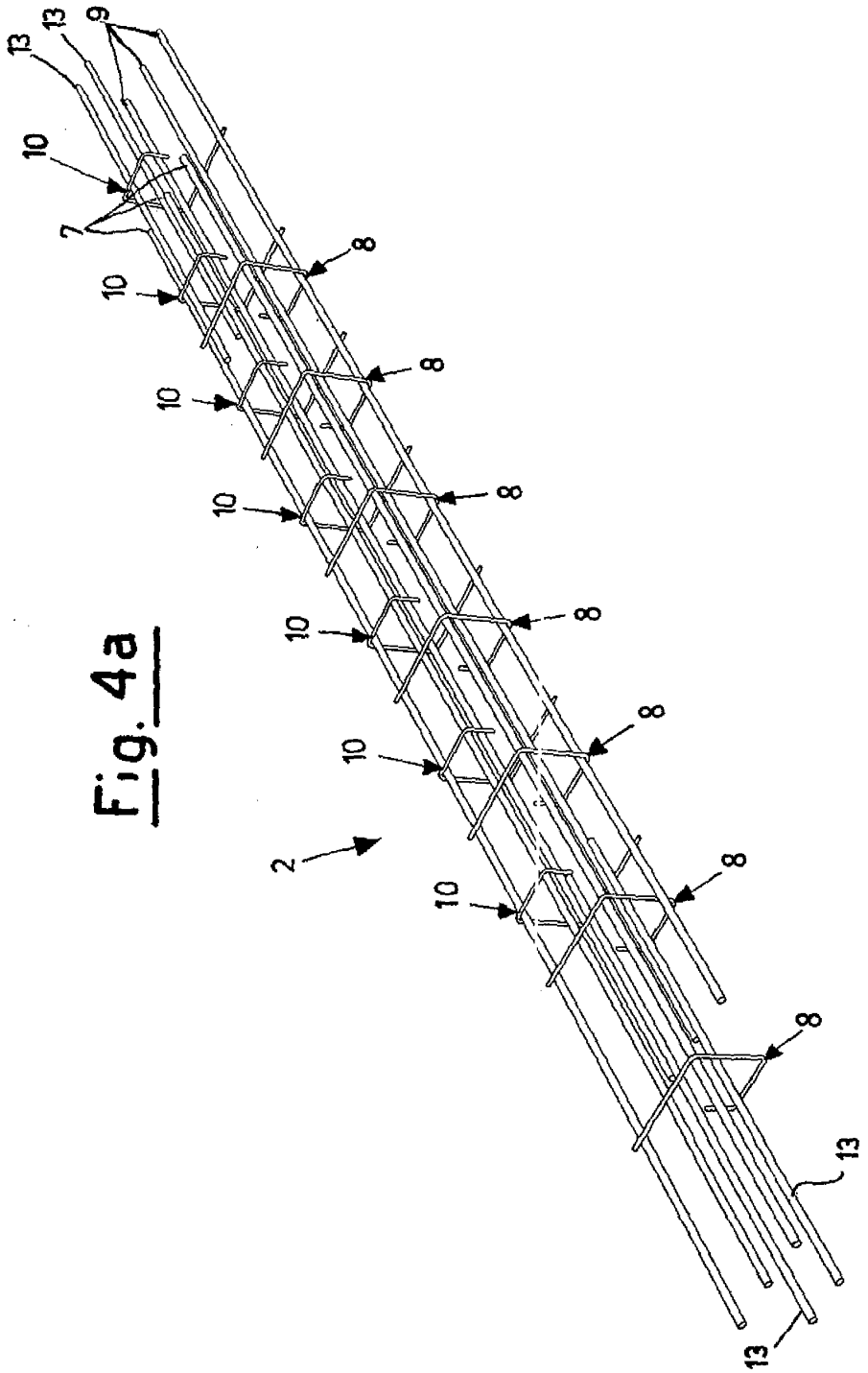
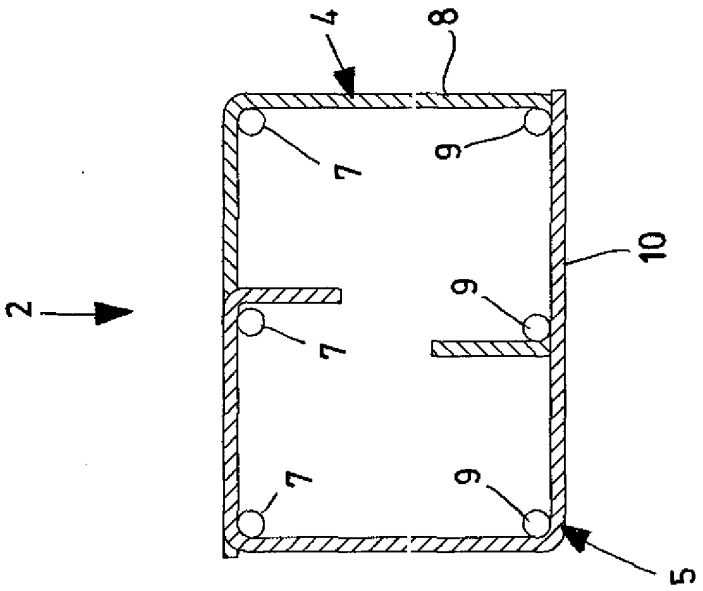


Fig. 4a

Fig.4b



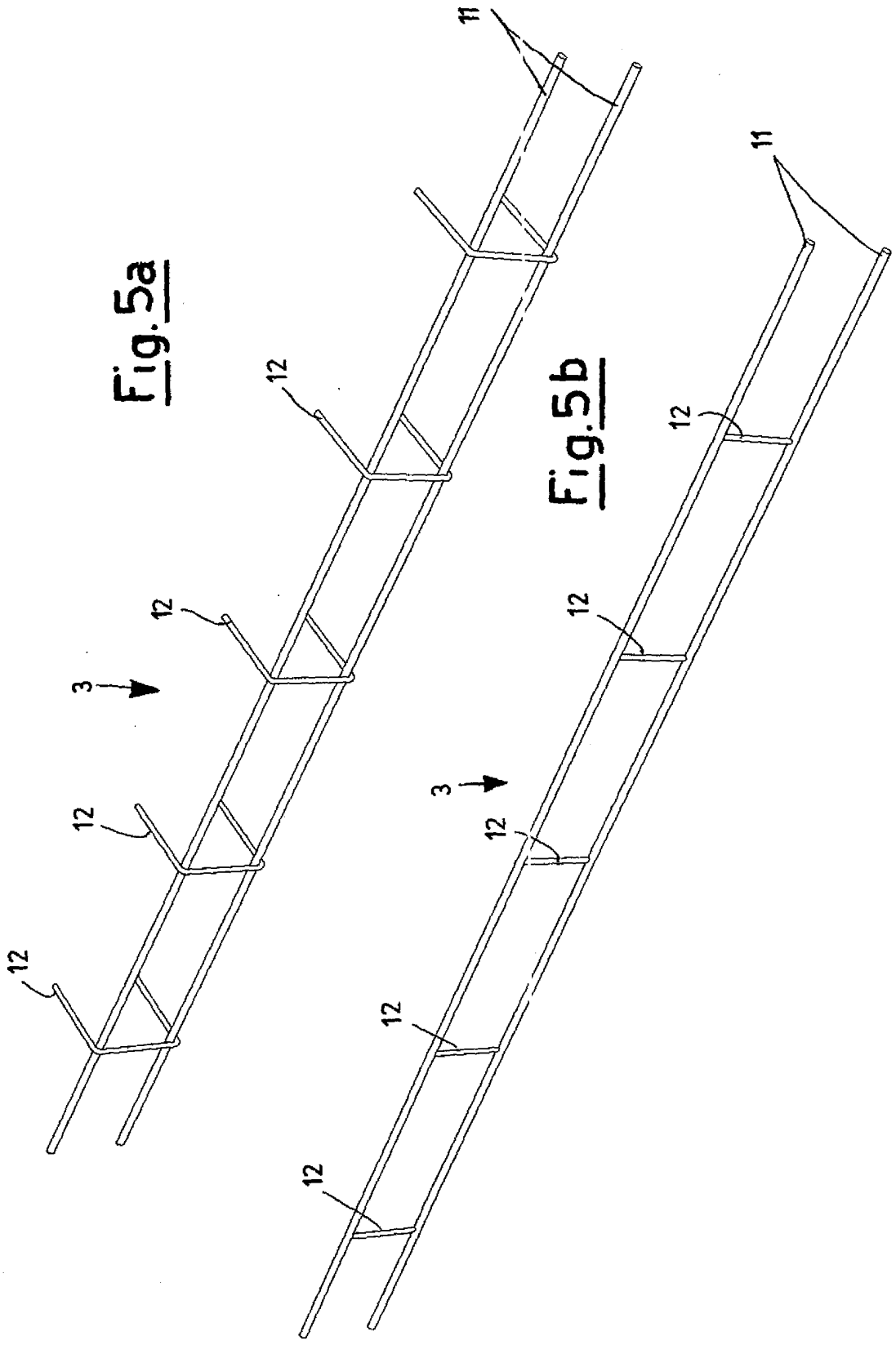

11
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Fig.5a
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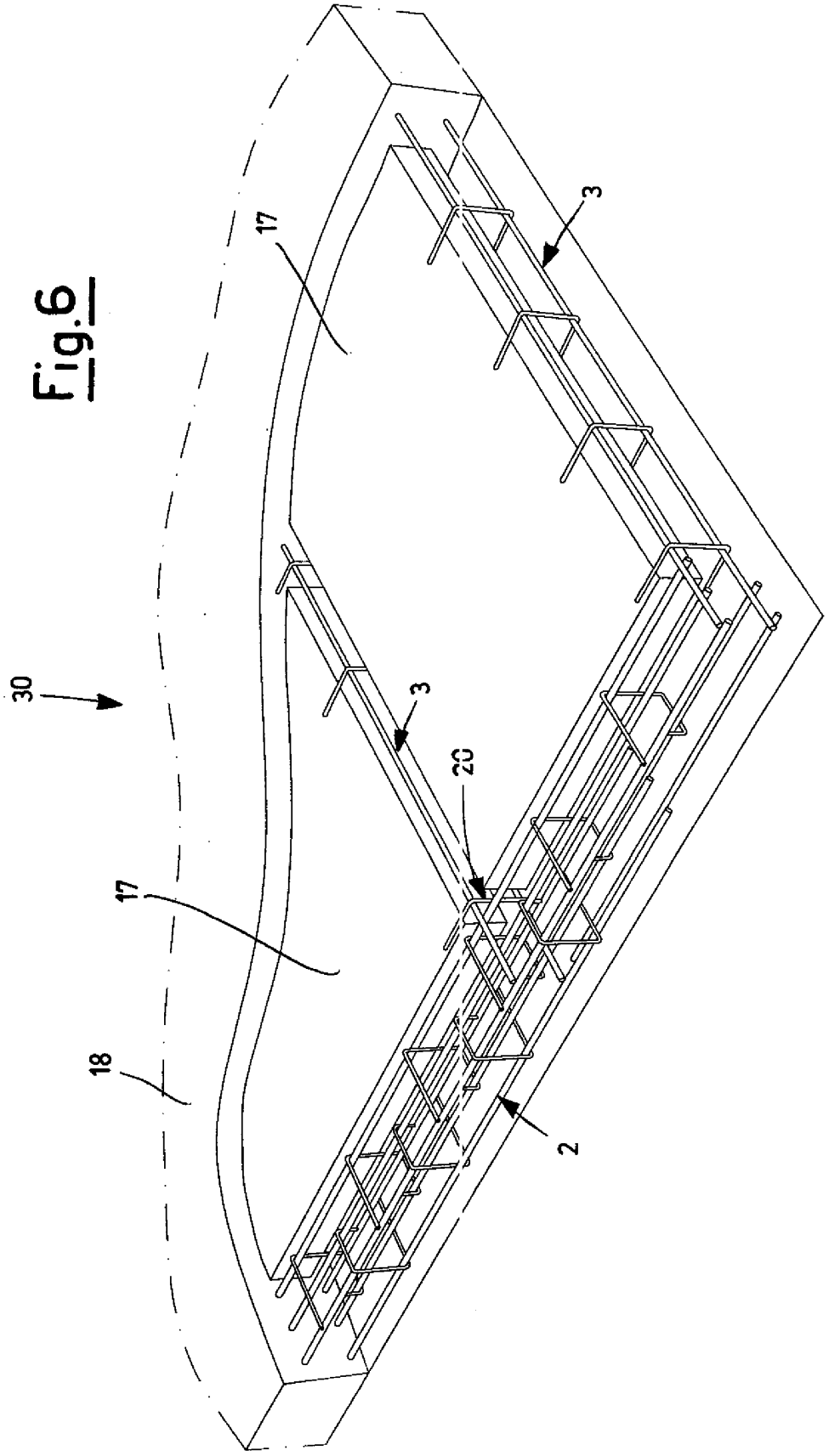
Fig.5b

Fig.6



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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 5874

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E04C
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 September 2005	Rosborough, J

CATEGORY OF CITED DOCUMENTS

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